ORGANIZATION: GENERAL ELECTRIC COMPANY
NUCLEAR ENERGY BUSINESS OPERATIONS
SAN JOSE, CALIFORNIA

REPORT NO.: 99900403/84-04	INSPECTION DATES(S) 10/15-19/84	INSPECTION ON-SITE-HOURS 244

CORRESPONDENCE ADDRESS: General Electric Company
Nuclear Energy Business Operations
ATTN: W. H. Bruggeman, Vice President & General Manager
175 Curtner Avenue
San Jose, California 95125

ORGANIZATIONAL CONTACT: Mr. J. J. Fox, Senior Program Manager
TELEPHONE NUMBER: (408) 925-6195

PRINCIPAL PRODUCT: Nuclear steam system, services and fuel.

NUCLEAR INDUSTRY ACTIVITY: General Electric Company (GE), Nuclear Energy Business Operations (NEBO), has a work force of approximately 6,500 people assigned to domestic power plant activity.

ASSIGNED INSPECTOR: John W Craig for
P. Sears, Special Projects Inspection Section — 4/25/85 Date

OTHER INSPECTOR(S): O. Gormley, NRC; R. McIntyre, NRC; D. Hill, EG&G; R. Hanson, EG&G; W. Shier, BNL; G. Parker, EG&G; E. Harris, EG&G

APPROVED BY: John W Craig
John W.Craig, Chief, SPIS, VPB — 4/25/85 Date

INSPECTION BASES AND SCOPE:

A. BASES: GE Topical Report No. NEDO-11209-04A and 10 CFR Part 21.

B. SCOPE:

1. Status of previous inspection findings.

2. Validation/verification of General Electric's (GE's) plant transient computer codes and structural computer codes used at GE.

(continued next page)

PLANT SITE APPLICABILITY: Multiple plant applicability (BWRs)

3. GE's computer code error handling.

4. GE's Potentially Reportable Condition files.

5. Various reactive items as listed in this report.

A. VIOLATIONS

None

B. NONCONFORMANCES:

1. Contrary to GE Quality Assurance Topical Report NEDO-11209, Rev. 4 Section 3.12, "Design Change Control," Engineering Operating Procedures (EOP)40-3.00 "Engineering Computer Programs" (ECPs), does not require that Control Components (responsible engineers for ECP's) define other design documents affected by computer code changes or errors, or coordinate these changes with other responsible engineers whose documents are affected. Further, Section 4.1 of the same procedure (EOP 40-3.00) does not require that the Control Component interface with responsible engineers affected by a computer code error, and assess effects of computer code errors on designs, past and present.

2. Contrary to EOP 40-3.00, "Engineering Computer Programs," the Design Record File (DRF) for the CRNC-04 computer code (No. A00-01619) did not include all of the code testing specified in the Software System Specification.

3. Contrary to EOP 42-6.00, " Independent Design Verification," The verification of calculations described in GE Topical Report NEDE-25518 was not completed until after issuance of the report.

4. Contrary to EOP 42-10.00, "Design Records Files," the DRF for the PANACEA Core Design System (No. 670-0005) did not always identify the originator, reviewer, or date performed.

5. Contrary to Section 3.10 of the QA topical report NEDO-21109-04A, application of the SAP4G07 code was not fully verified in the following areas:

   a. Two options of the beam element (fixed end forces and shear deformation analysis) and one option of the pipe element (the ASME code analysis) had no verification provided.

b. One nodal point option (slaved degrees of freedom) and one option of the beam element (released degrees of freedom) had verification for the latest version only. However, an earlier version of the SAP4GO7 code (which is a Level 3 program), is still available for use on safety-related designs.

6. Contrary to EOP 42-6.00, the method from which analytical results were obtained in the SAP4GO7 computer program verification problems 4.1, 4.2, 5.1, 8.1, and 14 was not referenced, nor were any hand calculations included.

7. Contrary to EOP 40-3.00, "Engineering Computer Programs," users are reporting potential computer code errors verbally to the responsible engineer without the required documentation.

C. UNRESOLVED ITEMS

1. Potentially Reportable Condition File (PRC) 84-30, "Errors in the RVRIZO2 Engineering Computer Program," deals with errors that were identified in the RVRIZO2 code following its use in safety-related calculations for containment system design. GE has corrected these errors, implemented additional code modifications, and reevaluated the analyses. The results indicate that the previous calculations were conservative for the MARK I containment system. However, GE has supplied this code to utilities and architect engineers who may have used it for Mark I, II, or III containment system calculations. Thus, these potential code users external to GE are being notified by GE of the code errors. In addition, a report in the PRC File (dated October 8, 1984) indicated that the code has been designated as Level 2 (approved for design applications) since 1977 and may have been used in other safety-related analyses such as piping design. Thus, a review of all uses of RVRIZO2 is being performed by GE to insure that all safety-related code applications have been identified and evaluated.

   The modified version RVRIZO2 (designated as REFIX) has been the subject of a Design Review but has not been approved as a Level 2 code. The Design Team had several observations regarding further development and verification prior to Level 2 approval and noted that "REFIX" is not qualified for design applications but only for "general design assessment." Thus, a review of the uses of the code should be performed to insure that it has not been used beyond the current level of qualification.

   This item will be covered in a future inspection.

D. STATUS OF PREVIOUS INSPECTION FINDINGS

1. (Open) Nonconformance (84-02): Contrary to Engineering Operating Procedure (EOP) 42-10.00, Section 4.2.d.4, concerning Design Record Files (DRF's), the DRF's that supported the verification of computer calculations for SAFER02 computer code (DRF's No. A00-01249, A00-1320, and E00-137) did not identify the reviewer and date when performed. In addition, the calculations did not always identify the originator and date performed.

   The DRF's supporting the verification calculations for the SAFER02 computer code (DRF's No. A00-01249, A00-1320, and E00-137) were not updated prior to this inspection. However, two actions have been taken by GE to prevent recurrence of this type of nonconformance: (1) the Manager, Core and Fuel Technology, has issued a letter to all engineers responsible for engineering computer programs reiterating the DRF requirements for verification calculations; and (2) Quality Assurance Newsletter (dated August 1984) has been issued to all engineers and managers that includes a "DRF Closeout Checklist" with reminders about signing and dating DRF entries. This item will be the subject of a future inspection at GE.

2. (Closed) Nonconformance (84-02): Contrary to EOP 40-3.00, Section 4.3.B.1., concerning generating and maintaining the DRF, the DRF for the computer code SAFER02 did not contain a completed user's manual.

   A review of the SAFER02 DRF (No. A00-1716) indicated that a missing reference to the User's Manual (NEDE-30463) is now included in the DRF, thus satisfying the requirements of EOP 40-3.00.

3. (Open) Nonconformances (84-02): Contrary to EOP 42-1.00, Section 3.3.2, regarding design control, no documentation was available for the analyses described in GE topical reports NEDE 23785-1-P, Vol. II, and NEDE-24984. These topical reports were submitted to the Office of Nuclear Reactor Regulation for review.

   This nonconformance concerns the need for DRF supporting topical reports that describe the analytical methods used in safety-related computer codes. In particular, no DRF's are available for two topical reports related to computer codes: NEDE-23785-1-P (SAFER02 Code) and NEDE-24984 (ODYN04 Code). GE has stated that these topicals are not design documents; however, since these codes are used in the design process, documentation similar to that provided for design application analyses should be provided. This item will be the subject of a future inspection at GE.

4. (Closed) Nonconformance (84-02): Contrary to GE Topical Report NEDO-11209, Section 3.12, concerning design change control, error reports affecting the ODYN computer code were not formally distributed to all user groups. A responsible engineer had used ODYN for a safety-related calculation, but was not notified of an error that was discovered after completion of a licensing analysis.

   This nonconformance is related to the procedure for transmitting computer code errors to all responsible engineers affected by the error. The particular code error involved in this nonconformance affected the use of the ODYNM04C Code. GE has stated that a responsible engineer was mistaken when he indicated to the NRC Inspector that he had applied the OYDNM04C Code without knowledge of an error that existed in the code. A review of the DRF's associated with these analyses showed that the ODYN02 Code had actually been used. In addition, it was stated that the ODYN04 Code was never used in this Component. The Manager of Core and Fuel Technology has issued a letter to NEBO managers emphasizing the importance of communicating error reports. However, the issue concerning the mechanism of error report transmittal is not resolved (See Section B.1 above).

5. (Closed) Nonconformance (84-02): Contrary to Quality Control Instruction 7.2.17, Revision 12, Paragraph 3.4.1, regarding information to be included in an audit report, the GE auditor did not include the required evaluation statement regarding the effectiveness of the quality assurance program elements which were audited in the Brown Boveri, Inc. quality assurance audit report dated 2/3/84.

   The Inspector verified that the GE letter of 9/7/84 (referenced in GE audit response dated 9/24/84) was on file and had been sent to GE auditors. Two audits had been completed and filed between 9/7/84 and the time of inspection, and both audit files were reviewed by the inspector. One audit file contained a conclusion statement that considered Brown Boveri, Inc. an acceptable supplier; the other contained a conclusion statement indicating that the QA program was being implemented in a satisfactory manner. Both phrases indicate that the supplier is satisfactorily implementing a QA program. This item is considered closed.

6. (Closed) Nonconformance (84-01): Contrary to Section 9 of GE Topical Report NEDO-11209-04A, Revision 4, GE did not assure that pipe bending done at a vendor's facility was accomplished by qualified personnel, nor did GE assure that the pipe bending was accomplished using a qualified procedure for the pipe bend rate, heating, and annealing.

GE now verifies by QA surveillance the following:

a. The vendor's procedures are being implemented by which operators are being qualified by on-the-job training and records are being kept to confirm the qualifications.
b. The pipe bending process is now controlled as a special process.
c. The vendor's present QA program is acceptable.

Trip reports were presented to the NRC inspector verifying the aforementioned. This item is considered closed.

7. (Closed) Unresolved Item (84-01): GE's remedial actions concerning crack/indications in replacement recirculation piping shipped to the Hatch nuclear power plant were reviewed during the 99900403/84-01 inspection. GE reported that fourteen 12" risers were penetrant tested at Hatch by GE personnel after receipt and were determined to have indications. These risers had been tested using a die penetrant examination and were passed at a GE subcontractor's facility.

   GE's actions concerning the replacement recirculation piping were reviewed during this inspection and during GE's inspection of the subcontractor. There were no adverse findings and this item is considered closed.

8. (Closed) Unresolved Item (84-01): Representative samples of preloaded (stiff) pipe clamp applications were selected for analysis by an NRC consultant to examine their effects on piping. The stresses induced in the pipe by the clamps were calculated. Those stresses included thermal, preload, and dynamic stresses in areas in the pipe under or near the clamps. The object of the analysis was to determine if the total stresses are within ASME code allowables. Based upon this analysis the piping systems reviewed satisfy the ASME Code. This item is considered closed.

E. OTHER FINDINGS OR COMMENTS

1. Thermohydraulic Computer Codes

   During this inspection, the development and verification of three GE thermohydraulic computer codes (REDY06, PANAC06, and CRNC04) were reviewed. In addition, the Potentially Reportable Condition (PRC) file was surveyed for items pertaining to thermohydraulic code applications. Throughout the inspection, GE Quality Assurance Topical Report NEDO-11209 and the "Boiling Water Reactor Engineering Operating Procedures" (EOP) were reviewed and utilized. The findings and observations are summarized in the following sections.

a. REDY Computer Code: The REDY Code is used to simulate the transient behavior of a BWR system during various operational and accident conditions. During this inspection, the version of the code designated as REDY06 was reviewed and the comments are described below.

i. The responsible engineer for REDY06 stated that the code is used by approximately 20 engineers most of whom work in the same Component (Plant Transient Performance Engineering). REDY06 is also used in anticipated transients without scram (ATWS) analyses for new designs but it is not used in any reload applications.

ii. REDY06 is a consolidation of features included in several previous versions of the code. Some of the more significant models implemented in REDY06 include: an eight node steamline representation, an extended downcomer bulkwater model, a safety/relief valve model obtained from the SAFE Code, and a boron reactivity model.

iii. It was stated that REDY06 has been classified as a Level 2 code since 1980 and no errors have been reported.

iv. The review of the DRF for REDY06 (DRF NO. A00-593) indicated that the code verification relied on comparisons with calculations obtained from other codes. Six calculations were performed with models representing operating reactors: four were compared with ODYN02 results, one compared with REDY05, and one compared with REDY03. In each case, the outputs were compared and the major differences in the results were explained.

v. The Engineering Computer Program Abstract for REDY06 discusses restrictions on the use of the code. In particular, for non-ATWS analyses, the code is restricted to simulating events that do not involve significant vessel pressure and power increases. For ATWS calculations, REDY06 can only be used after comparison calculations are preformed with DDYN02. The DRF supporting an application of REDY06 in an ATWS analysis (DRF No. A13-00179) was reviewed and indicated that a comparison had been performed between ODYN02, REDY03, REDY06. The results indicated that REDY06 calculated higher (conservative) peak neutron power, heat flux, and steam dome pressure than the other two codes.

vi. GE Topical Report NEDE-25518 describing an application of REDY06 in an ATWS analysis for Perry Units 1 and 2 was reviewed. The DRF supporting this analysis (No. A13-00141) provided a reasonably complete description of the calculations; however, in some cases, the independent review was dated after the issuance of the report.

vii. The DRF supporting the basedeck used for the ATWS calculations described in NEDE-25518 was reviewed. This DRF described the model input changes implemented for the analysis and identified the responsible engineer and the independent reviewer.

There was one nonconformance (See Section B.3) identified during this part of the inspection.

b. PANACEA Computer Code: PANACEA is a three-dimensional coupled nuclear thermal-hydraulic computer code used for the steady state analysis of BWR core designs. The current version approved for safety-related calculations is designated as PANAC06/PANAC06C. The code calculations are also used as input for safety-related analyses performed with other codes (e.g., ODYN). The results of the review of the verification and application of PANACEA are described below.

i. The responsible engineer for PANACEA stated that approximately 100 people from four different Components use the code on either of two computer systems. The code is checked for consistency on both computers by comparing the results of a number of test cases. The large usage of the code was confirmed by reviewing a computer usage summary for a previous month that indicated that PANAC06 was accessed more than 1700 times.

ii. PANAC06 has been created from a previous version of the code and includes some modelling improvements, editing additions, and minor error corrections. A review of the DRF indicated that more than 150 test cases are run and compared with the results produced by a previous code version. Some of these test cases include comparison with actual plant data.

iii. It was stated that PANAC06 includes a new methodology identified as the "New Physics" models; this will be the subject of a separate verification program and is not currently used for safety-related calculations.

iv. The DRF's for two applications of PANAC06 (No. L11-00226 and No. L12-00608) were reviewed. Each contained a reasonably complete description of the analyses performed and were independently verified.

v. GE Nuclear Engineering Technical Procedure 384HA872, "Preparation of 3D Code For Initial Core Analysis" was reviewed. This procedure provides methods and examples to be used in the preparations of data for entry into the GEBALS PANACEA libraries. In addition, approved sources of the input parameters are identified.

vi. The DRF supporting the current PANACEA data base was reviewed. The input data for all except one of the specified plants was identified. It was stated that the remaining data was identical to several of the existing data bases. However, an independent verification was not indicated for all of the data base entries.

There was one nonconformance (B.4) identified during this part of the inspection.

c. CRNC Computer Code: The CRNC program is used as interface between the 3-D BWR core simulator code (PANACEA) and the 1-D core transient code (ODYN). The code collapses various neutronic parameters to one dimension in a format appropriate for use in the 1D codes. CRNC-04 is the current version approved for Level 2 use. Comments on the development and verification of the code are described below.

i. The DRF for CRNC-04 (NO A00-01619) was reviewed. This provided a complete description of the methodology implemented in the code and the verification program. However, the Software Requirements Specification (SRS) stated that CRNC-04 would be tested by comparing the code results with a hand calculation for a small core problem. The results of this test case were not available in the DRF and it was stated that the calculation was not performed.

ii. The verification program for CRNC-04 was reviewed and it was determined that only comparison calculations with a previous version of the code were performed. It was stated that this provided verification of only the changes implemented in the new version and not the complete methodology implemented in the various code versions. However, a detailed review of the DRF's for earlier code versions showed that the original code (CRNC-01) was verified against hand calculations for a simplified core test case.

There was one nonconformance (B.2) identified during this part of the inspection.

d. RVR1ZO2 Computer Code Errors: The Potentially Reportable Condition Files (PRC) were reviewed to determine if only items related to computer code errors had been entered and evaluated. A recent PRC, designated as 84-30, was identified. This PRC deals with errors that were discovered in the RVRIZO2 computer code that is used by GE in containment system and piping design calculations. RVRIZO2 has been approved for Level 2 applications (safety-related calculations) since 1977. The application identified in this PRC relates to the use of the code for sizing of safety relief valve discharge line vacuum breakers and the determination of timing requirements between safety relief valve actuations. Analyses, identified in the PRC file as being performed by GE, have been for the Mark I containment design. However, GE has released the code to utilities and architect engineers who may have used the code for other applications. It was stated in the PRC file that Mark I utilities have been notified of the errors; however, Mark II and III utilities have not yet been identified and notified. In addition, since the code had been designated Level 2 since 1977, assurance should be provided that it has not been used in other safety-related applications.

The GE review of RVRIZO2 resulted in the correction of three code errors and the implementation of two modelling modifications. The reanalysis of the Mark I containment calculations with the modified code indicated that the previous results were conservative assuming that the GE application guidelines regarding the

method of analysis were followed. In addition, the revised code has performed some verification calculations that have been reviewed by a design review team. However, the review team noted that the revised version of the code, designated as RZFIX, "is not qualified for design application but only for general design assessment." Thus, a review of the code applications should be performed to insure that it has not been applied beyond its current level of qualification. One Unresloved Item (See Section C.1 above) was identified during this part of the inspection.

2. Structural/Dynamic/Heat Transfer Computer Codes

a. SAP4GO7 Computer Code: The General Electric (GE) SAP4GO7 computer code is a large, general purpose, finite element code which is in wide use at GE. SAP4GO7 is basically the SAP4 code written by the University of California, with options added by GE. GE had accepted responsibility for verification of the code.

It was noted that SAP4GO7 is a Level 2 program, meaning it is among the least restrictive programs used for design applications. A program can only become Level 2 through the design review process. Following an application to raise a code to Level 2 status, a presentation of the code capabilities is made to a design review team, which has the responsibility to accept or reject the application. The presentation includes verification problems demonstrating that the code gives results comparable to those from either experimental data or alternate solution techniques, as per EOP-40-3.00. The verification problems for SAP4GO7 were reviewed during this inspection.

The verification status of SAP4GO7 was found in Table 1-5 of the SAP4GO7 user's manual. The NRC Inspector determined that all elements had been verified for static analysis and mode and frequency analysis. Most of the verification problems demonstrating the previous dynamic analysis techniques (i.e., direct integration, modal superposition, and response spectrum analysis) involve the use of the pipe element. Two options of the beam element (fixed end forces and shear deformation analysis) and one option of the pipe element (the ASME code analysis) had no verification provided.

Various combinations of element types and analysis types were included in the table, and their verification was implied by the verification of the separate components. However, no verification problems were provided for the combinations. It was further noted that other element and analysis type combinations were designated as nonverified and were not to be used. Furthermore, each element contained options, such as type of loading and special features such as the released degrees of freedom, which also required verification. However, one nodal point option (slaved degrees of freedom) and one option of the beam element (released degrees of freedom) had verification for the latest version of SAP4G07 only, although earlier versions of the code were still available for use in safety-related designs.

Two nonconformances (See Section B.5 & B.6 above) were identified during the inspection of the SAP4G07 code.

b. ANSYS Computer Code: ANSYS is a large structural/heat transfer computer code that has been developed commercially by Swanson Analysis Systems Inc. and licensed by GE. ANSYS version 2, update 180 is the production version on line at GE for safety-related design. GE is currently in the process of putting a later version of ANSYS (4.1b) on line. At this time version (4.1b) is not accessible for production use.

The NRC inspector reviewed past errors and the procedures used in handling these errors. The responsible engineer for ANSYS as well as ANSYS users were interviewed. GE stated that they have never received any error notices from Swanson Inc., concerning Version 2, update 180. GE could produce no documentation to show that they have contacted Swanson Inc. to search out errors on ANSYS version 2, update 180. GE individually verifies each design application in which ANSYS has been used.

The NRC inspector reviewed 5 recent DRF's which use ANSYS 03 in safety-related designs. ANSYS 03 is the GE classification for ANSYS version 2, update 180. The DRF's included verification by alternate calculations. Also reviewed were DRF 175-0013-1, ANSYS program material. This included a list of capabilities for which the verification program applies as well as exclusions to certain capabilities which could yield potential errors.

No Nonconformances or Violations were identified in this part of the inspection.

3. Engineering Computer Program (ECP) Error Report Handling

The NRC inspector performed an overall review of GE procedures for structural engineering computer program error report handling. EOP 40-3.00, Engineering Computer Programs, delineates procedures for the process of reporting computer code errors. ECP technical usage problems, including potential errors are documented and reported to the responsible engineer.

The responsible engineer documents, for inclusion on the DRF, all identified errors in approved ECPs used for safety-related design applications. Required documentation includes a description of the error and the corrective action to be taken. This is submitted within 30 days after identification of the error, for control component approval. The control component has overall management responsibility of all ECPs. However, the procedure does not assign responsibility for identifying design documents associated with the application of the computer code or for coordinating code changes with other responsible engineers whose design documents may be affected. Further, there is no requirement in the procedure that the control component interface with responsible engineers affected by the computer code error, and assess the effects of computer code errors on designs, past and present.

During this part of the inspection, the inspector determined that computer code users are reporting potential computer code errors verbally to the responsible engineer without the required documentation.

Two Nonconformances (See Section B.1 and B.7) were identified in the part of the Inspection.

4. Review of the Potentially Reportable Conditions (PRC) Files

Both open and closed files were reviewed and comments are noted below:

a. PRC-84-03: In January 1984, several Type CR2840 three-position keylock switches were found to exhibit a tendency for all of the required contacts to not close when an attempt was made to remove the key while the switch was in the process of being actuated. Further investigation showed that only those relays with P022 as the last four digits had failed. The accumulated tolerances in some of these switches would allow the action as described above.

Panel locations for the problem switches have been listed and GE is continuing its review. During a future inspection this item may be reviewed further.

b. PRC-84-45: During environmental testing, a GE CR2940 switch failed to operate after a radiation exposure of 37 megarads. (The switch was approved for radiation exposures up to 20 megarads.) The exposure had hardened the cam material of the switch to the point that it fractured. Although the switch would fail safe, the possibility of the leads shorting and thus degrading the safety IE bus suggested further investigation was warranted. After further study of the problem it was concluded that failure of the switch under high radiation conditions would not affect the termination wire on the switch. Investigation of secondary problems due to failure of this switch is continuing at GE. During a future inspection this item may be reviewed further.

5. HPCS Diesel Generator and Motor Control Centers

During a GE QA Systems audit at Powell Electrical Manufacturing Company October 21 and 22, 1981, it was noted that Powell could not produce design and other documentation required in GE specification 21A9301BA Rev. 0, Paragraph 4.7 which called for this equipment to be qualified in accordance with the requirements of IEEE 323. Because, in January 1984 this issue had still not been resolved to the satisfaction of GE QA, a PRC file was opened. In order to resolve this matter, GE Safety and Licensing requested, from the cognizant engineer, both description of environments (radiation, pressure, temperature, humidity, spray, etc., as applicable) in which the HPCS Diesel Generator and related Motor Control Center must operate in order to perform their intended safety functions and a demonstration that the Diesel Generator has or has not been qualified to these environments. The required documentation has not been assembled. This item will be covered during a future inspection.

6. Implementation of 10 CFR Part 21

Of 35 submittals of Potentially Reportable Conditions in 1983 three were still being evaluated in October 1984. Six were reported to NRC, and the average time for a report to be filed was 9 1/2 months. After a decision that a condition was reportable, GE complied with the requirement that NRC be notified within 48 hours. As a further example, of 54 Potentially Reportable Conditions identified in the

first 6 months of 1984 more than half were still being worked on in mid October. Likewise 15 of the 38 submitted in the first 6 months of 1984 were still being evaluated at the time of this inspection. No independent judgments of what constitutes a reasonable indication that a substantial safety hazard could have been created were made during this inspection. Potentially Reportable Condition files reviewed dealt with delivery of unqualified components. This appeared to result from continuing to purchase those components from vendors which no longer operated QA or other programs necessary for qualification, or from use of substitute commercial vendors without taking the necessary additional actions to qualify the components before they are shipped to the utility. This item will be further reviewed during a future inspection.

7. Potential Violation of the 1% Plastic Strain Limit on the Linear Heat Generation Rate (LHGR) for the Lead Test Fuel Assemblies

An LER initiated by the Tennessee Valley Authority (TVA) pertaining to the Browns Ferry facility indicated that a reload calculation yielded results in which the LHGR exceeded the 1% plastic strain limit.

GE received a request from TVA relative to an interpretation of the LHGR results, GE had provided earlier, in which the Rod Withdrawal Error (RWE) LHGR exceeded the 1% plastic strain limit. GE clarified what appeared to be a technical specification violation as outlined below.

a. The analysis for 1% plastic strain limit was not performed specifically for the lead test assembly but was conservatively included by subtracting 2.2% from the calculated limit.

b. The rod withdrawal error LHGR was calculated for the configuration which inherently includes a 2.2% power spiking penalty which enhances the conservativeness.

c. When reporting the RWE value of the LHGR and the 1% limit the RWE was further increased by 2.2% due to a lack of proper definition as to the use of the 2.2% limit. As a result, excessive conservatism on the RWE value and the 1% limit yielded an apparent violation in which the LHGR for the RWE condition exceeded the 1% limit.

d. GE recalculated the 1% plastic strain limit for the lead test assemblies specifically and properly applied the 2.2% penalty to the RWE value of the LHGR. The results were within the technical specification envelope. A violation did not occur and as a result of the activity, GE has started an effort to revise the reporting and documenting function for the 1% strain limit and the LHGR based on the RWE.

The above mentioned calculations were reviewed by the NRC inspector. No violations or nonconformances were identified during this part of the inspection.

8. Qualification of ASCO Scram Valves Used at Susquehanna I

During a control rod trip actuation test at Susquehanna I on October 7, 1984, four control rods failed to insert. The cause of the failure was determined to be the adherence of a valve disc to its seat in the scram pilot solenoid valve. During this inspection the inspectors obtained information on the use of this type of valve in other plants and on past experience and other factors which led to changes in disc material. Interviews with GE staff disclosed that two types of disc material had been used in ASCO scram pilot solenoid valves. The first type of material is used in valves located outside containment such as those at Susquehanna. The second type of material is used in valves located inside containment. The second type of disc material is an improved material included in all valve rebuild kits which meets current design criteria for use in harsh environments and is suitable for use inside or outside containment. The second type disc material was developed before GE had operating experience with the ASCO valves which used the first type of disc material. As a result of the improved material being included in the rebuild kits for ASCO valves, each time a valve is rebuilt the second type of disc material is installed. The qualification data for valves with both types of disc material were reviewed. The temperature and radiation values used in the tests were found to exceed those listed in the Susquehanna I FSAR.

During a telephone conversation with GE staff after the inspection, it was disclosed that ester oil contamination in the instrument air system had been found at Susquehanna I. When a scram pilot solenoid valve was tested with similarly contaminated oil the disc adhered to the seat. GE had earlier advised all utilities of the need to keep the instrument air system free from oil and other contaminants.

No violations or nonconformances were identified in this part of the inspection.

PERSONS CONTACTED

Company GE

Dates 15 OCT 84

Docket/Report No. 99900403/84-04

Inspector P. SEARS

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ENTRANCE MEETING

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
K MCINTYRE	REACTOR ENGR	USNRC
O P Gormley	Reactor Engineer	USNRC
G.B. Stramback	Mgr. Safety Evaluation Programs	GE SAL.
R.J. VALENCIA	SR ENGR	GE GAIRC GAS
R.K. WALOMAN	SR. ENGR.	NC & I - PDO
R.E. PINGLETON	MGR. QA SUPPORT NSPD	NSPD.-NSO
J.F. Murillo	Sr. Engr.	GE - QA&RO ; QAA
G.J. Anderson	Principal Engineer	Qual. Assurance Systems - QA&RO
J.M. CASE	Mgr. QUALITY SYSTEMS	GE QA+RO
J.C. WOOD.	PRINC. ENGR. QA	GE QA+RO
F.E. Hopkins	Specialist	NFED Core & Fuel Tech.
C.L. Buckner	Specialist QA Sys.	QAEE&I
M.M. Bilich	Spec Quality Liaison	NSPD-NSO
Bill Shier	Engineer	BNL
Bob Harris	Engineering Specialist	EG&G IDAHO
Robert Hanson	Senior Engineer	EG&G Idaho
Geoffrey Parker	Engr. Specialist	EG&G Idaho Inc
DEE HILL	DESIGN ENGR	" "
J J FOX	Senior Program Mgr	GE QA+RO

PERSONS CONTACTED

Company GENERAL ELECTRIC

Dates 10/15-19/84

Docket/Report No. 99900403/84-04

Inspector R MCINTYRE

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
RICHARD SCHRUM	ENGINEER	C & FT
John F. Murillo	SR Engr	QA&RO ; QAA
Robert J Valencia	SR ENGR	QA&RO; QAS
Sam Ranganath	Manager	Plant Technology
Gerald C. Mok	Principal Engineer	NPSED
DAN R. ERIE	SR. ENGINEER	QA&RO
J J FOX	Sr Program Mgr	QA+RO
LELAND BOHL	MANAGER	QA & RO
Elaine Hopkins	Specialist	C&FT NFED
J. E Wood	Mgr, Core & fuel Tech	NFED

PERSONS CONTACTED

Company GE San Jose

Dates 10/15-19/84

Docket/Report No. 99900403

Inspector G. Grantley

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
G. B. Stramback	Mgr Safety Evaluation Prog	GE STHO
E. Cimbalvo	Project Mgr PRA Files	GE STHO
G. J. Anderson	Principal Engineer	QA Systems, QA+RO
Charles Kelette	Act Mgr Nuclear Services	QA
Charles Eason	Principal Engineer	Quality Audits
Dan R Erie	Sr Engineer	QA - BWR Systems Dept
M. Aiken	Publicist	GE Pub info office
Jay Murray	Manager	QA audits
R.L. Gridley	Mgr Fuel Services Licensing	Safety and Licensing etc
J. Klapproth	Principle licensing Engineer	Safety and Licensing etc
A. Tsang	Lead System Engineer	Systems Engineering
Tim Reed		QA
Ed Gibbs	Senior Engineer	NPSED
Jim Carruth	Tech. Leader	NPSED
L.Y. Chang	Design Engineer	NPSED

PERSONS CONTACTED

Company GE

Dates 10/15-19/84

Docket/Report No. 99900403/84-04

Inspector P. SEARS

Page 1 of 1

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
T. J Fox	Sr Program Mgr	GE NEBO
W.R. FERRAULT	MGR, QCE	GE - QAEE & I
R.K. Longerbeam	Princ. Q.C. Engr.	GE - QAEE & I
J.C. WOOD	PRINC ENGR QA	GE - QA + RO
J.P. CLARK	MGR. NDTE ENGR.	GE-NEBO
GM GORDON	MGR. PLANT MATL's TECH	GE-NEBO
E.A Sayre	Mgr Plant Matls App.	GE NEBO
K W HESS	PRODUCT MGR, PIPING	GE - NPSED
H H Billich	Spec. Quality Liaison	GE-USPD-USO
GE Parker	Engr. Spec.	EG&G IDAHO - NRC Rep
D.W. Sandusky	Sr. Engineer ~~Plant Mat. App~~	Plant Materials Application
R.M. HORN	PRINC. Eng	GE- NEBO
T.A. CAINE	Sr. Engr.	GE-NEBO
L.E. DeLaurentis	Engineer	GE-NEBO
G.L. STEVENS	ENGINEER	GE-NEBO
R.N. ROSS	PRINCIPAL ENGINEER	GE - NEBO
J.W. Pyron	Sr. ENGINEER	GE.-NEBO
Sam Ranganath	Manager, Mech Analysis	Plant technology/NBE
Jerry Pearson	Mgr, Comp Svcs	Computations
Robert J VALENCIA	SR ENGR	QA&RO - QAS
ROGER L. FISHER	SR ENGR	GE NC&I PDO

Persons Contacted

COMPANY General Electric

DATES Oct 15-19 1984

DOCKET/REPORT NO. 99900403/84-04

INSPECTOR Bill Shier

NAME	TITLE	ORGANIZATION
Richard Schrum	Engineer	CFT
John F. Murillo	Sr. Engr.	QA, RO; QAA
Robert T. Valencia	SR Engr	QA, RO, QAS
J Elaine Hopkins	Specialist	CFT - NFED
Jay V Tice	Engineer	NPSED-PTPE
Andrew P. Rossa	Engineer	NFED
Steven P. Carnydon	Mgr Nuclear Matls	NFED
Ronald M. [illegible]	Sr Engineer	NFED
James M. Conway	Principal Eng.	NFED
Tom W. [illegible]	Manager Core Nuclear Engineering	NFED
Peter P. Stancavage	Principal Engineer	NSPD
Hoa X. Hoang	Engineer	NSPD
David A. Hamon	Engineer / Tech leader	NPSED
Ven S. Hwang	SR. ENGINEER	NFED

PERSONS CONTACTED

Company GE Dates 15 Oct 84

Docket/Report No. 99900103/84-04 Inspector P Sears/Robert Harrison

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Weekly Activities

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
Pilgram Issue		
Robin Galen	Sr. Lic. Engr-GE	GE
Harold Brammer	Mgr Reload Nucl Engr	GE
Elbyrne Thacker II	Engineer	GE
Main steam Line Break from Rated rather than HSB		
Jason Brown	Licensing Eng	GE ← PRC-84-41
PRC 84-14	Overpressure on the	HPCI/RCIC Turbine
Dick Ose	Engineer	GE

PERSONS CONTACTED

Company GENERAL ELECTRIC Co Dates 10/19/84

Docket/Report No. 99900403/84-04 Inspector P. SEARS

EXIT MEETING

NAME(Please Print)	TITLE(Please Print)	ORGANIZATION(Please Print)
Owen Gormley	Reactor Engineer	USNRC
RICHARD McINTYRE	REACTOR ENGINEER	USNRC
Robert Hanson	Senior Engineer	EG & G Idaho Inc.
Bob Harris	Engineering Specialist	EG & G Idaho Inc
Dee [illegible]	Design Engr	" " "
Bill Shier	ENGINEER	Brookhaven National Lab
W R PERRAULT	MGR, QCE	GE QAEE&I
C.L. Buckner	Spec. Qual. Sys.	GE - QAEE&I
F E HOPKINS	Spec.	NFED - C&FT
T T FOX	SR Program Mgr	GE QA&RO
J. F. Murillo	SR. Engr.	GE; QA&RO, QAA
J C WOOD	PRINC ENGR.	GE QA&RO QAS
R.J. VALENCIA	SR ENGR	GE QA&RO, QAS
E.V GIAMBUSSO	SR. LIC ENGR	S&LO
C.A. CAMERON	MGR.-LIC. SVCS.	
G.J. Anderson	Principal Engineer	GE-QA&RO
J E Wood	Mgr Core & Fuel Tech	GE- NFED
R.K WALOMAN	SR ENGINEER	GE - EDF
G.B. Strambach	Mgr. Safety Evaluation Programs	GE - NS&LO
GE Parker	Principal Engineer	EG&G - NRC Rep

DOCUMENTS EXAMINED

INSPECTOR: R MCINTYRE

SCOPE: _____

DOCKET NO. 99900403

REPORT NO. 84-04

PAGE 1 OF 1

ITEM NO.	*TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	DOCUMENT TITLE/SUBJECT
1	PROC	EOP 40-3.00	88	12/22/83	(EOP) ENGINEERING OPERATING PROCEDURE - ENGR COMPUTER PROGRAMS
2	PROC	EOP 42-1.00	17	11/1/83	INTRO - TECHNOLOGY AND DESIGN CONTROL
3	PROC	EOP 42-10.00	-	12/1/81	DESIGN RECORD FILES (DRF)
4	FL	RPT 44	—	9/30/84	HIS LIBRARY FILE USAGE MONTHLY SUMMARY FILE — COMPUTER CODES RUN 9/03/84 - 9/30/84
5	FL	SUMMARY/U/ECP LIST	—	10/15/84	ENGINEERING COMPUTER PROGRAMS ECP'S IN PROGRAM LIBRARY
6	FL	DRF 175-0013-1	—	—	ANSYS 01, 02, 03, PROGRAM MATERIAL
7	MANUAL	175-0013	0	11/29/78	ANSYS 03 USERS MANUAL
8	FL	DRF B13-01283	—	3/10/84	DRF USING ANSYS STIFF 55, 42, & 25 ELEMENTS AND HAND CALC VERIFICATION
9	FL	DRF B31-00127	-	9/4/84	DRF USING ANSYS STIFF 55 & 42 & HAND CALCS VERIFICATION
10	FL	DRF 175-0013-2	—	—	ANSYS 01 02,03 PROGRAM MATERIAL
11	QAM	NEDO-11209-04	4	12/31/82	NUCLEAR ENERGY BUSINESS OPERATIONS BWR QUALITY ASSURANCE PROGRAM DESCRIPTION / TOPICAL REPORT
12	QAM	"	"	"	SECTION 3 DESIGN CONTROL
13	RPT	AUDIT REPORT QP84-05		6/27/84	INTERNAL QA AUDIT OF ENGINEERING COMPUTER PROGRAM'S
14	RPT	CAR'S 2 TO 5	—	—	CORRECTIVE ACTION REPORTS 2,3,4,5

*TYPE OF DOCUMENT

DWG - DRAWING
SPEC - SPECIFICATION
PROC - PROCEDURE
QAM - QA MANUAL
P.O. - PURCHASE ORDER

INM - INTERNAL MEMO
LTR - LETTER
FL - FILE
RPT - REPORT
— - _____

INSPECTOR P. SEARS

SCOPE

DOCUMENTS EXAMINED

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REPORT NO. 84 - 04

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ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE / SUBJECT
1	TRIP REPORT	205-84D128		7/18-20/84	TRIP REPORT CONCERNING ~~QA~~ SURVEILANCE (QA) OF JOHNSON CONTROLS, CLEARFIELD, UTAH.
2	TRIP REPORT	12-7073		7/5-7/84	TRIP REPORT CONCERNING QA SURVEILANCE OF JOHNSON CONTROLS, CLEARFIELD, UT
3	P.O.	205-YE766	0	8/26/83	P.O. FROM GE TO JOHNSON CONTROLS COVERING 12" RISERS
4	MANUAL	175-0013	0	11/29/76	ECP ANSYS03 USERS MANUAL
5	CAL	DRF NO B13-01283	—	3/13/84	(DRF) DESIGN RECORD FILE USING ECP ANSYS STIFF 55 AND STIFF 42 SUBROUTINES AND HAND CALCS
6	CAL	DRF NO B33-00167	—	3/30/83	DRF ~~USE~~ ECP ANSYS USING STIFF 55, 42, 25 ~~VERSUS~~ HAND CALC'S
~~7~~	CAL	DRF NO B31-00127	—	4/4/84	DRF USING ECP ANSYS USING STIFF 55, 42 VERSUS HAND CALC'S
8	RPT	23A1571	—	2/25/83	STRESS & FATIGUE ANALYSIS REPORT USING ECP ANSYS 03 STIFF 55 & 42
9	RPT	DRF NO 137-0010		8/31/84	MECH ANALYSIS REPORT (MAR) # 84-36 FRACTURE MECHANICS EVALUATION

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INSPECTOR Bill Shier

SCOPE GE Computer Code Q/A ~~Inspection~~ Inspection

DOCKET NO 99900403

REPORT NO. 84-04

DOCUMENTS EXAMINED

ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE/SUBJECT
1	DRF	A00 593	1	JAN 1980	Design Record File for REDYMOG
2	—	—	—	Oct 1984	List of Engineering Computer Programs
3	PRO	NEDE-21109	100	Aug 1984	BWR Engineering Operating Procedures
4	—	—	—	Sept 1984	Monthly Summary of Computer File Useage
5	TOP	NEDE -25598	—	Dec 1981	Design Analysis and SAR Inputs for ATWS Performance and Standby Liquid Control System (Perry Plant)
6	DRF	A13-00141	—	Jul 1981	Perry 1 and 2 ATWS ALT 3A Design Analysis
7	TOP	NEDO-11209			Nuclear Energy Business Operation Boiling Water Reactor Quality Assurance Program Description
8	—	—	—	Oct 1984	Program Library List of Engineering Computer Programs
9	DRF	670-0005	—	JAN 1982	DRF for PANACEA Core Design System
10	DRF	L12-00608	—	Jan 1983	PB2 Cycle 7 Reload Licensing - Design Record File
11	DRF	184-0009-1	—	Sept 1983	DRF for GEBALS Libraries
12	PRC File	PRC-84-30	—	May 1984	Error In The RVR1Z02 Engineering Computer Program - Potentially Reportable Condition File
13	DRF	A00-01619-1	—	Feb 1984	cRNC-04 Engineering Computer Program Supplement 1
14	DRF	A00-01619	—	Aug 1983	cRNC-04 Engineering Computer Program

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TOP - Topical Report
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INSPECTOR Bill Shier

SCOPE GE Computer Code Q/A Inspection

DOCKET NO 99000403

REPORT NO. 84-04

DOCUMENTS EXAMINED

ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE/SUBJECT
15	DRF	693 0001	—	JAN 1979	CRNC03 Design Record File
16	DRF	693 0001	—	April 1978	CRNC02 Design Record File
17	DRF	L41-00226	—	JAN 1983	Peach Bottom 2 Cycle 6 Cycle Management
18	Pro	384HA872	2	Oct 1978	Preparation of 3D Code For Initial Core Analysis
19	DRF	A00-01969	—		DRF for Monticello ARTS - Transient and GETAR Analysis
20	DRF	B21-00225	—	April 1982	SRV Simmer Margin Analysis for Pilgram
21	DRF	E00-00137	—	Feb 1982	SAFER Qualification Study
22	DRF	185H-0026	—	Oct 1983	PERRY BASE DECK
23	DRF	A13-00179	—	JAN 1983	ATWS REDY/ODYN Comparison
24	LTR	—	—	Sept 1984	ENGINEERING Computer Program (ECP) Error Reporting Procedure - JE Wood to Distribution
25	LTR	—	—	Oct 1984	DESIGN RECORD FILES FOR ENGINEERING Computer Programs JE Wood to DISTRIBUTION
26	INM	—	—	Aug 1984	QUALITY ASSURANCE Newsletter #67

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Inspector DEE HILL

Type/Module

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DOCUMENTS EXAMINED

1	2	TITLE/SUBJECT	3	4
1	LOG	PRC LOG BOOK.	10/5/84	NA
2	FILE	PRC FILE 84-45 (GE 2940 SWITCHES IN THE ~~LIQUID~~ STANDBY LIQUID CONTROL SYSTEM) OPEN FILE.	10/15/84	NA
3	FILE	PRC FILE 81-35 (CR 2940 SWITCHES WITHOUT SADDLE CLAMPS	10/15/84	NA
4	FILE	PRC FILE-84-03 (FAILED KEYLOCK SWITCH CR2940) OPEN FILE	10/16/84	NA
5	FILE	PRC 82-04 (OVERLOADS ON HFA RELAYS LONG ENOUGH TO SHORT OUT)	10/16/84	NA
6	FILE	PRC-84-07 (FAILURE OF ASCO SCRAM SOLENOID PILOT VALVES AT PEACH BOTTOM SITE) OPEN FILE	10/16/84	NA
7	FILE	PRC-82-03 (HFA RELAYS IN THE HPCS).	10/17/84	NA
8	FILE	PRC-84-42 (LOW VOLTAGE TRIP SETPOINT ON TOPAZ INVERTERS)	10/17/84	NA
9	-	GE SWITCHGEAR FREQUENCY RELAY SUPPLY LIST	10/18/84	NA

Document Types:
1. Drawing
2. Specification
3. Procedure
4. QA Manual
5. Purchas Order
6. Internal Memo
7. Letter
8. Other (Specify-if necessary)

Columns:
1. Sequential Item Number
2. Type of Document
3. Date of Document
4. Revision (If applicable)

INSPECTOR Bob Harris

SCOPE

DOCUMENTS EXAMINED

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ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE / SUBJECT
1	LTR			Sept 24/1984	Response to August 28, 1984 NRC Inspection, Docket No. 99900403/84-02
2	PROC	NEDE-21109 Vol. 1		1/12/83	Engineering Operating Procedures - EOP-40.3, Rev. 7, 2/3/83, Engineering Computer Programs
3	ECP			10/15/84	U/ECPLIST - Listing of Electronic Computer Programs
4	MAN	NEDO-10909 Rev. 7 79NEDONSR	7	12/79	STATIC AND DYNAMIC ANALYSIS OF MECHANICAL AND PIPING COMPONENTS BY FINITE ELEMENT METHOD
5	PROB	DRF 175-0005			Verification Problems for SAP4G02 through SAP4G07 and DYSEA05
6	MAN	NEDO-10909 Rev. 6	6	July 1978	STATIC AND DYNAMIC ANALYSIS OF MECHANICAL AND PIPING COMPONENTS BY FINITE ELEMENT METHOD
7	QAM	NEDO-11209-04 Rev 4	4	12/31/82	NUCLEAR ENERGY BUSINESS OPERATIONS BWR QUALITY ASSURANCE PROGRAM DESCRIPTION, Section 3
8	PROC	NEDE-21109 Vol. 1		1/12/83	Engineering Operating Procedures - EOP-42-6.00, 4/30/81, Independent Design Verification
9	PROC	NEDE-21109 Vol. 1		1/12/83	Engineering Operating Procedures - EOP-42-10.00, 12/11/81, Design Record Files

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PRO - PROCEDURE
QAM QA MANUAL

LTR - LETTER
ECP -- Computer program listing
MAN - Computer Program manual
PROB -- SAP4G Verification problems

INSPECTOR Robert Hanson

SCOPE Technical Specification Review DOCUMENTS EXAMINED

DOCKET NO. 99900403

REPORT NO. 84 - 04

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ITEM NO.	TYPE OF DOCUMENT	DOCUMENT NO.	REV.	DATE	TITLE / SUBJECT
1	Procedure	70-42	4	3/27/81	Reporting of Defects and Noncompliances under 10CFR Part 21 or Part 50.55(e)
1	PRC file	PRC 84-14		closed 4/19/84	HPCI/RCIC Systems Design ~~and~~ Overpressure Spec (Unresolved
1	PRC file	PRC 84-33		closed 9/25/84	LaSalle - MSIV Isolation Reset
1	PRC file	PRC 84-47		Not closed	Shoreham Leak Detection System
1	PRC file	PRC 84-41		closed 9/25/84	Main Steam Break Outside Containment
1	PRC file	PRC 84-21		Not closed	Lack of Conf. Control on Spare & Renewal Parts -
1	PRC file	PRC 84-55		Not closed	Failure of the Rockwell MSIV to close
1	PRC file	PRC 84-54		Not closed	Shutoff Signal for RHR Isolation Valves -
1	PRC file	PRC 84-31		open	Gould Level Transmitters (163 C 1973)
1	PRC file	PRC 83-05		closed 3/12/84	RHR Shutdown Cooling Reg. Plants
1	PRC file	PRC 84-39		closed	Conprotas Sensitized Resins System End Caps
1	PRC file	PRC 83-30		closed 4/18/84	Core Spray / steam Cooling
1	VITS EWA (GE)	VITS 83-153 EWA 12-33		6/23/83 oct 7/83	Potential exceeding of LHGR in fuel assemblies Browns Ferry - 3 LTA corrective action
1	Vits	Vits-83-252		11/10/83	Questionable adequacy of Shutdown Margin Calcs and Associated QA.

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