W N P - 2
P L A N T
V E R I F I C A T I O N

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO. 2 (WNP-2)
OCTOBER, 1982 REVISION 1

8210270018

WNP-2
PLANT
VERIFICATION

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NUCLEAR PROJECT NO. 2 (WNP-2)
JUNE, 1982

WNP-2 PLANT VERIFICATION

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I. BACKGROUND AND PURPOSE

WNP-2 PLANT VERIFICATION

I. BACKGROUND AND PURPOSE

This report presents in a single document the bases for confidence that WNP-2 has been designed and constructed to meet applicable regulatory requirements and Safety Analysis Report commitments. The Plant Verification Program described herein is part of a broader WNP-2 Plant Completion Plan, as shown in Figure 1.

Plant Verification was first conceived as a response to the Supply System Managing Director's request for a ". . . well documented basis for my acceptance of plant completion, safety and technical adequacy." (See Attachment 1.) This request, issued in January 1981, six months after he assumed the Directorship, came during a one year's construction suspension required to correct prior quality problems of several construction contractors.

The report describes programs which were conducted or begun during the suspension to identify and correct deficiencies and re-establish an adequate quality level for completed work. It also describes the changes in management practices which the Supply System adopted to correct these early construction problems, including the employment of a more experienced construction management/systems completion contractor to assist in maintaining a high level of quality following construction restart in June 1981.

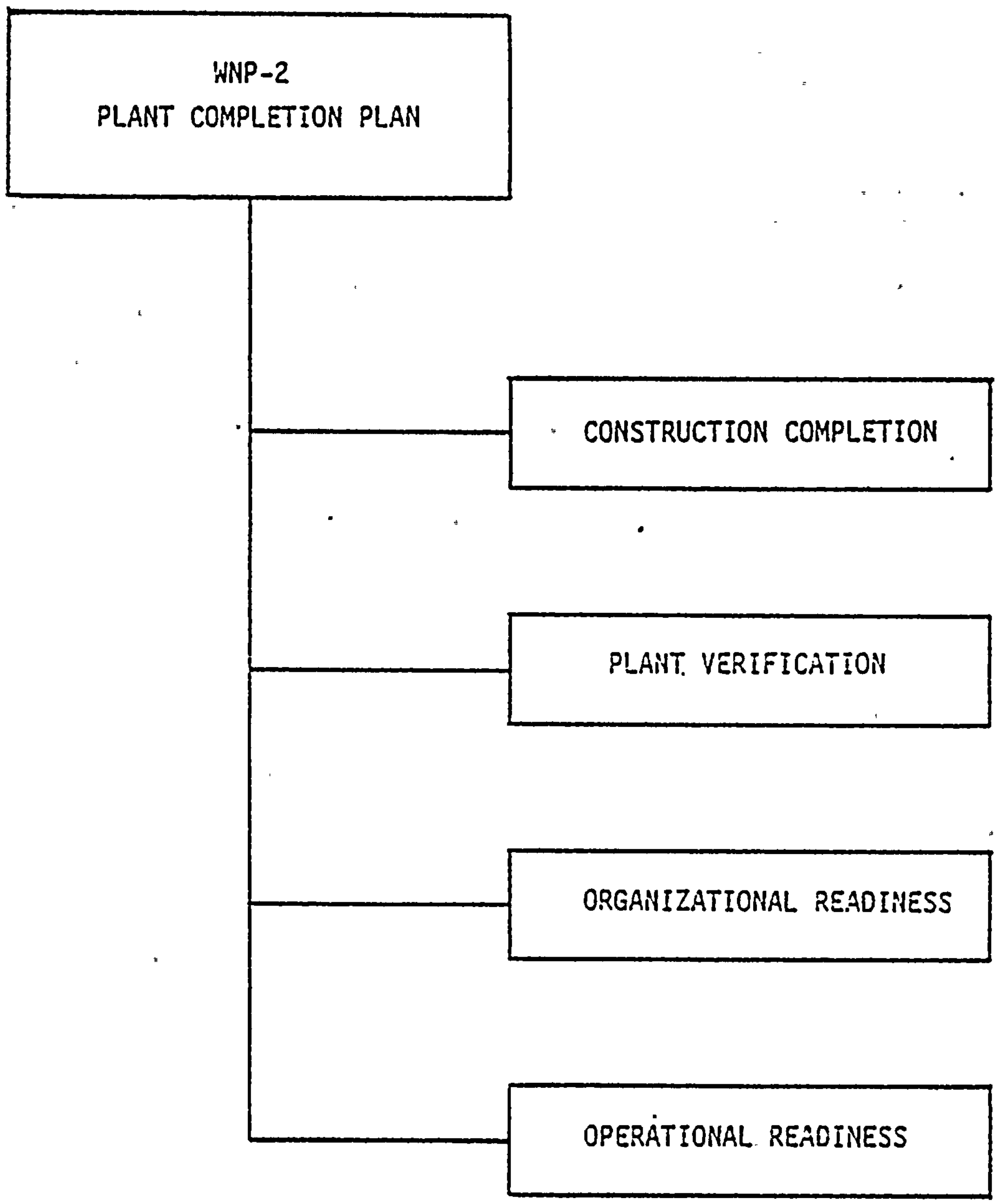
In addition to re-establishing the construction quality baseline for past work and describing methods for assuring that it will be continued to completion, the report also describes the bases for confidence in the design as developed by the architect-engineer and the nuclear steam supply system contractor. When both are complete, these design and construction verification activities would, under normal circumstances, be sufficient to demonstrate the technical adequacy of WNP-2.

However, in response to the Managing Director's request for an acceptance review and noting the design quality problems encountered at Diablo Canyon and elsewhere, the Supply System has decided to take several additional steps which go beyond normal practice, and which address NRC's concerns for strengthening quality assurance for nuclear plants under construction. These include a reverification that the design requirements for all safety systems are complete and clearly documented and, by independent design reviews of three selected systems confirm that these requirements were correctly reflected in the detailed design documents used in construction. Any deficiencies noted in these reviews will be submitted to an independent Findings Review Committee for evaluation and disposition. The Plant Verification Program and the implementation of several of its critical elements will be subjected to independent technical audit by an outside firm.

Plant Verification is an ongoing process in the design, construction, and testing of a plant. While this report summarizes the entire process, it focuses on verification activities beyond normal industry practice, namely the Requirements and Design Reverification reviews. These reviews, in combination with the in-process design controls and the construction quality assurance activities, will provide confidence that WNP-2 was designed and constructed in accordance with Supply System commitments.

FIGURE 1

WNP-2 PLANT COMPLETION PLAN SCOPE



INTEROFFICE MEMORANDUM

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

ATTACHMENT 1

Distribution:
- ☐ EDC WNP-1/4
- ☐ EDC WNP-2
- ☐ EDC WNP-3/5
- ☐ Admin File

A Squire (387)
DW Mazur (821)
RG Matlock (901A)
DE Dobson (1000)
PK Shen (388)
ME Witherspoon (135
LL Grumme (390)
lb/RLF
lb/GDB

Date: January 22, 1981

To: G. D. Bouchey, Director, Nuclear Safety (#396)

From: R. L. Ferguson, Managing Director (#387)
R. L. Ferguson

Subject: ACCEPTANCE REVIEW PLANS FOR SUPPLY SYSTEM NUCLEAR FACILITIES

Reference:

Confirming our recent discussions on this matter, I would like to request that you develop detailed "acceptance review" plans for each of our Projects which will assure a thorough, systematic review by Supply System personnel of our nuclear plants prior to turnover from our contractors for commercial operation and which will constitute a well-documented basis for my acceptance of plant completion, safety and technical adequacy.

As we discussed, the Supply System reviews will involve all of our technical organizations. The plan should cover design documentation and safety reviews, engineering certifications, construction completion/turnover process, startup testing and operational readiness assessments culminating in fully operational plants ready for commercial power production.

In developing these plans for plant acceptance, first priority should be given to WNP-2. For WNP-2, special consideration should be given to assuring that any undetected quality defects that significantly affect plant performance or safety would be identified and corrected in the course of our functional testing and acceptance reviews.

md

II. OVERVIEW OF PLANT VERIFICATION

II. OVERVIEW OF PLANT VERIFICATION

Plant Verification is accomplished through proper implementation of design, construction, and testing practices; an appropriate level of checking and auditing against suitable standards; and a thorough evaluation and disposition of defects found. A number of the verification activities are standard practice in the course of designing and constructing a nuclear power plant. These baseline activities, which form the foundation for Plant Verification, are summarized in this section and presented in more detail in the appendices. In addition, Plant Verification, for WNP-2 includes several major activities related to assurance of quality in construction plus design requirements and design reverification reviews which go beyond normal industry practice. The basic elements of Plant Verification for WNP-2 as shown in Figure 2 are:

- Requirements and Design Reverification - The WNP-2 design process, including the independent design reviews and technical audits that have been performed meet the requirements of 10CFR50 Appendix B and ANSI 45.2. The Requirements Reverification and Design Reverification reviews together with the independent processing of findings from these reviews go beyond normal industry practice. The purpose of these additional reviews is to: 1) provide increased confidence that the WNP-2 design is correct and complies with regulatory requirements, 2) provide a documented review of design near completion for the plant acceptance review directed by the Managing Director, and 3) address the recent industry concerns about quality controls in the design process, e.g., Diablo Canyon.

- Construction Verification - In addition to the Quality Assurance program for ongoing work, confidence in the adequacy of WNP-2 construction is provided by: 1) The Restart program which was an extensive review and quality program upgrading activity initiated in July 1980 to correct previous problems and preclude their recurrence, 2) the ongoing Quality Verification Program which is designed to establish the adequacy of construction completed before July 1980, and 3) the component inspection and tests performed as part of the system turnover process. The Restart and Quality Verification Programs, while unique to WNP 2, are not perceived as something beyond normal industry practice in that they establish an acceptable quality baseline from which ongoing construction with adequate quality controls can depart. Component inspection and testing are also part of the normal turnover process; however, the scope of these activities at WNP-2 are more extensive than usual.

- Performance Verification - The testing program to ensure that components and systems perform in accordance with design requirements is based on industry experience and NRC requirements.

- o Operating Envelope Verification - The WNP-2 process for assuring that the Technical Specifications and plant operating, maintenance, and emergency procedures are consistent with the design, industry experience, and regulatory requirements follows standard industry practices.

Each of the four elements of Plant Verification is discussed briefly in this section and more fully in other parts of the report as noted.

A. Requirements and Design Reverification

In October 1981, the Supply System began an engineering transition activity to accept from Burns and Roe the engineering responsibility for design changes made to the plant after completion. As part of this transition, and in response to recent design quality problems experienced elsewhere in the industry, the Supply System decided to perform a completeness check of the WNP-2 engineering records, which includes a review of the design requirements for all safety systems, and an in-depth design review (reverification) of three systems. The methodology and scope of these reviews are described in Section IV.

The objectivity and integrity of the reverification reviews of the three systems are assured through:

- o Organizational structure and overview from the Office of the Managing Director to assure independence from the WNP-2 Project and appropriate resolution of findings,
- o Use of engineers that were not involved in the original design,
- o Use of procedures and checklists and training of the engineers that will perform the reviews,
- o An independent findings review process to validate and assess the significance of findings, and
- o Review of the plans and audit of the process by highly qualified, independent technical consultants.

The steps to ensure the objectivity of the Requirements and Design Reverification reviews are discussed in more detail in Section III.

As discussed in the opening paragraphs of this Section, the Requirements and Design Reverification reviews will provide "increased" confidence in the design adequacy of WNP-2. These reviews do not include a re-audit of the WNP-2 design control process and its implementing procedures. It has been concluded based on previous reviews and audits that the in-process design controls have been adequate and comply with the applicable project commitments (10CFR50, Appendix B, ANSI N45.2 and Safety Analysis Reports). This conclusion is supported by:

- o WNP-2 uses a standard, General Electric BWR-5 Nuclear Steam Supply System (NSSS). The Balance of Plant (BOP) design and the control and integration of the overall plant design was performed by an experienced Architect Engineer (Burns and Roe). General Electric performed reviews of the BOP design to assure that it was consistent with the NSSS interface requirements. Throughout the development of the WNP-2 design, the Supply System has participated in the design process through specification of Owner requirements, design reviews, and audits.

As discussed in Appendix A, design verification activities were performed as a matter of routine practice. The standardized, General Electric BWR Quality Assurance Program provides for extensive documentation of their design control process and design verification. Past and recent reviews and audits of the Burns and Roe design process have confirmed that adequate design controls have been used. Similarly, the overall design review process of site construction contractors and prepurchase equipment suppliers (including the Burns and Roe review of the contractor's design submittals) was evaluated by the Supply System and found to be adequate.

The process, controls, and normal review and verification activities associated with the development of the WNP-2 design are summarized in Appendix A.

- In addition to the "normal" design process used by Burns and Roe, many independent technical reviews of the plant design have been conducted which contribute to the level of confidence in the design adequacy. Areas of independent technical design reviews include Burns and Roe off-project design reviews, General Electric NSSS/BOP reviews, Supply System reviews of systems, EDS Nuclear Inc. review of pipe hanger criteria and methods, and Bechtel reviews of more than 320 specific design issues. The scope and depth of these reviews are summarized in Appendix B.

B. Construction Verification

Verification of the construction quality is provided by the in-place Quality Verification Program for construction completed before July 1980 and by the overall WNP-2 Quality Assurance Program for ongoing construction (after July 1980).

From the fall of 1978 through the spring of 1980, a number of problems were identified by both the Supply System and the NRC which indicated that the quality assurance (QA) programs of several of the major construction contractors at WNP-2 were not effective in achieving the required quality levels in their work and the work of some of their subcontractors. In addition, the increasing backlog of unresolved or recurrent construction quality problems during this period indicated that the actions taken by WNP-2 Project Management were not successful in achieving timely, effective resolution of quality problems. Therefore, in July 1980, the Supply System issued Stop Work Order No. 9 which stopped all Quality Class I and Seismic Category I construction work at WNP-2. In addition, the NRC (under 10CFR50.54(f)) requested information on the steps to be taken by the Supply System to strengthen management control of the project and to provide reasonable assurance that the contractor's QA programs would be effective.

The stop work at WNP-2 was in effect for approximately one year. During the recovery process, known as the Restart Program, a number of actions were taken to improve the WNP-2 QA Program. They include:

- Strengthening project management by consolidating the responsibility for design and construction under the WNP-2 Program Director,
- Hiring a more experienced, nuclear Construction Management organization (Bechtel Power Corporation),
- Improving the overall level of Quality Assurance and Quality Control (QC) by revising work procedures and quality programs to assure compliance with licensing requirements, specifications, codes and standards, and to preclude recurrence of the previous problems,
- Reducing the backlog of unresolved construction quality problems,
- Improving the timeliness and control of engineering direction to the field, and
- Assuring that the impacts of quality problems on hardware installed before the work stoppage will be identified and corrected.

Most of these activities have been accomplished. The remaining effort is completion of the Quality Verification Program, which addresses those activities necessary to assure that the hardware installed prior to the stop work is adequate.

The Quality Verification Program (QVP) covers components, systems, and structures that are Quality Class I and/or Seismic Category I. It requires a sample review of documentation for completeness, accuracy and disposition, and sample reinspection of installed hardware. The Quality Verification Program is the result of corrective action initiated by the WNP-2 Restart Program (summarized in Appendix D). The reviews and reinspections conducted under the QVP are based on the construction specification requirements that were reviewed for compliance with the FSAR during the Restart Program. In addition, a list of generic problem areas identified during the Restart Program were used as input to the QVP sampling process.

The Quality Verification Program is structured to provide flexibility for adjustments in the program's scope based on the results of the ongoing reviews and reinspections. The minimum sample size for reinspection is ten percent of the hardware that was installed, inspected, and accepted prior to July 1980. The Quality Verification Program, which is discussed in more detail in Appendix E, will establish an adequate level of confidence in construction completed prior to July 1980. In addition, the progress and results of this program are reported bi-monthly to the NRC and are monitored by the Inspection and Enforcement Branch, Region V.

Verification of ongoing construction is provided by the overall WNP-2 Quality Assurance Program, which is summarized in Appendix C. Bechtel Power Corporation, as Construction Manager and Systems-Completion Contractor, is implementing a standardized QA Program. This program, through the Bechtel Quality Assurance and Quality Control organizations provides the necessary controls, surveillance, and auditing activities to insure that the quality of in-process construction is adequate. In addition, as discussed in Appendix C, the Supply System has sufficient overview and controls on the Bechtel Quality Assurance Program to establish confidence for the Supply System in the quality of ongoing construction.

An additional activity deserving mention is the augmented system turnover inspection and testing being performed by the Supply System Test and Startup organization. This inspection addresses proper equipment maintenance and to date has included over 39,000 components (refer to Subsection IV.F). While the primary objective is to correct problems which occurred prior to 1980, this activity provides extra assurance of correct construction through review of equipment maintenance records and inspection of installed equipment.

Appendices D and E summarize the nature, scope, and principal results of the completed activities (Restart Program), and the key features of the ongoing programs to complete the verification of construction quality at WNP-2. Many of the activities described were completed or initiated as part of the Restart Program. Therefore, the majority of the detailed results are contained in the Restart Program record.

C. Performance Verification

In-plant tests verify that the components, systems, and structures are functionally integrated and perform in accordance with the design and plant performance requirements. Plant features that are not testable under certain postulated accident scenarios and natural phenomena (e.g., tornados, earthquakes, etc.) are verified or controlled through equipment qualification testing, engineering analysis, and consideration for such items as materials selection, interlocks, administrative procedures, redundancy, and diversity. The in-plant tests are conducted under both normal operating conditions and over a wide range of abnormal/transient events. The tests include:

- Component and system lineup tests,
- Individual and integrated system preoperational tests,
- Individual and integrated system power ascension tests,
- Testing and operation with approved procedures, and
- Testing and operation with trained and qualified Supply System personnel.

The scope of the testing program and the process used to ensure that tests are developed and implemented in a controlled manner are discussed in Appendix E and are documented in detail in other approved documents and procedures, e.g., the Corporate level Test and Startup Program Manual.

D. Operating Envelope Verification

Operating Envelope Verification is the process of assuring that the Technical Specifications and plant operating, maintenance, and emergency procedures are consistent with the design, the as-constructed plant, industry experience, and the applicable regulatory requirements and Safety Analysis Reports. For WNP-2, this process follows standard utility practices and is summarized in Appendix E.

The Technical Specifications are prepared and reviewed by the WNP-2 Operating Plant Staff. The Technical Specifications are also reviewed by General Electric and Burns and Roe to assure consistency with the design. An additional independent technical review will be conducted by the Supply System engineering group responsible for implementation of the Requirements and Design Reverification reviews. The final approval and issuance of the Technical Specifications rests with the Nuclear Regulatory Commission.

The procedures for plant operation, maintenance, and emergency response are generally prepared by the WNP-2 Operating Plant Staff, making maximum use of existing documentation from other similar operating plants. The review process is typical of that used within the industry. After preparation and review by the operations staff, procedures receive a multidisciplined technical and safety review by a Plant Operations Committee which include Operational QA and an on-site Safety Engineering Group. In addition, a Corporate Nuclear Safety Review Board overviews this process.

E. Conclusions

The activities discussed in this report when complete will verify that WNP-2 has been designed and constructed in compliance with our commitments.

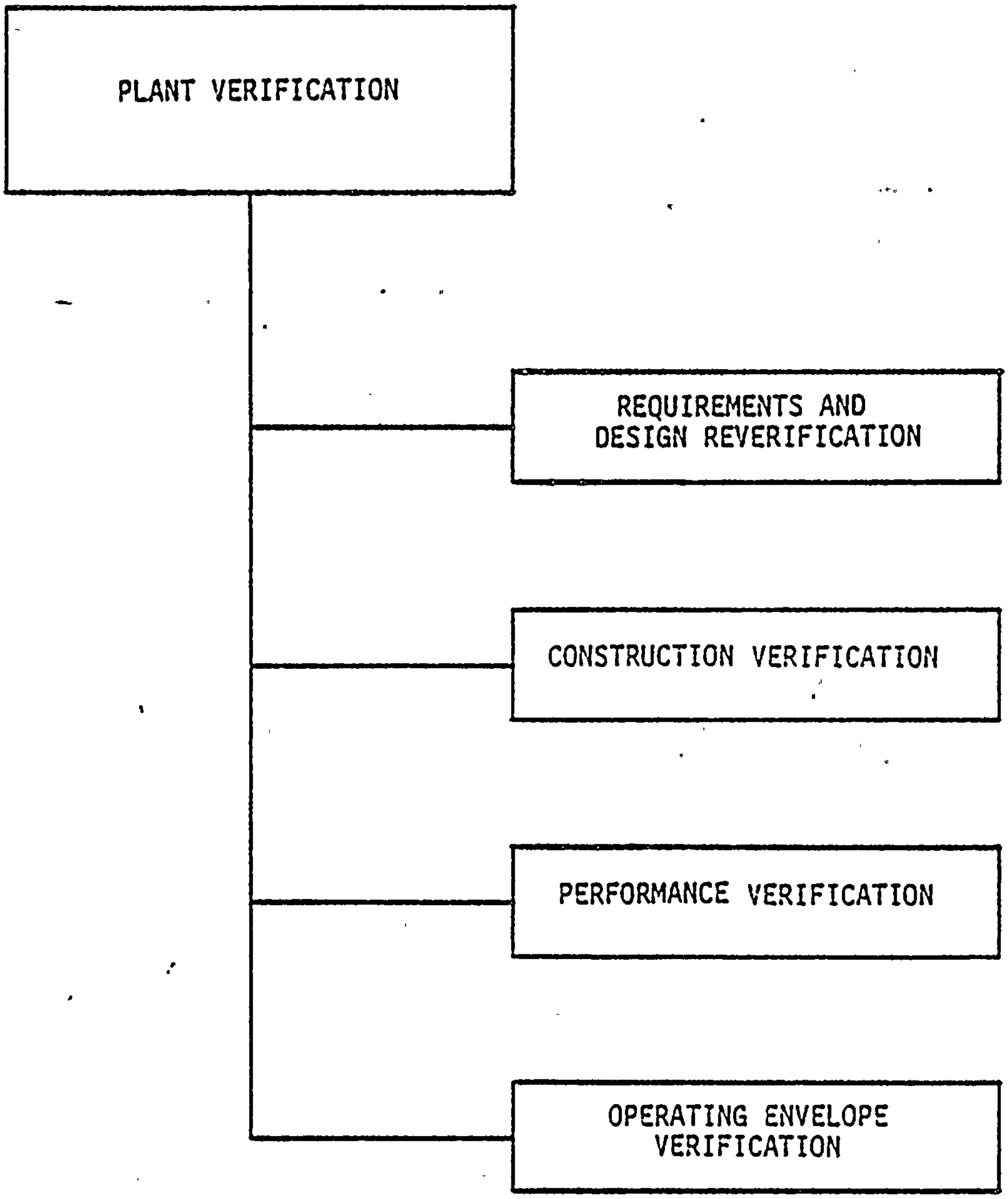
The normal controls for the design of WNP-2, combined with the Requirements and Design Reverification reviews to be performed by the Supply System (and any followup corrective action) will provide a high level of confidence in the completed design.

The Quality Verification Program will ensure that construction completed prior to July 1980 is acceptable or reworked as necessary. The WNP-2 Quality Assurance Program will ensure that effective quality controls are imposed on in-process construction. These quality-related activities will verify the adequacy of construction.

In-plant testing will serve as a final step in verification of the design and construction of WNP-2. The satisfactory completion of the testing programs, in conjunction with other Supply System activities related to operational and organizational readiness, will bring WNP-2 into the commercial operation phase.

FIGURE 2

ELEMENTS OF PLANT VERIFICATION



III. INDEPENDENT ADMINISTRATION OF THE PROGRAM

III. INDEPENDENT ADMINISTRATION OF THE PROGRAMS

As noted in the preceding Section II, verification is achieved through proper implementation of design and construction, combined with tests, reviews, audits, and inspections conducted by qualified individuals other than those who performed the original work. The Supply System has conducted such reviews as part of its basic design and construction programs in accordance with 10CFR50, Appendix B, and ANSI N45.2. The Supply System conducted additional technical and quality reviews to correct construction problems which arose prior to July 1980. These basic verification programs, will, when complete, provide an acceptable level of confidence in the design and construction of WNP-2. These programs are described in Appendices A through E.

Going beyond this, the Supply System has taken particular care to assure the independence and objectivity of the Requirements and Design Reverification reviews which are over and above normal industry practice. This Section describes the steps taken to insure the credibility of the Requirements and Design Reverification reviews and the evaluation and disposition of findings from these reviews.

A. Requirements and Design Reverification

The Requirements and Design Reverification reviews as described in Section IV, consist of a completeness check of the WNP-2 engineering record, a review of the design requirements for all safety systems, and an in-depth technical review of three selected systems. The Requirements and Design Reverification reviews will be performed by the Supply System using personnel who were not involved in performing the original design. The technical personnel performing the reviews will be chosen primarily from the Systems Design Engineering group, although special expertise from other Supply System organizations and/or outside engineering groups and consultants may be used. Burns and Roe personnel are involved in the collection of the engineering records to be reviewed and the initial completeness check for some systems. However, they are not involved in either the Requirements or Design Reverification reviews.

The Systems Design Engineering group has about 25 engineers with an average experience of approximately 12 years. About one third of the group have advanced degrees. The individuals assigned to the reviews include a mix of disciplines covering electrical, mechanical, nuclear, structural and instrumentation and control. The organizational responsibilities and interfaces associated with performing the reviews and processing the findings are briefly described below. Details of the findings reviews process, including independence, are discussed in Subsection IV.D.

Figure 3 shows the Supply System organizations responsible for the design, construction, and testing of WNP-2 and the Systems Design Engineering group, that is responsible for performing the Requirements and Design Reverification reviews. The Systems Design Engineering group is independent of the WNP-2 Project and reports to the Director of Technology. Their review activities also receive approval and overview from the Office of the Managing director.

Figure.4 includes the principal interfaces associated with conducting the Requirements and Design Reverification reviews and processing the findings.

A flowchart of the process for the review, evaluation, and disposition of potential findings from these reviews is shown in Figure 5.

The selection of the specific design features, calculations, etc., to be reviewed will be based on a number of inputs including the results from the Requirements Reverification review, the QA Program (previous design/engineering problems identified in the QA record),

and the Burns and Roe and contractor records. Systems Design Engineering is responsible for preparing the review procedures, selecting the specific features to be reviewed, performing the reviews, and participating in processing the findings as indicated in Figures 4 and 5.

The Technical Specialist, Office of the WNP-2 Program Director, is responsible for coordinating the verification activities between the WNP-2 Project, WNP-2 Operations, and WNP-2 Test and Startup.

The Technical Specialist, Office of the Managing Director, is responsible for approving the overall scope of the reviews and the findings review process. This includes the composition of the findings review committee, conducting special reviews as indicated in Figure 5, and providing management overview of the program. Included are independent reviews of the program scope and of implementation by organizations both internal and external to the Supply System. Some of the reviews will be performed by an independent technical auditor. In addition, a senior management review group has been established to assist in development of the scope of an audit program and to monitor the followup corrective action. Refer to Attachment 1.

B. Quality Verification Program

The Quality Verification Program (QVP), described in more detail in Appendix E, is the final phase of th WNP-2 response to the July 1980 stop work. This program is in-place and is monitored frequently by the NRC as mentioned in Section II. The organization and structure of the QVP are described in Quality Verification Instruction No. 1 (Volume III of the RCSW Manual). The program is managed by Supply System personnel reporting to the WNP-2 Manager of Construction. Hardware reinspections are performed by Bechtel (primarily on the previous mechanical contractor's work) or site contractor quality control inspectors in accordance with project approved reinspection programs. The minimum sample size for reinspection is ten percent (10%) of the hardware completed, inspected, and accepted prior to July 1980. Under the program credit may be taken for reinspections performed for other reasons (e.g., NRC IE Bulletins); however, this requires a formal assessment by the Supply System and concurrence by Project Quality Assurance that the other inspection meets the requirements of the QVP.

PLANT VERIFICATION ABRIDGED ORGANIZATION

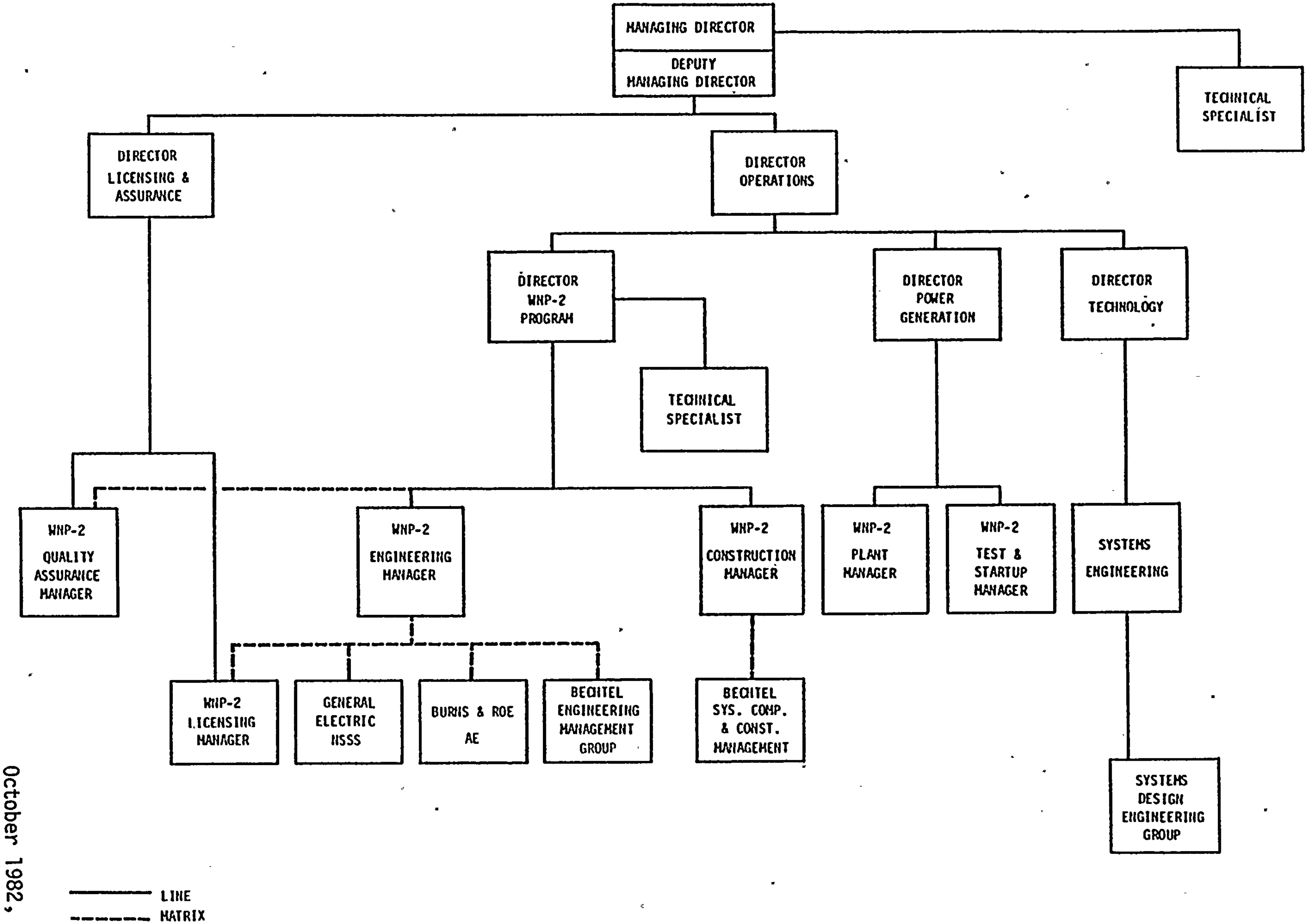
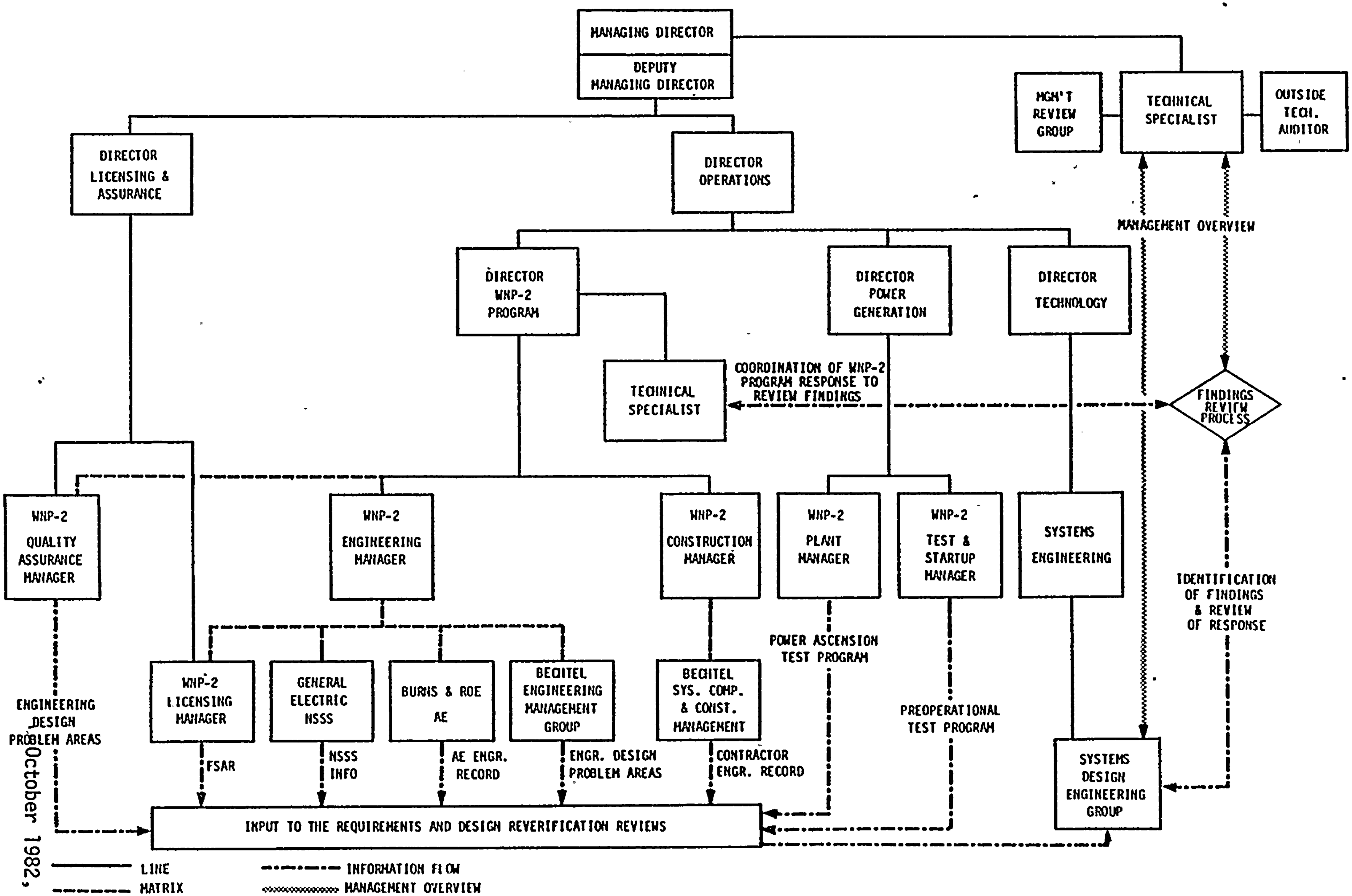


Figure 3

PLANT VERIFICATION ABRIDGED ORGANIZATION



October 1982, Rev. 1

Figure 4

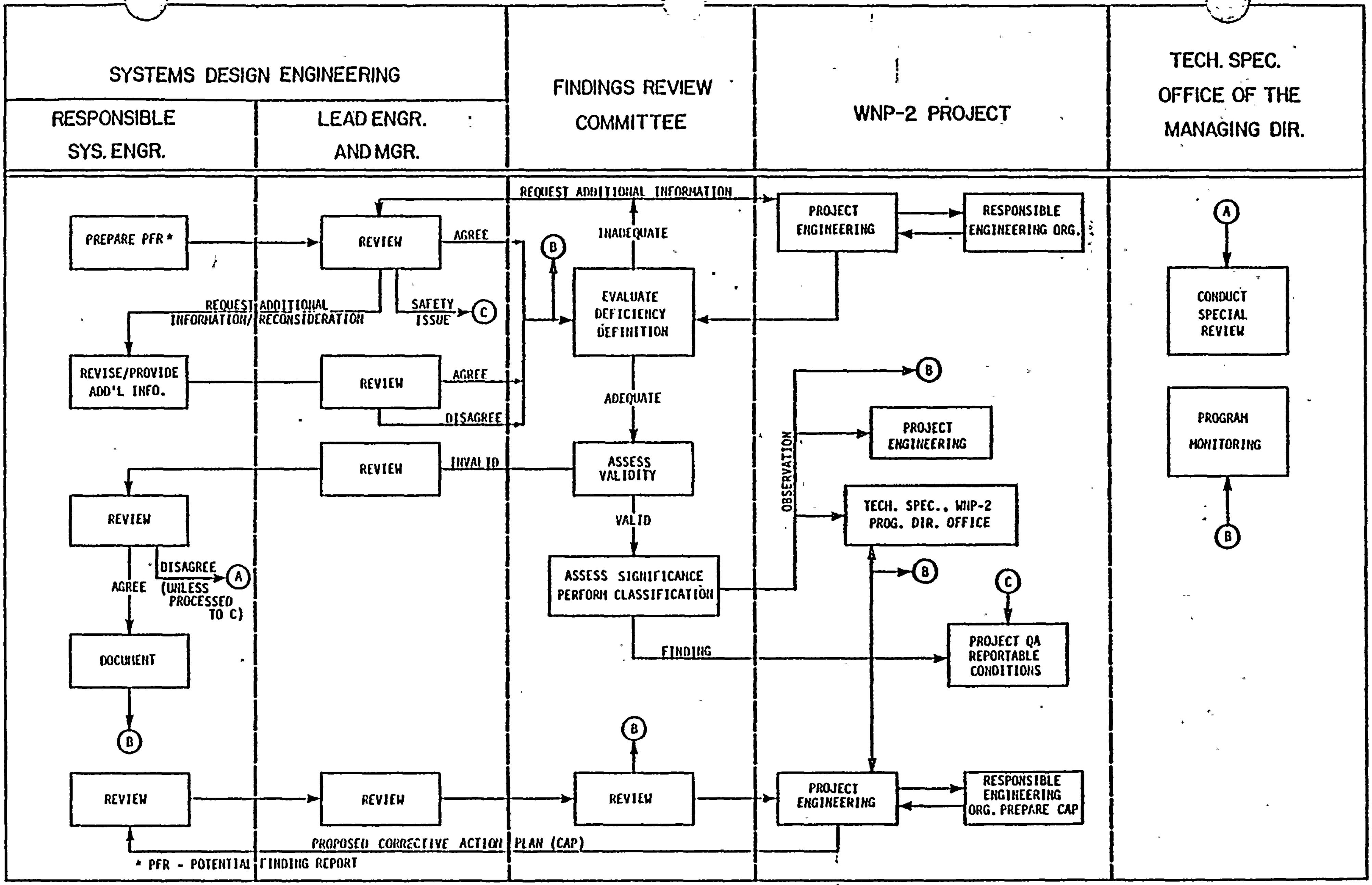

SYSTEMS DESIGN ENGINEERING
RESPONSIBLE SYS. ENGR.
LEAD ENGR. AND MGR.
FINDINGS REVIEW COMMITTEE
WNP-2 PROJECT
TECH. SPEC. OFFICE OF THE MANAGING DIR.
PREPARE PFR*
REVIEW
AGREE
SAFETY ISSUE
C
B
REQUEST ADDITIONAL INFORMATION/ RECONSIDERATION
REQUEST ADDITIONAL INFORMATION
INADEQUATE
EVALUATE DEFICIENCY DEFINITION
PROJECT ENGINEERING
RESPONSIBLE ENGINEERING ORG.
A
CONDUCT SPECIAL REVIEW
REVISE/PROVIDE ADD'L INFO.
REVIEW
AGREE
DISAGREE
ADEQUATE
PROJECT ENGINEERING
OBSERVATION
PROGRAM MONITORING
REVIEW
INVALID
ASSESS VALIDITY
REVIEW
VALID
TECH. SPEC., WNP-2 PROG. DIR. OFFICE
DISAGREE
(UNLESS PROCESSED TO C)
AGREE
ASSESS SIGNIFICANCE PERFORM CLASSIFICATION
DOCUMENT
FINDING
PROJECT QA REPORTABLE CONDITIONS
REVIEW
REVIEW
REVIEW
PROJECT ENGINEERING
RESPONSIBLE ENGINEERING ORG. PREPARE CAP
PROPOSED CORRECTIVE ACTION PLAN (CAP)
* PFR - POTENTIAL FINDING REPORT

FIGURE 5

ATTACHMENT 2

INTEROFFICE MEMORANDUM

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

Distribution:
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RL Ferguson, 387
JR Honekamp:ar, 387
DW Mazur, 385
JW Shannon, 370
A Squire, 386

Addressees:
WC Bibb, 685
GD Bouchey, 370
RB Glasscock, 280
RG Matlock, 901A
PK Shen, 580

Date: May 24, 1982

To: Addressees

R. L. Ferguson

From: R. L. Ferguson, Managing Director, 387

Subject: WNP-2 PLANT COMPLETION PLAN

Reference: Memo dtd 1-22-81, R. L. Ferguson to G. D. Bouchey, "Acceptance Review Plans for Supply System Nuclear Facilities."

In my memorandum of January 22, 1981, I requested that acceptance review plans be developed for each of our nuclear projects with first priority given to WNP-2. The stated purpose of these plans was to provide a well documented basis for my acceptance of the facility and the readiness o. the organization to operate the facility in compliance with our commitments. In addition for WNP-2, special consideration should be given to assuring that quality defects that could significantly affect plant performance or safety will be detected and corrected in the course of our reviews and functional testing.

As you know, we now have a WNP-2 Plant Completion Plan and are in the process of finalizing the WNP-2 Plant Verification Report to document the basis for our confirmation that the plant was designed and constructed in accordance with our commitments. To assure me that this process as it evolves will meet the objectives of my January 22, 1981, memorandum, I have asked John Honekamp to develop and implement a program of independent technical reviews and audits of the WNP-2 Plant Completion Plan and the associated Plant Verification Report. These reviews and audits should utilize organizations both internal and external to the company in a concept parallel to a financial audit where the bulk of the audits are conducted by independent internal organizations and an outside firm is utilized to review and validate the internal audit process and periodically check the implementation of selected aspects.

The first phase of this program utilizing Technical Audit Associates to review the draft Plant Verification Report is in progress. The next phase will require a continuing participation of senior management from several departments to achieve a well balanced, coordinated program with effective feedback for corrective action where required. I am, therefore, requesting that you provide this participation through a senior management review group chaired by John to periodically:

- Review the scope, structure, and balance of the audit program and recommend changes as required to assure that it achieves its objectives.

- Assess the validity and significance of the findings generated by the audit program and provide feedback to improve the program as appropriate.
- Receive the feedback from the outside independent auditor and assist in development of corrective action where appropriate.
- Review the progress of the audit program and recommend changes in priority or allocation of resources as required.
- Review the results of the audit program and the effectiveness of follow-up action.

In addition to periodic meetings with me, the management review group should provide to me written reports of its findings and recommendations. At this point, a group composed of Peter Shen, Bill Bibb, Don Bouchey, Bob Glasscock, and Bob Matlock and meeting on a monthly basis would appear adequate. However, the responsibility for establishing the structure and functioning of this group have been delegated to the Chairman. John will be in touch with you to establish the final composition and schedule for the management review group.

IV. WNP-2 UNIQUE VERIFICATION ACTIVITIES

IV. WNP-2 UNIQUE VERIFICATION ACTIVITIES

Assurance that the WNP-2 design and construction are correct must come primarily from the basic design, construction, testing, and quality assurance programs, which are derived largely from industry standards and NRC requirements. Over and above such considerations, the Supply System has initiated the Requirements and Design Reverification reviews to provide increased confidence that the WNP-2 design is correct. These reviews are considered unique and beyond normal design practice. In addition, an augmented system turnover inspection program is being performed to ensure equipment is adequately maintained.

The Supply System is reviewing the design requirements of all safety systems and is performing an in-depth independent design review of three selected safety systems. These reviews are referred to as Requirements and Design Reverification, respectively. The term reverification is used, rather than verification, because the design has been and continues to be verified by the normal design process (refer to Appendices A and B). The Supply System's reviews constitute an additional level of design verification.

In addition to the Design Reverification reviews of the three selected systems, two other significant reviews are being performed which will provide input to Design Reverification and add confidence in the adequacy of the WNP-2 design. They are: 1) the collection and review of the WNP-2 engineering record on a system basis by Supply System and Burns and Roe engineering personnel, and 2) a review of the design of ASME Code piping and supports by Bechtel and Supply System engineers (described in Appendix B). These reviews are separate from the Design Reverification reviews in that their schedule is tied to the system turnover process, and the resolution of problems and deficiencies from these reviews are handled by normal WNP-2 procedures. Both of these reviews were started before the Design Reverification reviews and will continue after they are completed. However, for the three systems selected for Design Reverification, the two other reviews will provide input to the Design Reverification reviews as follows.

The engineering record is being collected and reviewed to prepare for the transition of engineering responsibility for future design configuration control from Burns and Roe to the Supply System. This review is procedurally controlled and is performed to ensure the completeness of the engineering record for all plant systems. During the collection of the engineering record, the design requirements for all safety systems are reviewed to assure that they are complete and clearly documented as the basis for future design changes. Since the same Supply System group will also be performing the Design Reverification reviews on the three selected systems, the collection and review of the engineering record will serve as the starting point for the Design Reverification reviews.

The review of ASME Code piping and supports by Bechtel and Supply System engineers is clearly an in-depth design review as evidenced by the checklists included in Appendix B (Attachment 18). These reviews are independent in that neither the Bechtel nor the Supply System engineers conducting the reviews were responsible for specifying or performing the subject design and analysis work. Therefore. this review will be taken credit for in the piping and support portion of the Design Reverification reviews. For the three selected systems, the findings from the piping and support reviews will be processed through the special findings review specific to Requirements and Design Reverification (Subsection IV.D).

The scope, rationale for selecting the three safety systems, review criteria, and steps in the Requirements and Design Reverification reviews are discussed in Subsections IV.B and C. Subsection IV.E presents the schedule for performance of these and related activities.

The augmented turnover inspection and testing program, which is also considered to be beyond normal industry practice is being performed by the Supply System's Test and Startup organization at the time of system Provisional Acceptance. The additional inspections and tests are being performed due to the long construction duration for WNP-2, i.e., concern for idle components and systems and some contractors' past maintenance activities. To date, over 39,000 components have been tested or disassembled, inspected, and refurbished. Additional information on this program is discussed in Subsection IV.F.

A. Engineering Record Review

Engineering records will be collected and reviewed on a system-by-system basis. The schedule basically follows construction completion by means of the system Provisional Acceptance and Turnover dates (refer to Attachment 2 of Appendix E). The task of assembling an engineering record will begin near the Provisional Acceptance date for each system and will be completed before the Turnover date for preoperational testing. Each system will have a package that will contain, but not be limited to, the following:

- A description of the system including the definition of its boundaries (based on a functional capability),
- System design criteria,
- A list of current, applicable Burns and Roe/General Electric and vendor drawings,
- A list of current, applicable Burns and Roe and vendor calculations,
- A list of current, applicable Burns and Roe Technical Memorandums (documented technical positions on specific engineering issues),
- A current Master Equipment List (applicable portion only), and
- A list of open engineering items/concerns.

B. Requirements Reverification

1. Objective and Scope

The Requirements Reverification reviews consist of collecting the engineering record and reviewing the design requirements of all safety systems to assure that they are current, complete, and clearly documented. These design requirements will be the basis for future design configuration control. The systems or portions of systems subject to Requirements Reverification are listed in Table 1. This list includes:

- o All front line active systems required to function during anticipated, abnormal, and design-basis transients to maintain the plant response within the limits described in the FSAR.
- o Support systems essential to the operation of these front line systems.
- o Other active systems included because of their operational importance or because they are required in response to beyond design-basis events.

Several systems which are not required to function or support the front line systems during transients do cross the containment boundary and hence are isolated during some transients. Since the only required active function in these cases is isolation, these systems were not included on the basis that the design requirements associated with isolation will be addressed many times during the Requirements Reverification for the systems listed in Table 1.

2. Review Criteria

The design requirements for the systems listed in Table 1 will be reviewed for completeness against the design considerations listed below. This list is based on ANSI N45.2.11-1974 (Quality Assurance Requirements for the Design of Nuclear Power Plants) and is abridged in a manner which considers the stage of construction, the systems being reviewed, and focuses on key design parameters. The design requirements review will consider:

- o Basic functions of the system and and the major components and structures of the system,
- o Performance requirements such as capacity, rating, and system output,

- Codes, standards, and regulatory requirements including the applicable issue and/or addenda,

- Design conditions such as pressure, temperature, fluid chemistry, and voltage,

- Loads such as seismic, wind, thermal, and dynamic,

- Environmental conditions anticipated during operation such as pressure, temperature, humidity, corrosiveness, site elevation, wind direction, nuclear radiation, electromagnetic radiation, and duration of exposure,

- Interface requirements including definition of the functional and physical interfaces involving structures, systems, and components,

- Material requirements including such items as compatibility, electrical insulation properties, protective coating, and corrosion resistance,

- Mechanical requirements such as vibration, stress, shock, and reaction forces,

- Structural requirements covering such items as equipment foundations and pipe supports,

- Hydraulic requirements such as pump net positive suction head, allowable pressure drops, and allowable fluid velocities,

- Chemistry requirements such as provisions for sampling and limitations on water chemistry,

- Electrical requirements such as source of power, voltage, raceway requirements, electrical insulation, and motor requirements,

- Layout and arrangement requirements,

- Operational requirements under various conditions such as plant startup, normal plant operation, plant shutdown, plant emergency operation, special or infrequent operation, and system abnormal or emergency operation,

- Instrumentation and control requirements including indicating instruments, controls and alarms required for operation, testing, and maintenance. Other requirements such as the type of instrument, installed spares, range of measurement, and location of indication should also be included,

- o Redundancy, diversity, and separation requirements of structures, systems, and components,
- o Failure effects requirements of structures, systems, and components, including a definition of those events and accidents that they must be designed to withstand,
- o Test requirements including in-plant tests and the contitions under which they will be performed,
- o Fire protection or resistance requirements,
- o Materials, processes, parts, and equipment suitable for application, and
- o Safety requirements for preventing personnel injury including such items as radiation hazards, restricting the use of dangerous materials, escape provisions from enclosures and grounding of electrical systems.

3. Requirements Reverification Process

The process for Requirements Reverification will include the following steps:

- o Prepare and approve implementing procedures and instructions, and conduct training on implementation of the Requirements Reverification process,
- o Assign a cognizant system engineer responsible for the Requirements Reverification of each safety system,
- o Obtain system design requirements source documentation, and
- o Evaluate the design requirements source documentation against the review criteria identified in Paragraph IV.B.2.

For the three selected systems, the results of the above review will be used as input to the Design Reverification reviews to confirm that the proper design requirements were used as the input to the detailed design.

4. Report and Documentation of Findings

The findings from the Requirements Reverification reviews for the three systems selected for Design Reverification will be processed in accordance with the special findings review activity that is an integral part of Design Reverification. Resolution of problems and deficiencies from the Requirements Reverification reviews of the other safety systems and the review of the engineering record (refer to IV.A) will be reported and processed in accordance with normal WNP-2 Project procedures.

C. Design Reverification

1. Objective

For selected safety systems verify that the design is based on the requirements identified by the review performed in Subsection IV.B and that the design is adequate. This review will verify that the design process correctly translated the design bases identified by the Requirements Reverification review into the detailed design and the design documents ultimately transmitted to the construction and fabrication organizations.

A procedural review of the design process, i.e., design and implementation procedures, is not within the direct scope of this task. These processes have been reviewed and demonstrated effective through previous technical and quality assurance audits and Supply System reviews. (Refer to Appendices A and B for design process details). However, as part of the reviewing engineer's assessment of his findings, he will review the applicable elements of the design control process to determine if a deficiency in the process contributed to the finding.

2. Systems and Review Scope

Three systems have been selected for an in-depth Design Reverification review by the Supply System. The selection process focuses on the more complex systems in terms of both the design and design interfaces and includes within the sample of systems a comprehensive range of hardware types and design disciplines. The criteria used for the selection were:

- o The system, or a majority of its features, shall be important to the safe shutdown and cooldown of the reactor,
- o The systems selected shall include the main design interfaces between Burns and Roe, the NSSS supplier (GE), and the construction contractors, and
- o The systems selected shall include safety-related mechanical components, piping, instrumentation and controls, electrical equipment, and cabling.

The emphasis on systems important to safety will assure that the reviews include the more complex and comprehensive design criteria which are associated with safety-related systems. The specific systems selected are:

- o Residual Heat Removal System, suppression pool cooling mode,
- o High Pressure Core Spray System, and

- o Reactor Feedwater System from condensate valves, COND-V-142A and B (condensate side of reactor feed pumps) to the reactor vessel nozzles.

These systems are complex, interact with other safety and non-safety systems, represent both Burns and Roe and NSSS design activities, and include the major design interfaces between GE, Burns and Roe, and site contractors. Their design also requires the application of site specific seismic response spectra developed for WNP-2 and the new containment loads.

It should be noted that the review scope of the Reactor Feedwater System includes non-safety piping and components, i.e., from the condensate valves to the containment outer isolation valves. This provides for review of the feedwater control system and the following boundary interfaces: ASME Section III/ANSI B31.1, Quality Class I/Quality Class II, and Seismic Category I/Seismic Category II.

These three systems will be reviewed in detail starting with the design requirements and extending through the development of the design documents. This will assure that the design criteria have been adequately applied in the design of the selected systems. The review will include consideration for the structural, mechanical, electrical, and instrumentation and control aspects of the system design. More specifically, the review will be conducted to assure the systems/structures and their components have been properly classified in accordance with 10CFR50 and to assure the adequacy of the engineering design including, but not limited to, computer modeling, analyses, calculations (including assumptions, input and output), related design interfaces, design drawings and specifications, and review of as-built drawings.

The detailed scope of the review will be defined in the Design Verification Plan developed for each of the three systems as described in Paragraph IV.C.4. The items selected for review will emphasize those areas that are not verified during the preoperational and power ascension testing programs (e.g., pipe analysis and support loads, transfer of key design information between organizations, and separation criteria). These design elements would be emphasized over pressure drop calculations and valve operation logic that are normally verified during the testing programs. Each Design Verification Plan will include at least one hundred (100) key points to be checked. In this context, a check point may include verification that an important, derived design input is correct, or confirmation that revised design inputs were properly transferred at a key design interface, or a detailed review of a pipe stress analysis. The check points will also be selected in a manner to allow an assessment of the performance of the principal design organization in selected areas.

During the process of these reviews, the results will be used to further guide the direction of the Design Reverification effort, e.g., the depth of review for specific items, the pursuit of problem areas, and the need for changes of the review scope. Changes in the program scope will require the approval of the Office of the Managing Director and will be documented in the program record.

3. Review Criteria

The review consists of two phases: 1) an integrated system review that focuses on system functional and interface criteria using a generic system checklist, and 2) a component review that focuses on the specific design requirements for selected components, including piping and supports, and the development of the design for those components. The latter review is based on a modified ANSI N45.2.11 checklist.

In addition, the design requirements for the selected systems will be evaluated to determine whether they are considered as "accepted" or were derived. In some cases, e.g., new containment loads, where the design requirements have been widely reviewed and accepted, the review of the requirements will be limited to confirmation that the approved loads were correctly applied. In those cases where the design requirements were derived from "accepted" criteria, the Design Reverification review will examine the process of deriving the requirements on a sample basis. Design requirements that are treated as "accepted" during this portion of Design Reverification will be identified in the record of the review.

The component vendor design activities are not included in the review. However, confirmation that the correct design inputs were properly transmitted to the vendor and that the correct design outputs were used by the interfacing engineering organizations is in the review scope.

The design review will address the following:

System Design Review:

- o Are the system functional requirements satisfied?
- o Is the ASME code properly applied for the system piping and components?
- o Are the applicable mechanical, electrical, and instrumentation and control separation criteria satisfied?
- o Are the component redundancy requirements satisfied?
- o Are containment isolation requirements satisfied?

- Are the system heat removal requirements satisfied?
- Are the system power requirements satisfied?
- Are the system control requirements satisfied?
- Are corrosion prevention requirements satisfied?
- Has the design properly considered radiation exposure to plant personnel?
- Are the system layout and arrangement requirements satisfied?

Component Design Review

- Were the component design inputs correctly selected and incorporated into design?
- Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent reverifications when the detailed design activities are completed?
- Are the appropriate quality and quality assurance requirements specified?
- Are the applicable codes, standards, and regulatory requirements including issue and addenda properly identified and are their requirements for design met?
- Have applicable construction and operating experience been considered?
- Have the design interface requirements been satisfied?
- Was an appropriate design method used?
- Is the output reasonable compared to inputs?
- Are the specified parts, equipment, and processes suitable for the required application?
- Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?
- Has the design properly considered radiation exposure to plant personnel?
- Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?

- o Have adequate preoperational and subsequent periodic test requirements been appropriately specified?

4. Design Reverification Process

   This process will be integrated with the Requirements Reverification process described in Paragraph IV.B.4. The process for Design Reverification will include the following steps:

   - o Prepare and approve implementing procedures and instructions, and conduct training on implementation of the Design Reverification process,
   - o Assign a cognizant system engineer responsible for the Design Reverification of each selected system,
   - o Generate design process flowcharts which include the source documents of the design criteria, the responsible design organizations, and the design information transmittal paths,
   - o Obtain the system design documentation,
   - o Select the components and system design features to be reviewed and prepare a Design Verification Plan unique to each system which considers: the design process flowcharts, methods of design verification (design review, alternate calculations, and qualification testing), component importance to proper system operation, system/component complexity, areas of redesign, load combinations, design margin, etc.,
   - o Obtain Technology management concurrence to the individual Design Verification Plans and submit them to the Office of the Managing Director for review,
   - o Evaluate the design documentation against the review criteria identified in Paragraph IV.C.3, and
   - o Identify and evaluate deficiencies as described in Subsection IV.D.

5. Report and Documentation of Findings

   A summary report of each safety system Design Reverification review, including all Potential Findings, their classification and corrective action plans, will be prepared.

D. Processing of Findings

The purpose of this Subsection is to discuss the processing of Potential Findings identified during the Design Reverification reviews. This process shall review, evaluate, classify, and ensure appropriate corrective action is initiated for each Potential Finding. Figure 6 is a basic flowchart of the findings review process. It is repeated here to assist in understanding the text of this Subsection.

A Potential Finding is defined as a deficiency in the use of design requirements, in the development of the detailed design, or in the final design or design changes issued for fabrication or construction, that renders the proper function of that component, system, or structure indeterminate or precludes its proper function for its required modes of operation. Upon identification of a Potential Finding by the responsible system engineer, he shall prepare a Potential Finding Report (PRF). The PFR shall include: a description of the deficiency, the basis for identifying the deficiency as a Potential Finding, the probable cause, an assessment of its significance, and a recommended classification. The engineer may include a proposed corrective action at his option.

The PFR is reviewed by Systems Design Engineering (SDE) supervision/management for adequate content, accuracy, and initial conclusions. The PFR is then transmitted to the Findings Review Committee (FRC) for evaluation and classification. In the event the Potential Finding is a potential 10CFR50.55(e) or 10CFR Part 21, it shall also be processed in parallel by Project Quality Assurance (QA) in accordance with applicable project procedures.

The FRC shall be composed of senior technical personnel with broad, commercial nuclear experience. The Committee shall include a balance of engineering disciplines and will be chaired by the Technology Directorate, Assistant Director for Generation Engineering. It will include a representative of the corporate licensing group, the Plant Technical Staff Manager who reports to the Directorate of Power Generation (via the Plant Manager), the Technical Specialist, Office of the WNP-2 Program Director, and a fifth member to be selected by the Chairman. The fifth member can be external or internal to the Supply System provided that the individual selected does not report to the WNP-2 Project.

In addition to the five designated members, the committee structure will include provisions for designated alternates within the constraint that not more than one member shall report to the WNP-2 Project and this member shall not serve as an alternate chairman. The use of alternates on the FRC will be minimized in order to preserve continuity in the findings review process. To convene a FRC meeting, a minimum of five members must be present.

In addition, an independent technical auditor will be informed of the scheduled FRC meetings and their agenda. The auditor will participate in a sufficient number of meetings to make a meaningful assessment of the findings review process. All PFRs, including their classification and corrective action plans, will be provided to the auditor.

The Committee, as their first function, shall establish a procedure that defines the charter of the FRC and details the process for evaluation and classification of Potential Findings. The procedure shall include criteria to be used in assessing the impact of a Potential Finding on the design adequacy of WNP-2. The criteria shall include, but not be limited to, the following considerations:

- o Is the Potential Finding unique to a specific component or system?

- o Is the Potential Finding generic in nature to a component type, component/system function, methodology, analysis approach, etc.?

- o Is the Potential Finding due to human error, lack of procedure implementation, or inadequate procedural controls (design control process problems)?

- o Is the Potential Finding a safety issue?

- o Is the Potential Finding significant to the design adequacy of WNP-2?

In the event a Potential Finding is safety related and was not identified as a potentially reportable condition by Systems Design Engineering, the Committee shall notify Project QA of the condition per site procedures.

The Committee shall review each Potential Finding identified during the Design Reverification reviews. The PFR shall be discussed by the responsible system engineer with the Committee. The Committee shall determine if the PFR has sufficient information to allow for validation and classification of the Potential Finding. The Committee shall acquire additional information, as needed, from Systems Design Engineering or the responsible engineering organization.

The Committee shall determine if the Potential Finding is valid. If the Committee disagrees with the validity of the finding, it shall be returned to the originator of the PFR with the reasons for that conclusion. If the originator concurs with the Committee's evaluation, he shall document his concurrence. If the originator disagrees with the Committee's position on the validity of the PFR, he may request a Special Review which is conducted under the direction of the Technical Specialist, Office of the Managing Director. In the event the Potential Finding was already being processed as a potentially reportable condition, the result of that evaluation would govern the validity of the PFR and the conduct of a Special Review would not be necessary. The result of the 10CFR50.55(e) or 10CFR Part 21 review would feedback accordingly into the processing of the PFR by the Findings Review Committee.

If the Committee determines the PFR is valid, it shall then classify the Potential Finding as: 1) a Finding for those items which significantly impact the design acequacy, or 2) an Observation for those items which do not significantly impact the design adequacy. The criteria for significance shall be in the governing FRC procedure and shall include, but not

be limited to: those criteria applicable to 10CFR50.55(e) and 10 CFR Part 21 reportable conditions, or a Potential Finding associated with a design control problem (including implementation) that could lend itself to repetitive or other deficiencies that may fall within the 50.55(e) or Part 21 critria. In assessing the impact on design adequacy of the latter criteria, the Committee may direct that further investigation be performed by Systems Design Engineering or the responsible engineering organization.

Observations are transmitted from the Committee to WNP-2 Project Engineering for corrective action as appropriate. This includes interface with the responsible engineering organization (Burns and Roe or GE) or recording of the Observation for defered action. Findings are provided to WNP-2 Project Engineering for transmittal to the responsible engineering organization for corrective action. A response date is established for a proposed corrective action plan to be returned and submitted to the originator of the PFR for review. The proposed plan shall be reviewed and concurred to by the PFR originator and by the Committee. Should there be disagreements on the adequacy of the proposed plan that cannot be resolved by a consensus, the disagreement will be noted in the record and reported to the Office of the Managing Director for resolution. In the event the responsible engineering organization provides information that may change the original validity or classification of a Potential Finding, that information shall be used in the findings review process for reconsideration and changes in the record as appropriate. In addition, the Observations and Findings are transmitted from the Committee to the Technical Specialist, Office of the WNP-2 Program Director, for coordination of other project organization activities that may be involved in the resolution of the subject item.

The Committee shall document its activities and conclusions for each PFR. The PFR, related internal and exteral correspondence, corrective action plans, and Committee documents shall be filed by the responsible system engineer. This information will be included in the final reports provided by Systems Design Engineering on the review of each of the three selected systems.

E. Schedule

The Requirements and Design Reverification activities are associated with four (4) principal phases: 1) preparing procedures, 2) assembling the engineering record and performing the Requirements Reverification, 3) performing the Design Reverification, and 4) compiling results and conclusions into final reports.

Procedures are being prepared to provide guidance and direct the engineering record, Requirements and Design Reverification reviews. These procedures are scheduled for approval by early July, refer to Figure 7. The procedure which governs the activities of the Findings Review Committee (FRC) will be approved by mid-July. It is not anticipated at this time, that the FRC will be in session before September 1982, due to the early stage of the Design Reverification review.

As noted on Figure 7, the assembly of the engineering record and the Requirements Reverification review have begun for the three selected systems. Completion is scheduled for mid-July.

Design Reverification starts with an assembled engineering record and the results and open items from the Requirements Reverification review. These items are inputs to the development of each system Design Verification Plan (DVP), refer to Subsection IV.C. The DVP is not separate from the Design Reverification review, but is the plan for performing the in-depth review for each of the three systems. The DVPs are scheduled for completion by mid-September, with the subsequent Design Reverification reviews projected to be finished by early 1983. Refer to Figure 7.

Prior to Systems Design Engineering issuing their final reports on the review of each of the selected systems, the findings evaluations must be completed and related corrective action plans must be established. Allowing time for the evaluations, interface with the responsible engineering organizations, and their responses to Findings, the reports and FRC activities are scheduled for completion by mid-April 1983. The final report which addresses overall design adequacy based on the Requirements and Design Reverification reviews follows in May 1983. This report, which includes input from the individual system reports and from the FRC activities, will be prepared under the Technology Directorate by the Assistant Director for Systems Engineering.

The schedule of activities should provide for any necessary followup by the responsible engineering organizations and related construction rework, if any, in a manner to support fuel load in September 1983.

In addition, as noted on Figure 7, there are scheduled audits, interim reports, and evaluations of the reviews. The three scheduled assessments by Supply System management allow for revisions to the program in the beginning and middle, and evaluation of its implementation and need for expansion in scope near completion of the reviews.

F. Component Inspections

As discussed in the opening paragraphs of this Section, extensive component inspections and tests are being performed. The inspections and tests are performed in the following manner.

As a part of the system Provisional Acceptance (PA) process, a PA package is prepared which contains, among other items, copies of the component maintenance records. Based on a review of these records by the Supply System Test and Startup organization, information gathered during the PA walkdown of the system, and experience with similar components on prior PA turnovers, a decision is made to proceed with the system lineup testing (refer to Appendix E, Section C) or to disassemble and inspect components prior to system lineup testing. When it is decided to perform a detailed inspection, the disassembly and inspection is performed by Test and Startup personnel using the approved component maintenance procedure that will be used during plant operation, or an approved system lineup test procedure.

The results of these maintenance and inspection activities are documented as part of the plant component maintenance record. Significant deficiencies found in the process of conducting these inspections are reported through the Test and Startup Program. The QA function is accomplished under the Operations QA Program. Examples of these inspections, their findings, and the corrective action are provided in Table 2 to this Section. Based on a review of Table 2, it is clear that proper layup conditions and cleanliness have been a problem. It should be noted that the stainless steel portion of the reactor coolant pressure boundary had not come in contact with water due to construction or testing activities prior to the Reactor Pressure Vessel hydro. A concern for stress corrosion cracking due to improper layup, therefore, does not exist.

To date approximately 39,000 components and pieces of equipment have been inspected or tested. All procedures for inspection, testing, and rework are written by Supply System startup and operations personnel. Vendor representatives have been used to assist in inspections, e.g., Byron-Jackson and Ingersol-Rand during disassembly and reassembly of pumps. The majority of the components and equipment turned over are in good condition. The problems encountered have generally been on items PA'd before the July 1980 stop work. A number of actions have been taken to improve cleanliness control and maintenance. With general housekeeping improved, fewer problems have been encountered with recent systems undergoing PA.

TABLE 1

SYSTEMS SUBJECT TO REQUIREMENTS REVERIFICATION

Startup System Number	Title
1.0	Nuclear Boiler System
3.0	Reactor Recirculation System
5.0	Remote Shutdown System
6.0	Reactor Core Isolation Cooling System
7.0	High Pressure Core Spray System Including the HPCS Diesel
8.0	Low Pressure Core Spray System
9.0	Residual Heat Removal System
10.0	Standby Liquid Control System
13.0	Control Rod Drive System (Partial)
15.0	Reactor Protection System
16.0	Neutron Monitoring System
20.0	Nuclear System Servicing Equipment
22.0	Primary Containment Atmospheric Control System
25.0	Primary Containment Atmospheric Monitoring System
36.0	Process Radiation Monitoring System
37.0	Radiation Monitoring System (Partial)
39.0	Standby Gas Treatment System
45.0	Supervisory Control System (Partial)
47.0	Standby AC Power System
50.0	DC Electrical Distribution System
58.0	Standby Service Water System
63.0	Main Steam System
72.0	Feedwater System
81.0	Reactor Building Emergency Cooling System
84.0	Control, Cable, and Critical Switchgear Rooms HVAC System (Partial)
87.0	Standby Service Water Pump House H&V System
88.0	Diesel Generator Building H&V System

TABLE 2

TEST AND STARTUP COMPONENT INSPECTIONS

Equipment Inspected	Typical Findings	Corrective Action
RHR-P-2A RHR-P-2B RHR-P-2C & Motors	o Excessive corrosion due to improper layup after initial installation.	o Cleaned and sandblasted prior to reassembly. Presently in-insuring proper layup conditions are maintained, i.e., dry air purge.
	o Wrong O-rings used during initial assembly of pumps due to error in vendor manual.	o Installed the proper O-rings and corrected vendor manual.
	o Foreign materials found in pumps (i.e., wood, nails).	o Removed all materials and insured proper cleanliness was maintained during reassembly.
	o Found motor heater de-energized and motor not protected from construction dirt.	o Energized heaters after inspecting and cleaning motor.
RHR-P-2B	o A unique finding was a defective weld in the pump case.	o Reworked pump case.
LPCS-P-1 & Motor	o Excessive corrosion due to improper layup.	o Cleaned and sandblasted prior to reassembly. Presently insuring proper layup conditions are maintained, i.e., dry air purge.
	o Wrong O-rings used during initial assembly of pumps due to error in vendor manual.	o Installed the proper O-rings and corrected vendor manual.
	o Foreign materials found in pumps (i.e., wood, nails).	o Removed all materials and insured proper cleanliness was maintained during reassembly.
	o Found motor heaters de-energized and motor not protected from construction dirt.	o Energized heaters after inspection and cleaning motor.

TABLE 2 (Condt)

Equipment Inspected	Typical Findings	Corrective Action
HPCS-P-1 & Motor	o Excessive corrosion due to improper layup.	o Cleaned and sandblasted prior to reassembly. Presently insuring proper layup conditions are maintained, i.e., dry air purge.
	o Wrong O-rings used during initial assembly of pumps due to error in vendor manual.	o Installed the proper O-rings and corrected vendor manual.
	o Foreign materials found in pumps (i.e., wood, nails).	o Removed all materials and insured proper cleanliness was maintained during reassembly.
	o Found motor heaters de-energized and motor not protected from construction dirt.	o Energized heaters after inspection and cleaning motor.
COND-P-1A COND-P-1B COND-P-1C & Motors	o Foreign material and excessive corrosion problems.	o Cleaned and sandblasted prior to reassembly. Presently insuring proper layup conditions are maintained, i.e., dry air purge. Removed all materials and insured proper cleanliness was maintained during reassembly.
	o Improper clearances on shaft couplings.	o Reworked by machining to proper clearance or obtained new couplings.
	o Found motor heaters de-energized and motor not protected from construction dirt and debris.	o Energized heaters, cleaned and inspected motors.
COND-P-2A COND-P-2B COND-P-2C	o Corrosion problems.	o Cleaned and sandblasted.
	o Defective impeller found in COND-P-2B.	o Replaced impeller.
	o Found motor heaters de-energized and motor not protected from construction dirt and debris.	o Energized heaters, cleaned and inspected motors.

TABLE 2 (Condt)

Equipment Inspected	Typical Findings	Corrective Action
Main Generator & Its Seal Oil System	o Dirt, weld slag, and rag found in the seal and piping.	o Cleaned seals and piping.
	o Found the generator and exciter shafts grounded due to dirt lodged in the generator blower and damaged insulation on the generator bearing dowels.	o Cleaned blower and replaced damaged dowels.
Mechanical Vacuum Pumps & Motors	o Excessive dirt and foreign material due to missing screens.	o Cleaned, inspected, and installed screens.
	o Damaged motor bearings.	o Ordered bearings to replace damaged ones.
Static Inverters 1, 2, & 3	o Experienced an initially high failure rate on some component parts.	o Maintained inverters in an energized condition and reworking as required, dealing with vendor to determine the cause of problem.
Batteries 24V, 125V 250V, & Racks	o Poor and improper installation.	o Insuring proper installation of batteries and racks. o Replacing, reworking, and ordering new batteries and racks as necessary.
	o Improper storage.	o Insuring that all storage requirements are met.
H&V (General)	o Poor and improper maintenance has caused damage to dampers and motors (bearing problems).	o Cleaning and reworking as necessary.
Valves (General)	o Poor and improper storage has caused damaged seals, shafts, and bonnets.	o Clean, inspect, rework, and replace as necessary, stroke and insure smooth operation.

TABLE 2 (Condt)

Equipment Inspected	Typical Findings	Corrective Action
Instrumentation (General)	o Poor and improper storage has caused damage.	o Clean, inspect, functionally test and replace as necessary.
	o Improper instrument.	o Replaced with correct instruments.
	o Open NCRs on Contract 58, instrument racks shipped with some instruments missing.	o Insure instrument is installed, functionally test and close NCRs.
Electrical (General)	o Poor and improper maintenance of installed equipment.	o Clean, inspect, test, and replace as necessary.
	o Incorrect installation and design.	o Obtain redesign via B&R engineering and insure correct installation.
	o Incorrect or no fuses or overloads.	o Installed correct and needed items.

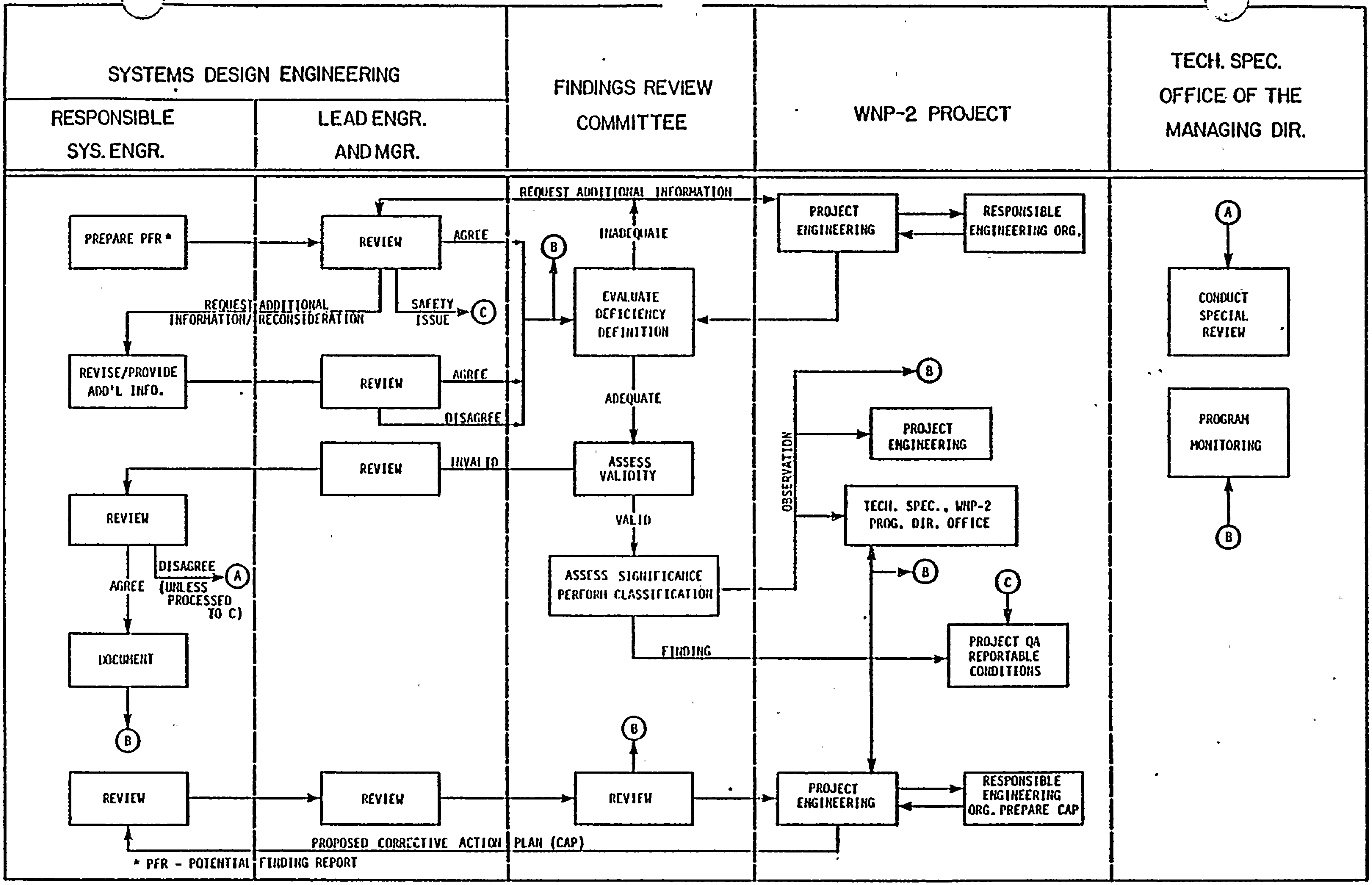
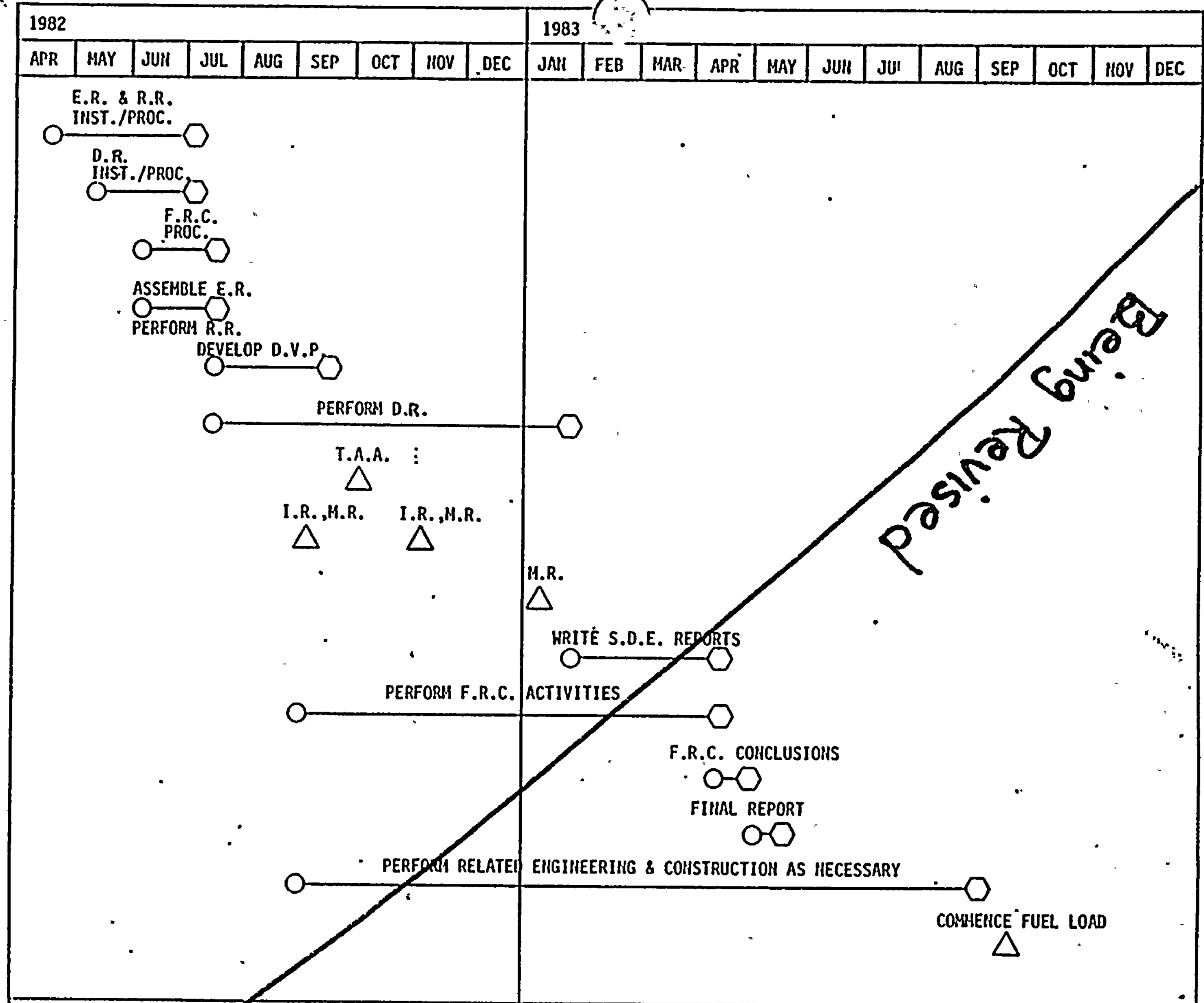

SYSTEMS DESIGN ENGINEERING
RESPONSIBLE SYS. ENGR.
LEAD ENGR. AND MGR.
FINDINGS REVIEW COMMITTEE
WNP-2 PROJECT
TECH. SPEC. OFFICE OF THE MANAGING DIR.
PREPARE PFR*
REVIEW
AGREE
REQUEST ADDITIONAL INFORMATION
INADEQUATE
PROJECT ENGINEERING
RESPONSIBLE ENGINEERING ORG.
B
A
REQUEST ADDITIONAL INFORMATION/ RECONSIDERATION
SAFETY ISSUE
C
EVALUATE DEFICIENCY DEFINITION
CONDUCT SPECIAL REVIEW
REVISE/PROVIDE ADD'L INFO.
REVIEW
AGREE
DISAGREE
ADEQUATE
OBSERVATION
PROJECT ENGINEERING
PROGRAM MONITORING
REVIEW
INVALID
ASSESS VALIDITY
VALID
TECH. SPEC., WNP-2 PROG. DIR. OFFICE
REVIEW
DISAGREE
AGREE
(UNLESS PROCESSED TO C)
ASSESS SIGNIFICANCE PERFORM CLASSIFICATION
FINDING
PROJECT QA REPORTABLE CONDITIONS
DOCUMENT
REVIEW
REVIEW
REVIEW
PROJECT ENGINEERING
RESPONSIBLE ENGINEERING ORG. PREPARE CAP
PROPOSED CORRECTIVE ACTION PLAN (CAP)
* PFR - POTENTIAL FINDING REPORT

FIGURE 6



NOTES:

ENGINEERING RECORD	E.R.	SUPPLY SYSTEM(SDE) INTERIM REPORTS	I.R.
REQUIREMENT REVERIFICATION	R.R.	SUPPLY SYSTEM MANAGEMENT REVIEW	M.R.
DESIGN REVERIFICATION	D.R.		
SYSTEMS DESIGN ENGINEERING	S.D.E.		
TECHNICAL AUDIT ASSOCIATES	T.A.A.		

FIGURE 7

APPENDIX A

APPENDIX A

DEVELOPMENT OF DESIGN

WNP-2 has a standardized, BWR-5 NSSS which was designed under the General Electric BWR Quality Assurance Program. Based on this standardization and the numerous reviews and audits performed on the NSSS design by GE and other utilities, the focus of this Appendix is primarily on Burns and Roe, the Architect Engineer, in the following areas:

- o Organization,
- o Design process, and
- o Design interface with other organizations.

In addition, a review performed by the Supply System to determined the adequacy of past and ongoing design verification for the Burns and Roe and contractor (excluding NSSS supplier) designs is discussed.

The General Electric design control program is presented in Attachment 1 (GE letter GEWP-2-82-17) to this Appendix. This attachment is a brief statement of their program; however, extensive details are provided in the NRC approved, GE Quality Assurance Topical Report, NEDO-11209-04A.

Supply System Corporate Quality Assurance (QA) routinely audits the General Electric activities associated with WNP-2. As with Burns and Roe, these audits evaluate compliance with SAR commitments, 10CFR50, Appendix B, ANSI N45.2, and implementing procedures. The audits are performed on the various GE facilities which interact with WNP-2 through design, procurement, or fabrication (including fuel). Typically, two (2) or more audits are performed on GE per year.

The audits are procedurally controlled and documented. QA deficiencies are discussed with GE Project Management, resolved, and re-audited to verify implementation of corrective action.

Examples of areas audited include:

- o GE audit performance,
- o Procedure compliance in general,
- o Control of design changes,
- o Technical interface controls,
- o Control of purchase orders,
- o Shipment and protection of reactor pressure vessel with internals,
- o FSAR review cycle,

- o Design control,
- o Drawing control,
- o Design verification, and
- o Calculations.

The performance of these audits has provided additional assurance to the Supply System of the adequacy of the GE design for WNP-2. The audits have confirmed the extensive documentation of the GE design process based on their implementation of ANSI N45.2.11 in 1975 and the use of the standardized, GE BWR Quality Assurance Program which was approved by the NRC in 1976.

A. Burns and Roe Organization

1. Pre-January 1, 1976

Burns and Roe had a number of Divisions through which it carried on its Corporate business. Of major interest relative to design are the Power Engineering Division and the Project Operations Division.

The Power Engineering Division had within it, among other departments, the Chief Engineers who through a Deputy Director reported to the Vice President, Power Engineering Division. Each Chief Engineer had a limited number of Supervising Engineers who acted in their behalf due to the number of projects in progress. It was the function and responsibility of each Chief Engineer, or his delegated Supervising Engineer assigned to a project, to establish criteria in his particular discipline for the overall plant design, to review the work on a periodic basis, and to approve drawings and specifications.

The Supervising Engineer was not to perform the engineering and design, but was to review and approve the engineering and design documents generated by the project staff against the criteria and provide a guide to the project staff in interpretation of criteria.

The Project Operations Division provided a project with management, engineering, and design personnel to meet project requirements. The responsibility to implement the engineering criteria established by the Chief Engineer (Supervising Engineer) resided in the Lead Engineer. The Lead Engineer was responsible for developing the design, calculations, specifications, and drawings for the cognizant discipline. His primary functions were to lead the discipline and to provide day-to-day direction to engineers and designers of the same discipline who were assigned to the project. He was also responsible for coordinating his group's activities with Lead Engineers of other disciplines.

During the course of the work, scheduled reviews and close liaison between the cognizant Supervising Engineer and the Lead Engineer assured that the detailed design of the project met the established technical standards and criteria. Drawing and specification sign-off authority was in the scope of the Supervising Engineer for the Chief Engineer.

2. Post-January 1, 1976

During a Burns and Roe reorganization in January 1976, all of engineering was consolidated into the Engineering and Design Division. The Chief Engineers reported, through a Deputy Director, to a Vice President who was Division Director of the Engineering and Design Division. The position of Supervising Engineer was combined with the Lead Engineer position into a new classification entitled Group Supervisor, who reported to the Chief Engineer. The function of the Power Engineering Division was completely changed and for the purposes of this discussion is no longer connected with WNP-2.

The Group Supervisor represents his respective Chief Engineer on the project and carries full responsibility and authority within the scope of his discipline for the applicable project related work. He is responsible to provide technical direction for the engineering, design, and drafting efforts, including calculations, specifications, and drawings in his discipline. He is jointly responsible to the cognizant Chief Engineer and to the Project Manager for project administration, and reports to both of them. The Group Supervisor has the authority to make all technical decisions except for those specifically reserved to the Chief Engineer. Where authorized by the Chief Engineer, he applies his professional engineer's seal to drawings and specifications. However, he obtains the approval signature of the cognizant Chief Engineer on documents which define the basic criteria for the project, such as project criteria documents, general arrangements, flow diagrams, and one line diagrams of major systems.

Project Management was provided through the Project Operations Division. Project Management reports to the Vice President of the Project Operations Division. A technical decision by the Engineering and Design Division may be questioned by Project Management; however, Project Management has no technical responsibility for the project. First-line Project Management is implemented on a discipline basis by the Project Engineers. Refer to Figure 1 of this Appendix for a current WNP-2, Burns and Roe Project organization.

8. Burns and Roe Procedures

Burns and Roe established, at the beginning of the project, the necessary procedures to perform the engineering and design activities. The engineering procedures, "E", and Quality Assurance procedures, "Q", were developed from Burns and Roe standard procedures, and were subject to approval by the Supply System. As the project progressed, additional procedures were prepared to control procurement and construction activities.

In 1978, the project initiated the Project Procedures System developed to implement the Burns and Roe Nuclear Quality Assurance Manual which had been approved by the Quality Assurance Branch of the NRC. Selected procedures for the scope of services provided by Burns and Roe, modified in some instances due to project commitments, were issued to replace the "E" and "Q" series procedures. The project procedures currently in use can be related directly to the elements of 10CFR50, Appendix 8, through the procedures matrix contained in the Burns and Roe Nuclear Quality Assurance Manual. Controlled copies of the current, applicable procedures are available and in use by the various WNP-2 related Burns and Roe organizations. Table 1 of this Appendix lists the procedures related to design activities.

A copy of the earlier procedures are contained in the Burns and Roe project files.

C. Design Requirements

The design requirements for WNP-2 were developed from many sources. The major equipment vendors, General Electric (NSSS) and Westinghouse (turbine generator), dictated the interface between the NSSS and the Balance of Plant.

The environmental and geological conditions of the plant site were established by consultants to Burns and Roe and the Supply System. These conditions led to the development of site specific design requirements in compliance with State and Federal regulations, as well as industry standards for related design practice. Other design requirements were established by applicable codes and standards, and the NRC (AEC) requirements for design and construction of nuclear power plants.

1. NRC (AEC) - At the time of the development of the WNP-2 design requirements, the AEC had issued a number of minimum design standards called General Design Criteria, Appendix A of 10CFR50 (dated May 21, 1971). The nuclear (safety related) systems had to be evaluated against these General Design Criteria.

   The NRC (AEC) also issued Appendix B of 10CFR50 (dated July 27, 1970), Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants. Appendix B establishes Quality Assurance requirements for the design, construction, and operation of the structures, systems, and components.

   At the same time the AEC had also issued eleven (11) safety guides of which ten (10) were applicable to BWRs. These safety guides, although issued as guidance at that time, were included in the WNP-2 design requirements.

   Over the past decade, the NRC (AEC) requirements have evolved through the Code of Federal Regulations, Regulatory Guides, NUREGs, Branch Technical Positions, IE Bulletins, miscellaneous directives, etc. The current requirements and commitments for WNP-2 are primarily identified in the PSAR and FSAR.

2. NSSS - In 1970, specifications for the NSSS were prepared by Burns and Roe and issued for bid to Westinghouse, Combustion Engineering, Babcock & Wilcox, General Electric, and Gulf General Atomics. General Electric (GE) was awarded the contract on March 23, 1971. Design requirements for the NSSS were developed by GE, including the reactor and primary system detailed configuration and the containment envelope requirements. For auxiliary services and systems within the NSSS contract scope, GE provided specifications, flow diagrams, and NSSS requirements imposed on the Balance of Plant (BOP) systems. These requirements formed the basis for the majority of the safety systems in the plant. A listing of the documents provided by GE is available in the Burns and Roe Project Technical Control Log.

3. Turbine Generator - The contract for the turbine generator was awarded to Westinghouse on May 2, 1967. This early date was selected to assure that the Supply System obtained a place in the Westinghouse order line for this long lead item, even though the detailed requirements for the turbine generator were not known at the time. The contract was let for an 1100 MW machine with estimated steam and back pressure conditions. Westinghouse provided detailed requirements for the interface of its equipment with the remaining BOP equipment and the NSSS. A listing of the documents furnished by Westinghouse and other vendors and contractors is available in the Burns and Roe Project Technical Control Log.

4. Environmental - WNP-2 environmental requirements are contained in the Environmental Report, originally prepared and submitted to the AEC in support of the request for a Construction Permit. In addition to members of its own staff, the Supply System utilized independent consulting firms and individuals specializing in the various disciplines to assess pertinent environmental aspects of the WNP-2 design, the site, the surrounding environment, and the interaction with local and regional environments.

   The Environmental Report, Construction Permit stage, focused on the impact of construction. In 1977, the Environmental Report, Operating License stage (EROL), was submitted. The EROL focused on the impact of operation. The NRC completed their review and issued the final Environmental Statement in December 1981.

5. Geology - Available information included geologic and seismic information provided from a reservoir of subsurface data based on geologic observations and studies conducted near the site from 1903 to 1945 (reconnaissance geology), 1945 to 1970's (groundwater characteristics and bedrock studies), and in the 1960's to present (seismic history and potential seismic activity).

   Soils investigations in 1971 and 1972 provided the subsurface conditions and design parameters for foundations under plant structures and for the general site area. Field and laboratory tests were performed on samples recovered from borings and test trenching to determine physical, chemical, static, and dynamic soil properties.

   In recent years, the Supply System Hanford Geology Program was developed and will remain as an ongoing activity to maintain an understanding of the contemporary geologic process in the Columbia Plateau and recent geological findings. This will ensure the acceptability of the safe shutdown earthquake for the plant. Members of the program's advisory panel include Weston Geophysical Research, Woodward-Clyde Consultants, Northwest Energy Services Co., United Engineers and Constructors, and Burns and Roe.

6. Codes and Standards - The use of codes and standards for the most part were imposed on the design of WNP-2 by regulatory and State requirements. In other cases, the designer elected to reference applicable codes and standards as requirements in the design documents in lieu of describing detailed requirements. Appropriate editions and addenda of the codes and standards were used in the design of WNP-2. A complete listing of those imposed are contained in the various contract specifications; the principal codes are also referenced in the PSAR/FSAR.

D. Design Documents

1. General Arrangements - The general arrangement (GA) drawings were initially begun by using the Cooper Nuclear Station (CNS) GA's as a model with appropriate changes for the increased NSSS size (1100 MW versus 800 MW). The major difference between CNS and WNP-2 was the containment configuration. CNS used the inverted light bulb design with a torus, while WNP-2 used the over-and-under containment. This difference had to be accommodated in the WNP-2 GA's. As information was obtained from GE, Balance of Plant equipment suppliers, and Supply System preferences were resolved, the GA's were revised accordingly. Supervising Engineers reviewed these drawings bi-weekly during peak development periods, and at the 70% and 100% completion stage in accordance with Burns and Roe procedures.

   The original issue of these drawings were contained in the PSAR. As the design developed, the GA's were revised accordingly.

2. Flow Diagrams - Flow diagrams were divided into two main categories, NSSS and BOP. The Burns and Roe NSSS flow diagrams were developed from GE flow and process diagrams. They were supplemented by line, valve, and equipment designations unique to WNP-2 to provide a uniform system of identification compatible with BOP systems. These diagrams were updated as the overall design developed. Flow diagrams for systems subsequently added to the plant (e.g., Main Steam Isolation Valve Leakage Control System) were developed as the need arose.

   BOP flow diagrams were initially developed using CNS flow diagrams as a guide. As system information became available, these diagrams were updated as required. Instrumentation requirements obtained from GE, equipment suppliers, and the Supply System, were combined with Burns and Roe requirements and included in the design. Diagrams were reviewed for criteria compliance by the Supervising Engineers at the 70% and 100% completion stages in accordance with Burns and Roe procedures.

   There was a continual interchange of information between the project disciplines during the development of the flow diagrams. Reviews by the Lead Engineers with their comments are recorded on marked copies of the flow diagrams. These diagrams are available in the Burns and Roe project files.

3. One Line Diagrams - One line diagrams were developed in accordance with the criteria and direction provided in the Burns and Roe Engineering Criteria Document and the Engineering Standards. Source documents for these diagrams included:

   o Motor and valve lists (equipment to be supplied),

   o Burns and Roe Technical Memorandums (economic and technical analyses),

- o Vendor requirements (primarily NSSS),
- o Supply System requirements (power system interface),
- o Calculations, and
- o Engineering sketches.

The diagrams were approved by the electrical engineering discipline, with a concurring review sign-off by the nuclear and mechanical engineering disciplines.

4. Logic Diagrams - Logic diagrams were prepared by the instrumentation and controls (I&C) discipline to illustrate system operation and to provide information for the preparation of electrical control diagrams (elementary diagrams).

   The logic diagrams were divided into two main categories:

   - o NSSS (GE) supplied logic diagrams, and
   - o Balance of Plant logic diagrams.

   The BOP logic diagrams were also divided into two categories:

   - o BOP logic diagrams prepared by the turbine manufacturer, known as the Automatic Turbine Control Flowcharts and the BWR-DEH Control System Diagrams, and
   - o Other BOP logic diagrams prepared by Burns and Roe.

   The Burns and Roe BOP logic diagram developement program had several sources. System design descriptions or Technical Memorandum were issued by the cognizant system engineers which described major points of consideration in system functional requirements. System configurations and essential features, equipment performance specifications, and limits were also obtained from Burns and Roe specifications, vendor supplied specifications and drawings, meetings with vendors, and various correspondence.

   The logic diagram, upon completion, was reviewed by the cognizant electrical, mechancial, nuclear, Lead Engineers and Group Supervisors to assure conformance to system requirements. This review is documented by the appropriate reviewer's signature on the logic diagram.

5. Elementary Diagrams - Elementary diagrams were developed by the electrical engineering discipline using NSSS, Burns and Roe, and vendor logic diagrams.

For NSSS components, preparation of elementary diagrams consisted mainly of reformating GE data. For BOP components, elementary diagrams were developed from the I&C discipline logic diagrams. The diagrams were approved by the electrical engineering discipline, with a concurring review sign off by the engineering discipline whose equipment was addressed on the particular drawing.

6. PSAR/FSAR - The Preliminary and Final Safety Analysis Reports (PSAR and FSAR) contain the commitments made by the Supply System to the NRC for WNP-2 design, construction, and operation.

The PSAR was prepared as a part of the Application for a Construction Permit (CP), and thus contains commitments related to the design bases for WNP-2. The PSAR was prepared by Burns and Roe and reviewed by the Supply System and General Electric, as appropriate. The PSAR commitments were revised and new commitments added as a result of NRC (AEC) review of the PSAR.

The FSAR was prepared as a part of the Application for an Operating License (OL) and contains, in addition to the design bases, more direct operational commitments. This report was also primarily prepared by Burns and Roe, but with much more involvement in both preparation and review by the Supply System staff. This is due mainly to the fact that 1) the Supply System staff was considerably larger than during the PSAR preparation, and 2) the operational commitments impact the manner in which the plant will be staffed and operated. A Supply System Lead Technical Reviewer or author has been assigned responsibility for each FSAR section. Approval by the Lead Technical Reviewer is required prior to initial approval of the section or any modifications thereto.

The Lead Technical Reviewer is responsible to assure that the section is technically correct, meets NRC requirements (Code of Federal Regulations), and appropriately addressed NRC guidance documents, e.g., Regulatory Guides, Standard Review Plans, and Branch Technical Positions. In addition to a Lead Technical Reviewer, most FSAR sections were also assigned a secondary reviewer. In general, the secondary reviewers were selected from central Supply System organizations or a project organization other than that of the Lead Technical Reviewer. Final approval of an FSAR section or changes thereto require the approval, not only of the Lead Technical Reviewer, but also the Plant Manager, Project Engineering Manager, Licensing, and the Deputy Director, Safety and Security. Documentation of the SAR review process is maintained as part of the WNP-2 licensing files.

Supply System contractors (principally Burns and Roe and GE) utilized similar, formalized internal procedures for preparation, technical review, and control of FSAR sections and licensing reports.

The Nuclear Regulatory Commission (NRC) conducted an extensive review of the WNP-2 FSAR which involved hundreds of formal questions and numerous meetings between the NRC staff and consultants and the Supply System staff and contractors.

The comprehensive process of preparation and review of the Safety Analysis Reports (PSAR and FSAR), along with the strict control of SAR changes and NRC commitments, represents a significant element in ensuring that the WNP-2 design requirements were appropriately specified and implemented.

7. Engineering Criteria Document - The Engineering Criteria Document, together with the PSAR/FSAR (including amendments), defines the basic engineering and architectural concepts that were followed in the design of WNP-2 to assure a soundly engineered project. These documents contain the technical and functional requirements (including applicable regulatory requirements, design bases, and other industry and quality standards) that govern the design of the overall plant.

   Each section of the Engineering Criteria Document was prepared by the cognizant Supervising Engineer (Group Supervisor, after 1976) and approved by the Chief Engineer in that discipline. The criteria were divided and categorized under architectural, civil/structural, electrical, mechanical, nuclear, instrumentation, and stress.

   The detailed engineering and design effort proceeded in accordance with the approved criteria document. Of necessity during the course of a project of this duration and complexity, criteria had to be added or modified. Therefore, periodic additions and revisions were made using a controlled system, Project Criteria Advance Change, which provided the revised data to all participants pending the issuance of a formal revision of the Engineering Criteria Document. Each change/addition was originated by the cognizant Supervising Engineer/Group Supervisor and approved by the Chief Engineer in that discipline. Documentation of the Chief Engineers' approval is contained in the Burns and Roe project files.

8. Technical Memorandum - The Technical Memorandum is a document whose original purpose was to record the results of special engineering studies that were developed during the course of the project and to distribute these data internally to cognizant engineering personnel. Later, these documents were also used to submit the engineering information to the Supply System for information or approval, as applicable. Each Technical Memorandum has a unique chronologically controlled number. The index to the memoranda is by number reference with subject and title, enabling access to specific topics. Each memorandum is prepared by cognizant engineering personnel, reviewed by the cognizant Group Supervisor and by Project Management prior to issuance. There is no formal approval cycle for the Technical Memorandum other than the sign-off of the memo itself.

9. Engineering Sketches - Engineering sketches are uncontrolled documents utilized by engineering personnel primarily for the following:

   - Preliminary studies,
   - Development of design details, and
   - Economic analyses and cost comparisons.

   The sketches do not require checking and approval. Their numbering is controlled and they are filed as a collected body of documents.

   Where sketches are utilized to develop design details, they are transmitted to the Design and Drafting Group for incorporation into design drawings. The engineering review, checking, and approval is, therefore, performed on the final design drawing.

10. Engineering and Design Standards - The Engineering and Design Division has a Standards Department responsible for the developement of the Engineering and Design Standards. Senior engineers are assigned to this department to prepare technical standards to be used by all Burns and Roe projects. Each engineer has access to a copy of the standard developed for his discipline. Each standard and each revision to a standard is approved by the cognizant Chief Engineer. When the design of WNP-2 was started, the standards had not been formalized and, therefore, were not imposed. As the standards were formalized, instructions were issued that they be used for future work on WNP-2.

E. Detail Design

The detail design of WNP-2 was procedurally controlled in accordance with the requirements of 10CFR50, Appendix B. These procedures provided for the establishment of design criteria, utilization of the criteria during the detail design effort; design interface review, independent reviews, and design change control in accordance with requirements established for the original design. The detail design process used the established design requirements to generate calculations to support the development of design drawings and specifications to control the procurement, fabrication, and construction of structures, systems, and components.

1. Calculations

Calculations were performed to develop the detail design requirements of the structures, systems, and components. The results of these calculations were used to develop the design drawings and design specifications. These calculations were prepared, independently checked, approved, and revised in accordance with a documented procedure. The procedure required the use and identification of applicable criteria, assumptions, and references used in the performance of the calculation. If assumptions were used that required verification at a later date, the procedure requires the verification of the adequacy of these assumptions prior to finalization of the calculation. When the design required modification as a result of assumption resolution, the procedure required that appropriate action be taken to correct the design. Calculations were approved by the cognizant Supervising Engineer/Group Supervisor. Evidence of the approval is demonstrated by sign-off on the calculation.

Before a calculation is started, the details of the assumptions made, the codes to be followed, etc., are listed on a lead sheet. In order to avoid misdirection in design, this lead sheet was concurred to prior to performance of the calculation.

2. Specifications

Prior to the preparation of design specifications, procedures were developed to control their preparation, review, and approval. The procedures provided for the generation of various internal, external, and final issues of design specifications. The design specifications prepared for WNP-2 are composed of bidding documents and plans and specifications. The bidding documents requested the submittal of contractural, technical, and Quality Assurance information with the bid to evaluate the adequacy of the bid. The plans and specifications provide the contract conditions, contract drawings, if applicable, and technical and Quality Assurance requirements. The specification division designations used followed those established by the Construction Specification Institute.

Each design specification typically contains a technical section, contractor Quality Assurance requirements (specific section for safety-related components), special process and welding requirements, as applicable, and general and special conditions. The development and processing of design specifications were monitored by a specification coordinator who was responsible to assure implementation and compliance with procedural requirements.

Burns and Roe Project Management and the Supply System determined the scope of work to be included in each design specification. Based on the scope of work, each Lead Engineer involved would assign a cognizant engineer to prepare their discipline's technical requirements or section for the design specification. These drafts were reviewed by the Lead Engineer before they were given to the specification coordinator. Upon receipt of all technical sections, the specification coordinator assembled the drafts into a design specification. The drafts became the Burns and Roe Comment Issue and contained all the sections, technical, non-technical, and bidding documents, required for a design specification. The Burns and Roe Comment Issues were routed with a specification review and approval signature sheet to each discipline providing input and Quality Assurance for review, and then to Burns and Roe Project Management and the cognizant Supervising Engineers for approval. Comments generated during the reviews were documented in the routed copy and initialed by the reviewer. After completion of the review cycle, the comments generated were either accepted for incorporation into the next issue of the design specification or resolved by the preparer of the draft with the reviewer making the comment.

The Burns and Roe Comment Issue preparation, review, approval, and comment resolution as described above was typical for each of the design specification issues prepared. The issues of a design specification were the Burns and Roe Comment, Client (Supply System) Comment, Client Concurrence, and the Bid Issues. Each of the issues that were routed for review and approval are filed and maintained in the Burns and Roe specifications history file.

The final issue of a design specification is the Bid Issue. The approval of this issue by Burns and Roe and the Supply System Project Manager is documented on the design specification's Bid Issue Approval Sheet prior to sending the specification to prospective bidders.

During the bidding period, changes to design specifications were accomplished through design specification addenda. Addenda were prepared by cognizant engineers and reviewed and approved only by those disciplines and Supervising Engineers involved in the change and who reviewed and approved the original design specification.

Bidder proposals were received by the Supply System and copies were transmitted to Burns and Roe for review and recommendation for contract award. The proposals were reviewed by the cognizant discipline engineers for technical content, by Quality Assurance for quality requirements, and by Project Management for overall adequacy. Recommendations for award were documented by the reviewers and incorporated in a letter to the Supply System.

Changes to the design specification were prepared, reviewed, and approved in the same manner as the original design specification. The initiating document for a change was the Project Change Notice (PCN) which is described below under drawings.

3. Drawings

Design drawings were prepared to control the design, component fabrication, and construction of WNP-2. The construction drawings were developed based on the general arrangement drawings, flow and one line diagrams, and structural, system and component detail design requirements developed through calculations and contractor provided design requirements. Drawing preparation, review, approval, changes, and controls were established by documented procedures. These prodedures provided for drawing format, identification and revision control, periodic reviews during development, interdiscipline review, design and drafting checks, engineering reviews, and formal approval by Burns and Roe and the Supply System.

The actual preparation of design drawings was an iterative process between the various engineering disciplines providing the necessary information to complete a drawing.

Because of this iterative process, interdiscipline reviews were performed and several check prints were issued during the development of design. These check prints were checked by design and drafting personnel to an established checklist and then routed for review to the various discipline engineers who provided the drawing input. Prior to 1976, this review included cognizant discipline and Lead Engineers, and the cognizant Supervising Engineers. The Supervising Engineer reviewed and signed a comment print and associated calculations to assure the design inputs were reflected in the design. Since 1976, the cognizant Group Supervisors have provided this review. Upon resolution of all comments, the drawings were routed for final engineering review and approval with the latest comment print. Upon approval, drawings would be issued for information, bid, fabrication or construction, depending on project needs. The comment print was filed. The comment prints and the final drawing provide the documented evidence of the Burns and Roe interdiscipline and independent drawing review for WNP-2.

Drawing changes were processed in accordance with the requirements for the preparation of the original drawing. However, the technical changes were identified in Project Change Notices (PCN).

In 1978, the Project Engineering Directive (PED) was initiated as the change mechanism to forward design changes to the construction contractors. Similar to the PCN, the PED control process required interdiscipline review as applicable. Refer to the following subsection for design change control details.

Drawing control is currently maintained through the Drawing Control Log (DCL) which lists each design drawing, the drawing's current revision level, and changes/PEDs issued against each drawing that have not been incorporated. The DCL is a controlled document which is updated bi-weekly to reflect the incorporation of PEDs, the revision of drawings, and new, unincorporated changes/PEDs. This document is distributed in a controlled manner to project organizations and construction contractors.

F. Design Change Control

The preparation, review, and approval of the detailed design documents were previously described. This subsection discusses the controls for changes to these documents.

1. Project Change Notice (PCN)

Burns and Roe uses a formal procedure to revise contract documents after they have been released for construction and issued to the Supply System and/or the contractors. In the New York office, revisions of contract documents such as drawings and specifications can only be made by issuance of a Project Change Notice (PCN). The PCN is a form completed by the originator of the change and records the description of the change, the reason for the change, the impact of the change on budget and capital costs, the impact of the change on schedule and the estimated engineering costs, and schedule by discipline for implementation of the change. The PCN is approved by appropriate levels of management. Each PCN is reviewed by all engineering and design disciplines in a meeting, prior to starting the work, to discuss the interdiscipline effects of the change, and the total impact on the plant. An adminstrative control system is used to ensure close-out of the PCN after the design work specified has been completed and issued by revision of the affected project documents.

After the work on the PCN is completed, the cognizant Group Supervisor prepares a draft contract Change Order describing the change, the reason for it, and incorporates the revised drawing and specifications. If the change involves modification of the technical content of the specification, the cognizant Group Supervisor signifies Burns and Roe approval by signing and sealing the last page of the original copy of the Change Order with his professional engineering stamp. The change is formally routed among the engineering disciplines involved with the change for signature approval. After review, it is sent to the contractor who indicates his approval of the change by executing and forwarding copies to the Supply System. The Supply System indicates acceptance of the change by executing and distributing the final Change Order.

Subsequent to August 1978, changes to construction contracts were made by the issuance of a Project Engineering Directive (PED) rather than changes to the drawings and specifications directly. The PED is incorporated at a later date at which time the appropriate professional engineer's seal is applied to the drawing or specification change.

2. Contract Waiver Request (CWR)

The Contract Waiver Request (CWR) was used by the Burns and Roe, New York office. A CWR is originated by a prepurchased contractor to propose a deviation from a specified requirement. Examples of the conditions subject to waiver are material substitution, configuration or material changes of hardware items, and deviations in performance characteristics. The cognizant engineer dispositions the waiver request consistent with consideration for the design needs, and evaluates the overall effects and interface possibilities that arise if the waiver is approved. The CWR is then submitted for review and approval by Burns and Roe Quality Assurance and Burns and Roe Project Management before being returned to the contractor.

3. Nonconformance Report (NCR)

Nonconformance Reports (NCRs) are prepared to identify and report nonconformances (i.e., deficiencies in characteristics, documentation, or procedure which renders the quality of an item or service unacceptable or indeterminate) during fabrication or construction. The requirements for the control of nonconforming items have been part of all construction contracts since the beginning of WNP-2 construction.

All NCRs are dispositioned by Burns and Roe and concurred with by Quality Assurance. Nonconformances which violate commitments to the Safety Analysis Report, design criteria, design bases or design margin with respect to performance or safety are presented to the Nonconformance Review Board, which includes representatives of the Supply System, for final disposition. Prior to 1980, the Burns and Roe site office only dispositioned those NCRs within their authority as defined by procedures. All other NCRs were deferred to New York for disposition. Since 1980, when Group Supervisors were assigned to the site, no distinction is made between the engineering authority of the site and New York office for NCRs. Therefore, the majority of NCRs are dispositioned at the site.

Originally, NCRs were required for all quality class nonconformances. When WNP-2 Construction Management became an integrated organization (Burns and Roe and Supply System), NCRs became required only for nonconforming conditions related to Quality Class I and Seismic Category I items. Quality Class II and G, Non-seismic Category I nonconforming conditions then became controlled by contractor programs.

All NCRs which approved deviations to design drawings or contract specifications caused the initiation of an engineering change document, e.g., PCN or PED, which in turn caused a drawing and/or specification to be revised.

NCR records have been maintained throughout the life of the project and are available in the WNP-2 project files.

4. Project Engineering Directive (PED)

A PED is a document originated by a responsible Burns and Roe engineer, in either the New York office or at the site engineering office, to provide a contractor with new or revised engineering and construction direction. The originating discipline for the PED has the responsibility to identify needed interdiscipline reviews. The performance/results of the interdiscipline reviews are recorded on work sheets and filed. PEDs include revisions to approved drawings, specifications, procedures, or solutions to problems requiring engineering direction. The PED contains the necessary details pertinent to a work scope to fully identify construction or implementation requirements. The PED is considered by the contractor as official technical direction from Burns and Roe carrying the technical authority of the original approved-for-construction drawings and specifications. This system facilitates more timely action which minimizes the impact of changes on contractor engineering, and facilitates maintenance of the construction schedule. In conjunction with the PED, the Drawing Control Log (DCL) is used to record a listing of the latest issued revisions of Burns and Roe contract drawings and the PEDs against each of these drawings that have not been incorporated. Similarly, the Specification Control Log (SCL) records all changes made to the technical specifications by PEDs not yet incorporated into the specification.

5. In addition to the above general Burns and Roe design controls, the Burns and Roe site engineering organization has and is utilizing the following to maintain control of design documentation and changes thereto:

   a. Request For Information (RFI) - The Request for Information (RFI) started as a simple device for the construction contractors to obtain answers and minor direction on daily construction problems. These problems included, but were not limited to, technical information clarification, resolution of various contractor interfaces, and Construction Management interface. These RFIs were answered by Burns and Roe site engineering within the constraints of procedures delineating the authority of site engineers on technical matters.

   In an effort to simplify and speed-up the communications between the construction contractors and Burns and Roe Engineering (site and New York), the purpose and scope of the RFI was expanded in February 1976 to include the functions of the Request For Contract Change (RCC) and the Contract Waiver Request (CWR). For those items of a significant nature (refer to Paragraph F.5.c, Request For Contract Change), Supply System review and approval of such RFIs was still required. In August 1978, when the PED became the design change document, such control by the Supply System was passed to review and approval of a PED, which complemented the RFI, based on dollar, quality class, and schedule related criteria.

Records/files of RFIs, their answers and internal routing for reviews by engineering disciplines and QA, have been maintained.

Beginning in 1980, with the transfer of Burns and Roe Group Supervisors to the site engineering organization, RFIs are no longer required to be dispositioned by the New York office.

b. Engineering Change Notice (ECN) - The Engineering Change Notice (ECN) was used to issue a change to a drawing or specification to the construction contractors on an immediate basis, where there was insufficient time to formulate and issue a change order due to status of the construction. The ECN showed the new conditions exactly as it would appear on the revised Burns and Roe drawing or specification.

The cognizant Lead Engineer at the site determined the need for an ECN. If the subject of the ECN was within the guidelines of the procedure on the authority for resolving discrepancies and nonconformances in the field, the cognizant Lead Engineer and the Resident Project Engineer could approve and issue the ECN to the construction contractor. If the subject of the ECN was not within the guidelines for resolving discrepancies and nonconformances in the field, the cognizant Lead Engineer would either have the cognizant Supervising Engineer in New York issue the ECN or he would obtain from the cognizant Supervising Engineer written authorization to issue the ECN.

All ECNs were assigned a Project Change Notice (PCN) number. This PCN was used to track the incorporation of the ECN into the revised drawing or specification. All ECNs were incorporated into the drawings/specifications by the Burns and Roe New York office. Logs and files of ECNs were maintained at the New York offices.

The use of ECNs stopped with the beginning of PEDs in August 1978.

c. Request for Contract Change (RCC) - The Request for Contract Change (RCC) was a document initiated by the construction contractors to request changes to Burns and Roe drawings and specifications. The request had to include information regarding benefit to the Supply System and whether or not the change involved a cost adjustment. RCCs could (but not necessarily) have the followings effects: change cost, change schedule, affect interfaces, modify quality class levels, require specification changes, and/or require drawing changes.

RCCs were initiated by construction contractors and submitted to the Burns and Roe Resident Project Engineer at the WNP-2 site. If the subject matter of the RCC was within the guidelines of the procedure on authority to resolve technical matters at the site, the Lead Discipline Engineer could disposition the RCC. If the subject matter of the RCC was outside the guidelines, the Lead Discipline Engineer would either send the RCC to New York or would obtain written authorization from the cognizant Supervising Engineer to disposition the RCC. After disposition, the RCC was reviewed/signed by the Burns and Roe site QA Manager and the Resident Project Engineer. RCCs which changed the quality classification of an item, affected schedule, or if it significantly increased the cost of the Project, required a review by the Supply System before being returned to the contractor. The contractor could not implement the RCC until a fully signed copy of the RCC was received.

Changes in the purpose and scope of the RFI in February 1976 eliminated the need for further use of the RCC.

G. Design Documentation Prepared by Site Engineering

With the transfer of Group Supervisors to the site in 1980, Burns and Roe site engineering was authorized to generate and issue design documentation. The authorization initially applied to hanger detail drawings, but was later extended to piping isometric and pipe whip restraint drawings.

The procedures for the generation and approval of these drawings parallel Burns and Roe, New York office procedures and Corporate standards. The drawings are issued via a controlled distribution to the contractor, Supply System and other internal Burns and Roe users. The design of the drawings are primarily changed by Project Engineering Directives (PED).

Calculations are originated and filed at the site; copies of related design calculations are sent to New York. The New York office also codes and microfilms the calculations. All calculations are prepared and controlled in accordance with approved project procedures.

Records/files are maintained at the site for all the design drawings generated by the site as well as changes to the drawings.

The methods which have been established by and for the Burns and Roe site activities for the control of design are an extension of the controls established by Burns and Roe Corporate policies. These policies have been successfully used on other nuclear power plant projects.

H. Prepurchase Vendor Interface

Major equipment items were prepurchased by Supply System to allow the timely delivery of the equipment and vendor drawings so that the proper interface could be engineered in support of schedule needs. Specifications were issued giving the performance requirements of the equipment. In addition, these specifications required the submittal of engineering and Quality Assurance documentation to Burns and Roe for review and approval. The documentation submitted was reviewed by cognizant engineers and Quality Assurance, as applicable, to assure the equipment would meet specification requirements, provide interface design information, and establish the quality program and procedures to be used for the work. The vendor document control system implemented by Burns and Roe provides for the documenting of receipt of submittals, routing of submittals to cognizant discipline engineers and Quality Assurance, and disposition of the submittals. The reviewers of each submittal dispositions and initials the document for their discipline. Upon completion of the interdiscipline review, the cognizant engineer makes final disposition of each submittal by indicating the status of the document; Approved, Approved-As-Noted, or Not Approved. Copies of the dispositioned submittals are distributed to the contractor, Supply System, and cognizant project personnel in accordance with the document distribution schedule. If the disposition of a document was other than approved, the contractor is required by contract to correct the submittal in accordance with the comments and to resubmit the document for review and approval.

The General Electric (NSSS) submittal process is different than the vendor document control system discussed above. GE submittals are processed, reviewed, dispositioned, and commented upon, but there is no requirement for resubmittal. General Electric is responsible for the NSSS design and the documents provided for BOP interface design requirements. Errors, concerns, or NSSS/BOP interface problems, identified by Burns and Roe or the Supply System, were documented in correspondence to GE. Such items were pursued to disposition and corrective action accordingly.

A vendor surveillance program was implemented by Burns and Roe to assure that prepurchase contractors were providing equipment in accordance with contract requirements. The vendor surveillance program consisted of establishing a vendor surveillance plan for each prepurchase contract, Quality Assurance program reviews, implementation audits of the program and applicable procedures, surveillance of fabrication, witnessing tests, and final inspections for release for shipment to the construction site. Each vendor surveillance was documented in a report and distributed to the contractor, Burns and Roe Project Management and the Supply System. Deficiencies were tracked and resolutions documented and distributed to appropriate project organizations.

I. Construction Contractor Interface

1. Document Review and Approval

The construction contractors are required to submit detail drawings of all the equipment they are to supply. These documents are reviewed by Burns and Roe to assure that the contractor has met the specification requirements. In some cases the contractor performed design, in which case he was required to submit the design for review and approval by Burns and Roe. Prior to submittal, transmittals were to be reviewed and checked by the contractor; therefore, the Burns and Roe review was made to assure compliance with the specification requirements; such as, use of proper loads, materials, or stresses, etc. The review procedure is similar to that outlined in Prepurchase Vendor Interface. Most of the review of contractor's design calculations were performed in the Burns and Roe New York office.

2. Burns and Roe Quality Assurance

The WNP-2 Quality Assurance organizations responsible for performing surveillances and audits of construction contractors has changed over time. Initially, Burns and Roe performed these functions until 1978 when the Supply System and Burns and Roe Quality Assurance organizations merged into an integrated organization. In the integrated organization, the Supply System became responsible for the WNP-2 Quality Assurance functions and were assisted by Burns and Roe Quality Assurance personnel. Subsequently, in June 1981, the integrated organization was disbanded and Bechtel became responsible for the contractor related Quality Assurance functions as discussed in Appendix C.

J. Supply System Assessment of Design Verification

The objective of the design verification evaluation was to determine if adequate design verification had been performed by the Supply System, Burns and Roe, and contractors on Quality Class I systems. The procedures and practices used did not result in an easily auditable process; however, it was expected that an in-depth review would substantiate WNP-2 compliance with our commitments. Efforts were undertaken to interview involved parties and gather objective evidence of design verification in Supply System files, at Burns and Roe, and within the contractor organizations. The Supply System expended several man-months reviewing in detail Burns and Roe and contractor practices, both across interfaces and within the individual design organizations. The objective evidence acquired demonstrated that design verification has occurred on WNP-2 in compliance with project commitments, PSAR/FSAR, ANSI N45.2, and 10CFR50, Appendix B.

1. Burns and Roe Design Control

The Burns and Roe design control procedures were reviewed specifically to determine their compliance with applicable requirements and to determine their implementation status on WNP-2. Additionally, extensive auditing of the design control process has been performed by the Supply System and Burns and Roe Corporate QA, refer to Appendix B.

The Burns and Roe generated documents governed by design control requirements (ANSI N45.2 and 10CFR50, Appendix B Criterion III) are calculations, drawings, and specifications. The Burns and Roe, WNP-2 project procedures governing the design control function for these or related documents are listed in Table 1.

The Burns and Roe Engineering and Design Standards have contained checklists used in the performance of calculations, and the calculation procedure requires resolution of all checker comments prior to the checker signing and initialing the calculation. The signing and initialing of the calculation by the checker is the objective evidence that the review function was performed in accordance with the Engineering and Design Standards and that comments have been resolved.

The Burns and Roe design input controls included establishing the Engineering Criteria Document. This document is based primarily on the WNP-2 SARs, Supply System requirements, and NSSS requirements. These design criteria have been procedurally controlled, as previously discussed in this Appendix.

In the design process, design inputs and contractual interfaces were considered during preparation, review, and approval of design documents. Checklists, similar to those in ANSI N45.2.11, were incorporated in the Burns and Roe Engineering and Design Standards in June 1981 and are used during the review process to ensure that the design inputs have been considered.

The design output is the result of the procedurally controlled design process discussed in the PSAR/FSAR and described in this Appendix under Design Documents and Design Detail. Changes to the design output documents are controlled the same as the original design.

It was concluded by the Supply System that the Burns and Roe design control process through the origination, checking, various reviews, and approvals of the design documents did perform the necessary design reviews/verifications to be in compliance with the WNP-2 commitments on design verification. Procedures have been in-place that control the design and design interfaces. The procedures do comply with the applicable commitments and requiremets, and the implementation is demonstrated in the design documents on file. Moreover, extensive audits over the duration of the project have not identified adverse trends in the design control area. As discussed further in Appendix B, Subsection I.C (Special Design Reviews), the adequacy of the Burns and Roe design process was further verified by design reviews.

2. Construction and Prepurchase Contractor Design Verification

Supply System engineers met with the major onsite Quality Class I construction contractors to determine the extent of their design verification efforts. A checklist was prepared and used in the evaluation, contract specifications were reviewed to determine the contractor scope of design, and the contractor's Quality Assurance manuals were reviewed to determine their commmitments to design verification. The design control methods used were discussed with contractor engineers actively engaged in the design process. Examples of design documents were randomly selected and reviewed by the Supply System to determine the depth of design review performed, both "in-house" by the contractor and by Burns and Roe. The onsite contractors reviewed were:

Contract No.	Contractor
213	Pittsburgh-Des Moines Steel Company (PDM) (Containment)
215	WSH/Boecon/GERI (WBG) (Mechanical)
216	Waldinger Corporation (HVAC)
217	Sentry Automatic Sprinkler Company (Fire Control)
218	Fischbach/Lord Electric Company (Electrical)
220	Johnson Controls (Controls)

Burns and Roe engineers, both onsite and at the New York office, were interviewed to determine how they review design document submittals from contractors.

Additionally, prepurchase equipment suppliers were contacted and efforts made to visit their design offices to review design control and verification procedures. The suppliers (contracts currently closed) refused to allow access for this review; therefore, the Burns and Roe files were used to review related design documents. A checklist was used and similar preparations were made to perform the review. The prepurchase contractors reviewed were:

Contract No.	Contractor
41A	Velan Engineering (Nuclear Valves)
53	Stewart and Stevenson, Inc. (Diesel Generators)
67	H. K. Porter (Air Handling Units)

The conclusion from this review was that adequate design verification has occurred on contractor designs. The contractor design documents were prepared and reviewed/checked by different engineers. Frequently, the design documents were also reviewed by an organization on subcontract to perform specific design functions or analyses, including design verification. In addition, approval of the design documents was often performed by an individual other than the originator or checker.

Reviews by Burns and Roe of contractor submittals was investigated to determine the degree that they constituted design verification. While Burns and Roe states that their reviews of submittals is performed to determine compliance with the design specifications, the Supply System review concluded that Burns and Roe engineers were in fact performing design review and in some cases alternate calculations.

A review of the Burns and Roe comments noted on a random sampling of submittals indicates that the Burns and Roe reviewer performed more than a review for comparison to the specification. Specific examples indicate that assumptions and their validity, design inputs and basis, and applicable codes and standards were considered. The results of each Burns and Roe review are clearly noted. Every transmittal reviewed has the design document stamped as Approved, Approved-As-Noted, or Not Approved, with the initials of the reviewing engineer. If the reviewer felt that more comments were necessary, a separate Burns and Roe sheet was attached.

The Burns and Roe review was an independent, third party check of the contractor's design documents.

In the case of WBG, their original design and design responsibility for small-bore pipe and supports has been totally transferred to Gilbert/Commonwealth, and engineering subcontractor to Burns and Roe.

TABLE 1

BURNS AND ROE

WNP-2 PROCEDURES

PROCEDURE NUMBER	PROCEDURE TITLE
SITE SPECIFIC	
WNP-2-005	WNP-2 Indoctrination and Training Plan
WNP-2-006	Prepurchased Documentation Deficiencies
WNP-2-007	Design Change Control System
WNP-2-009	Logic Diagrams Control
WNP-2-012	Request for Information or Change
WNP-2-015	Inspection and Enforcement Bulletins and Circulars
WNP-2-016	Award of Purchase Orders (WNP-2 Project)
WNP-2-017	Project Engineering Directive (Site Actions)
WNP-2-018	Drawing Control Log (DCL) and Specification Control Log (SCL)
WNP-2-019	Project Engineering Directive (PED) Home Office/Richland Actions
WNP-2-020	Management of Controlled Proprietary Documents
WNP-2-022	Security System - Classified Document Handling Procedure
WNP-2-023	Contract Waiver Request
WNP-2-024	Review of WPPSS Test Procedures and Test Results
WNP-2-025	ASME Code Class I Stress Report Log

PROCEDURE NUMBER	PROCEDURE TITLE
SITE SPECIFIC	
WNP-2-036	Revision of GE Mylars for Contract 59 BOP Panels
WNP-2-038	Calculation Control and Microfilming Procedure
WNP-2-039	Review and Approval of Vendor/ Contractor Documents
WNP-2-040	Quality Assurance Control Requirements in Specifications
WNP-2-041	Startup Problem Report (SPR) Site Only
WNP-2-042	Vendor Drawing Update Instruction
WNP-2-043	Technical Audits of Site Engineering
WNP-2-044.1	Valve List Updating Procedure
WNP-2-044.2	Specialty List Updating Procedure
WNP-2-044.3	Equipment List Updating Procedure
WNP-2-044.4	Instrument List Updating Procedure
WNP-2-045	Project Quality Assurance Surveillance (Site Engineering)
WNP-2-046	Update of Master Copies of Construction Contract Specifications at the Richland Washington Office
WNP-2-048	Site Review and Approval of Vendor/ Contractor Documents
WNP-2-049	Distribution of Electrical Wiring Diagrams (EWDs)
WNP-2-053	Engineering Hold
WNP-2-054	Technical Audits of Contractor Engineering

PROCEDURE NUMBER	PROCEDURE TITLE
PROJECT MANAGEMENT (a)	
WNP-2-PM-000	Project Instructions
WNP-2-PM-006	Document Distribution Control (Nuclear Projects)
WNP-2-PM-008	Project Plan
WNP-2-PM-013	Indoctrination and Training of Project Personnel (Nuclear Projects)
WNP-2-PM-014	Safety Analysis Reports (Nuclear Projects)
WNP-2-PM-016	Review and Approval Signature Requirements for System Descriptions, Drawings, Technical Specifications and SAR/ER
ENGINEERING & DESIGN (a)	
WNP-2-ED-001	Engineering Review and Approval of Project Drawings
WNP-2-ED-002	Client Approval of Drawings and Specifications
WNP-2-ED-003	Reporting of Defects and Non-Compliance (Nuclear Projects)
WNP-2-ED-008	Project Criteria Document (Nuclear Projects)
WNP-2-ED-008.1	Technical Standards Applicability List
WNP-2-ED-009	Review, Certification, and Approval of Technical Specifications
WNP-2-ED-010	Calculations
WNP-2-ED-013	Special Design Review
WNP-2-ED-016	Use of Technical Standards
WNP-2-ED-019	Evaluation and Implementation of Changes to Standards Other Than Nuclear Regulatory Requirements
WNP-2-ED-020	Design Reports

PROCEDURE NUMBER	PROCEDURE TITLE
QUALITY ASSURANCE [(a)]	
WNP-2-QA-001	Audits of Project Quality Assurance Program (Nuclear Projects)
WNP-2-QA-002	Corrective Action Requests (Nuclear Projects)
WNP-2-QA-004	Processing of Nonconformance Reports

NOTE: (a) Based on Corporate Procedures

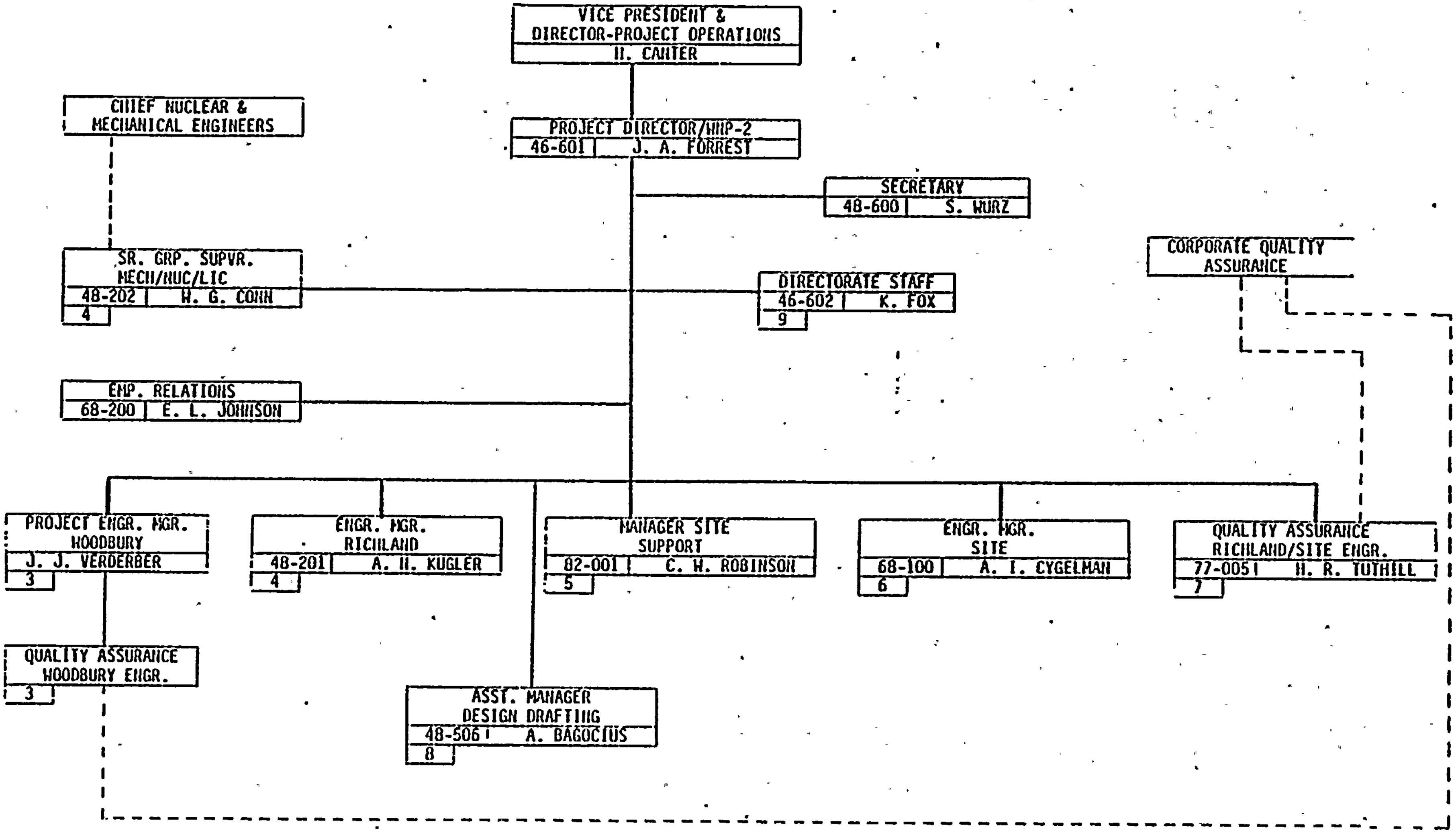


FIGURE 1

1

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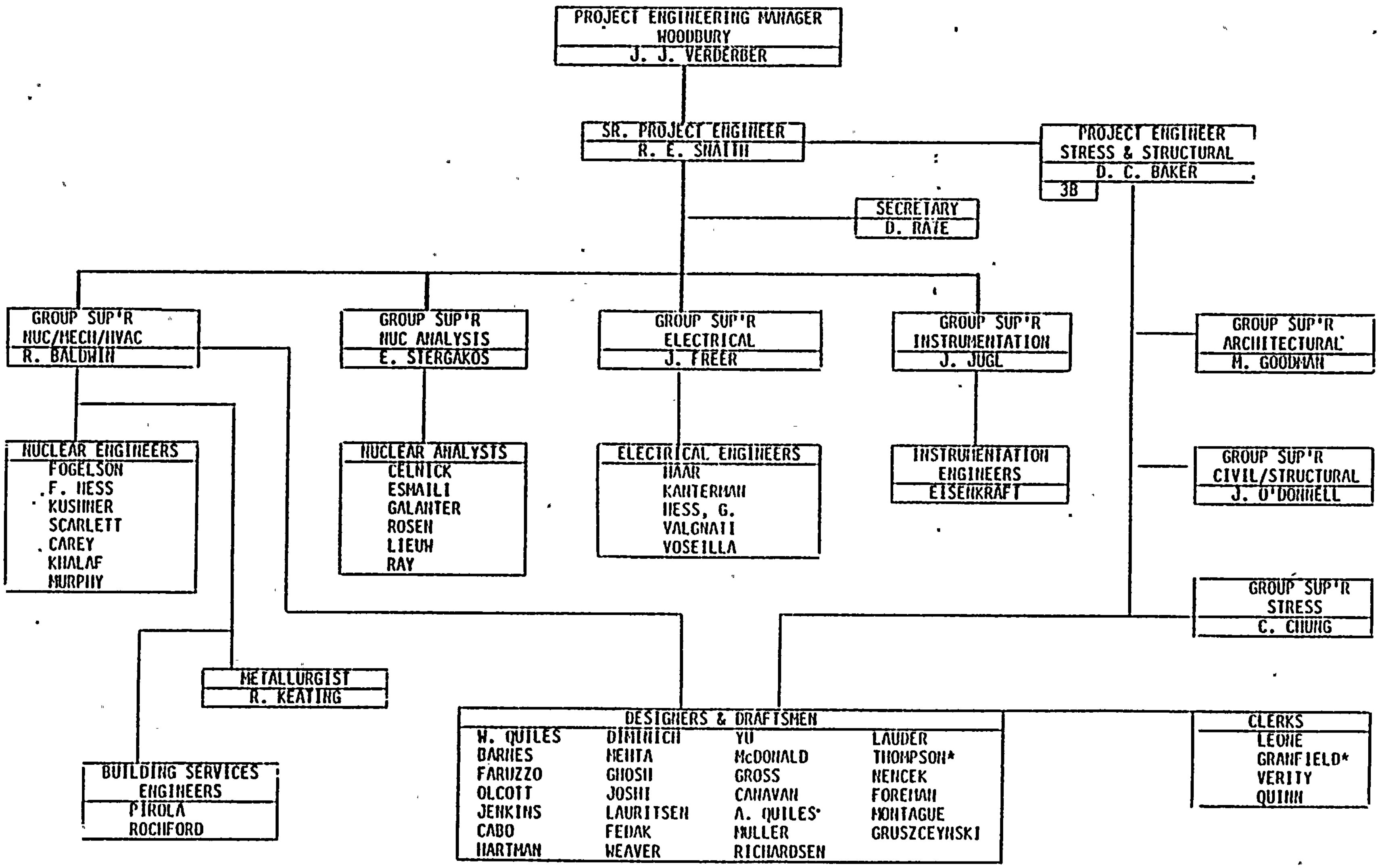

* - Part-time assignment to WNP-2

3A

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11/1/81

PROJECT DIRECTOR WNP-2
J. A. FORREST

SENIOR GROUP SUPERVISOR
48-202 W. G. CONN

ENGINEERING MANAGER
RICHLAND
48-201 A. N. KUGLER

SECRETARIES
48-205 J. KIRKHAM
48-206 T. WALKER

ADMIN. ASST.
48-208 I. A. RODRIGUEZ

PLANNING & SCHEDULING
48-256 S. K. FEIST

CLERK
48-009 J. L. TATE

MECHANICAL GROUP SUPERVISOR
48-209 T. R. McKINNEY

NUCLEAR GROUP SUPERVISOR
48-215 J. A. OGAWA

ELECTRICAL & INSTRUMENTATION GROUP SUPERVISOR
48-204 G. W. BRASTAD

PROJECT LICENSING SUPERVISOR
48-203 O. K. EARLE

MECHANICAL ENGINEERS

48-232	M. S. HARRIS
48-211	P. E. PEISTRUP
48-223	J. L. BEVAN
48-212	J. E. PARKER
48-220	H. W. MENTINK
**	L. M. POLENTZ

NUCLEAR ENGINEERS

48-210	S. R. KIRKENDALL
48-221	L. D. SHARP
48-228	P. T. MAIROSE
48-224	R. S. AYLWARD
48-218	M. C. HORNING
48-213	(OPEN)
48-214	(OPEN)
48-222	(OPEN)
48-219	(OPEN)

ELECTRICAL & INSTRUMENTATION ENGINEERS

48-234	J. G. DEL ROSARIO
48-253	S. GIANNINI
48-236	B. H. SUPREMO
48-241	J. C. SCHEETZ
48-250	B. H. HUNTINGTON
48-251	R. E. GREEN
48-252	B. J. VANEREM
48-254	S. J. STOKES
48-235	(OPEN)
48-237	(OPEN)
48-238	(OPEN)
48-239	(OPEN)
48-240	(OPEN)
48-242	(OPEN)

LICENSING ENGINEERS

48-216	A. LUKSIC
48-217	D. K. DABOLL

TECH. SPECIALIST
48-207 M. C. DUER

* CONTRACT ENGINEER

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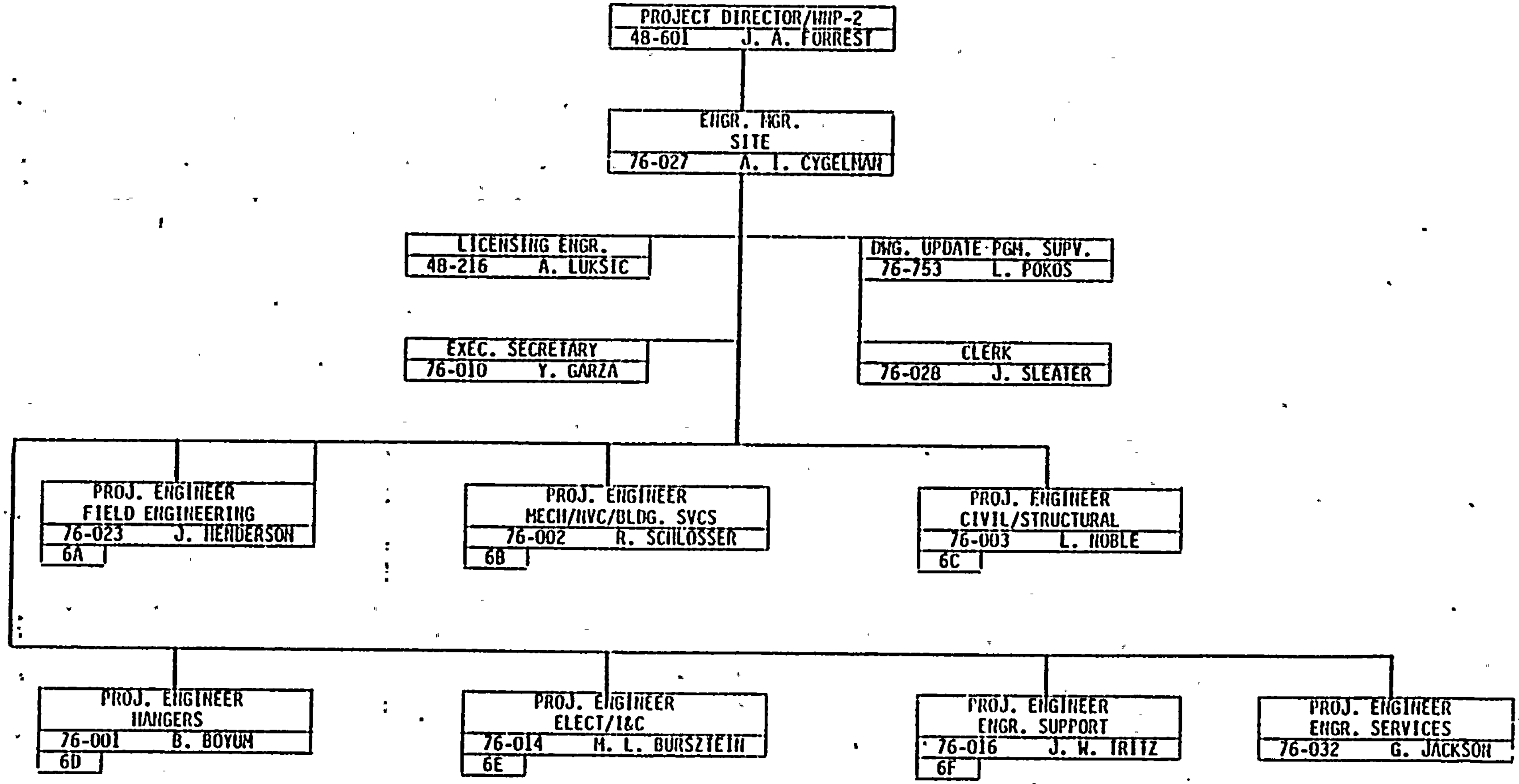
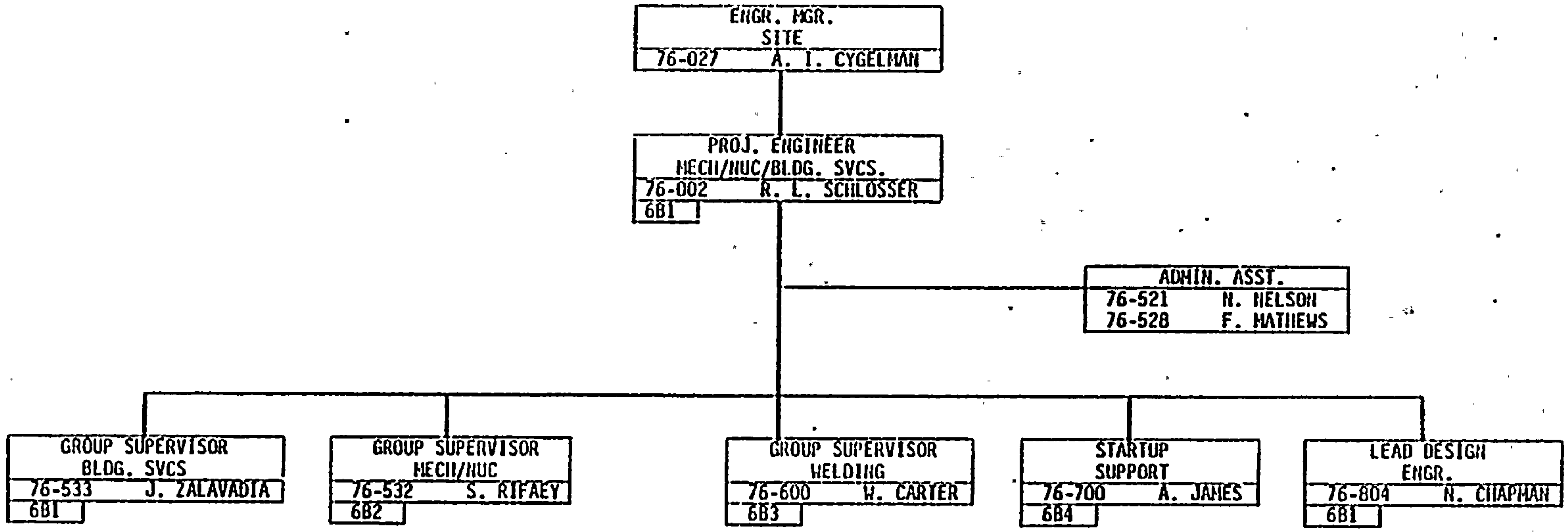

PROJECT DIRECTOR/WNP-2
48-601 J. A. FORREST
ENGR. MGR.
SITE
76-027 A. I. CYGELMAN
LICENSING ENGR.
48-216 A. LUKSIC
DWG. UPDATE PGM. SUPV.
76-753 L. POKOS
EXEC. SECRETARY
76-010 Y. GARZA
CLERK
76-028 J. SLEATER
PROJ. ENGINEER
FIELD ENGINEERING
76-023 J. HENDERSON
6A
PROJ. ENGINEER
MECH/HVC/BLDG. SVCS
76-002 R. SCHLOSSER
6B
PROJ. ENGINEER
CIVIL/STRUCTURAL
76-003 L. NOBLE
6C
PROJ. ENGINEER
HANGERS
76-001 B. BOYUM
6D
PROJ. ENGINEER
ELECT/I&C
76-014 M. L. BURSZTEIN
6E
PROJ. ENGINEER
ENGR. SUPPORT
76-016 J. W. IRITZ
6F
PROJ. ENGINEER
ENGR. SERVICES
76-032 G. JACKSON



NOTE: Typical organization below
Resident Project Engineer

GENERAL ELECTRIC
GENERAL ELECTRIC COMPANY
DOMESTIC BWR PROJECTS DEPARTMENT
175 CURTNER AVENUE
SAN JOSE, CALIFORNIA 95125

ATTACHMENT 1

EUGENE W. O'RORKE
GENERAL MANAGER

February 5, 1982
GEWP-2-82-17

Responds to: N/A

RESPONSE REQUESTED BY: N/A

Dr. R. G. Matlock
Program Director, WNP-2
Washington Public Power Supply System
P.O. Box 200
Mail Drop 906D
Richland, Washington 99352

Dear Dr. Matlock:

SUBJECT: W02808
WPPSS HANFORD 2 CONTRACT 2
GENERAL ELECTRIC DESIGN CONTROL PROGRAM

As requested by B. A. Holmberg on February 5, 1982, the following is the description of the General Electric Design Control Programs for your use in discussions with the NRC.

The General Electric commitment to provide a design control program for the Washington Public Power Supply System's Hanford 2 plant is documented in Volume V, Tab. 1, Part II of the contract. A detailed description of the General Electric design control program to be applied to the Hanford 2 plant is documented in the Preliminary Safety Analysis Report (PSAR), Volume 5, Appendix D, Sections D.4.2, "Classification of Systems & Components," and D.4.3 "Design Control." The PSAR was docketed by the AEC in August 10, 1971. The design control program described in Sections D.4.2 and D.4.3 of the PSAR addressed: classification of systems and components within the General Electric scope of supply as safety essential or non-safety essential; general design control commitments; system design; overall design review; component design; design of purchased equipment; design of General Electric manufactured mechanical equipment, fuel, instrumentation and controls; and field change control. On March 19, 1973 a construction permit for Hanford 2 was issued to Washington Public Power Supply System based in part on the above identified PSAR sections.

Beginning in August 1971, the date the PSAR was docketed, the General Electric design control program for Hanford 2 was implemented as described in the PSAR. Subsequently, however, the design control program has undergone numerous revisions, descriptions of which are contained in Section 3, "Design Control," of the following General Electric documents:

- Nuclear Energy Division Boiling Water Reactor Quality System Summary, Revision 1-T, March 17, 1971
- Nuclear Energy Division Boiling Water Reactor Quality System Summary, Revision 2, September 15, 1971
- Nuclear Energy Division Boiling Water Reactor Quality Assurance Program Description, Revision 3, June 1, 1972
- Nuclear Energy Division Boiling Water Reactor Quality Assurance Program Description, Revision 4, March 1, 1973 (NEDO-11209)
- Nuclear Energy Division Boiling Water Reactor Quality Assurance Program Description, NEDO-11209-01, May 1974
- Nuclear Energy Division BWR Quality Assurance Program Description, NEDO-11209-02, December 1975
- Nuclear Energy Division BWR Quality Assurance Program Description, NEDO-11209-03A, November 1976
- Nuclear Energy Division Group BWR Quality Assurance Program Description, NEDO-11209-04A, March 1978
- Nuclear Energy Business Group BWR Quality Assurance Program Description, NEDO-11209-04A, Revision 1, February 1980
- Nuclear Energy Business Group BWR Quality Assurance Program Description, NEDO-11209-04A, Revision 2, October 1980
- Nuclear Energy Business Group BWR Quality Assurance Program Description, NEDO-11209-04A, Revision 3, August 1981

NEDO-11209-03A, November 1976, and all subsequent revisions of NEDO-11209 have been accepted by the NRC as Quality Assurance Licensing Topical Reports.

The General Electric design control program described in NEDO-11209-04A, Revision 3, Section 3, "Design Control," addresses: general design control commitments; design interface control; system design; standard reactor island design; design of purchased engineered equipment; design of reactor equipment components; design of controls and instrumentation; design of fuel; design of high density fuel storage equipment; design verification; team design review; design change control; field change control; design change application. The design control program described in NEDO-11209-04A, Revision 3, Section 3, "Design Control," is being implemented currently on General Electric design work being done on Hanford 2.

In summary, the General Electric assurance of design control is based on a very rigorously applied design control program. We have had a QA design control program in effect since 1969 and have continuously updated this program to meet our changing organization and Regulatory requirements. As can be seen in Attachment 1 (GE Hanford 2 Design Control Program) and the NEDO-11209 documents listed above, the General Electric Design Control Program is a well defined and documented program which assures General Electric control of all design, testing and modification. The basic General Electric Design Control Program applied to General Electric work for the Hanford 2 was and is a generic program applied to all General Electric nuclear power plant design work performed from August 1971, the date the PSAR for Hanford 2 was docketed, to the present time.

Since August 1971, the General Electric Design Control Program has been audited extensively by the Washington Public Power Supply System and other General Electric utility customers. There have been as many as 30 audits a year conducted by the Washington Public Power Supply System and other General Electric utility customers during the past ten years. Additionally, the AEC/NRC has conducted two to four annual inspections of the Quality Assurance Program including at least one annual inspection of the design control program starting in 1974.

In addition to the external audits, audits are also conducted internally by NEBO. Attachment 2 summarizes the results thru 1981 of independent audits conducted by two NEBO organizations which are assigned responsibilities for audit of the GE Nuclear Energy Business Operations (NEBO) Design Control Program applied to Hanford 2 and other nuclear projects. A description of their functions and a summary of the audit results are given below:

1. Nuclear Energy Product & Quality Assurance Operation (NEP&QAO) reports directly to the Vice President and General Manager, NEBO, and is assigned responsibility for auditing the NEBO engineering and project management organizations for compliance with approved quality systems, procedures, and instructions.

2. During the past 10 years, NEP&QAO conducted 47 audits of the design control program applied to Hanford 2 and other nuclear power plants thru 1981. These audits resulted in 552 findings. Satisfactory corrective actions have been taken for 544 of the findings. Satisfactory corrective actions have been formally committed and scheduled to close out the remaining 8 items.

3. The Nuclear Reliability Engineering Operation (NREO) reports directly to the Vice President and General Manager - Nuclear Engineering Division, and is assigned responsibility for

conducting periodic audits of design activities that affect product quality. The NREO auditing organization was formed during 1975 primarily to provide assurance of compliance with the increased design control requirements stemming from ANSI Standard N45.2.II and Regulatory Guide 1.64.

4. During the past 6 years, NREO has conducted 39 audits of the design control program applicable to Hanford 2 and other nuclear power plants. These audits resulted in 212 findings. Satisfactory corrective actions have been taken for 201 of the findings. Corrective actions have been formally committed and scheduled to close out the remaining 11 findings.

The above describes the basic design control program and outlines the reasons we feel we have maintained a rigorous design control program and have confidence in our system.

Very truly yours,

E W O'Rorke

Eugene W. O'Rorke

Attachments

cc: F. A. MacLean, w/att.
R. E. Skavdahl, w/att.
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File No. 22.2

GE HANFORD 2 [illegible]GN CONTROL PROGRAM

GENERAL

- DESIGN REQUIREMENTS DEFINED - ACTIVITIES CONTROLLED BY DOCUMENTED SYSTEMS AND PROCEDURES.
- QUALITY REQUIRMENTS AND STANDARDS SPECIFIED IN DESIGN INPUT DOCUMENTS.
- MATERIALS, COMPONENTS, AND PROCESSES SPECIFIED AND CONTROLED IN THE DESIGN DOCUMENTS.
- DESIGN VERIFICATION PERFORMED BY INDEPENDENT VERIFIERS.
- CHANGE CONTROL IMPLEMENTED TO SAME LEVEL AS ORIGINAL DESIGNS.
- ONE SYSTEM FOR DESIGN CONTROL IMPLEMENTED FOR BWR DESIGN ACTIVITIES.

INTERFACE CONTROL

- DESIGN DOCUMENTS REVIEWED FOR INTERFACE COMPATIBILITY PRIOR TO FINAL ISSUE.
- INTERFACES DOCUMENTED AND CONTROLLED AS DESIGN INPUTS AND DESIGN INTERFACES.
- PROCEDURAL INTERFACES DEFINED BY ENGINEERING OPERATING PROCEDURES.

DESIGN PROCESS

- DESIGN SPECIFICATIONS TIED TO PROJECT REQUIREMENTS - APPROVED AND APPLIED BY CONTROLLED SYSTEM.
- DESIGN SPECIFICATIONS FORM THE BASIS FOR DETAILED SYSTEM, STRUCTURE AND COMPONENT DESIGNS. STATUS MAINTAINED BY COMPUTERIZED ACCOUNTING SYSTEM.
- INDEPENDENT DESIGN VERIFICATION PERFORMED FOR CURRENT DESIGNS.
- DESIGN FREEZE PERFORMED AFTER REVIEW AGAINST BALANCE OF PLANT (FURNISHED OUTSIDE GE) AND CONTRACT REQUIREMENTS.
- DESIGN MAINTAINED UNDER FORMAL CHANGE CONTROL - DESIGN HISTORY TRACEABLE AND RETRIEVABLE.

DESIGN VERIFICATION

- CURRENTLY PERFORMED ON DESIGN DOCUMENTS USING ONE OR A COMBINATION OF THE FOLLOWING APPROVED METHODS.
  - o INDEPENDENT DESIGN REVIEWS
  - o QUALIFICATION TESTING
  - o ALTERNATE CALCULATIONS
  - o INDEPENDENT CHECKING
- PROCESS STRENGTHENED AND EVOLVED OVER THE YEARS - CHRONOLOGY OF CHANGES FOLLOWS:

o	OCTOBER 1969 TO JUNE 1972	- SAFETY RELATED DESIGNS REVIEWED OR CHECKED FOR ACCURACY.
o	JUNE 1972 TO MAY 1974	- SAFETY RELATED DESIGNS FORMALLY VERIFIED - RESULTS DOCUMENTED.
o	MAY 1974 TO SEPTEMBER 1977	- SAFETY RELATED DESIGNS FORMALLY VERIFIED WITH RESULTS AND IDENTIFICATION OF VERIFIER DOCUMENTS.
o	SEPTEMBER 1977 TO MARCH 1978	- INDEPENDENT VERIFICATION PROGRAM EXTENDED TO DESIGNS SAFETY AND NONSAFETY RELATED.
o	MARCH 1978 TO PRESENT	- REQUIRMENTS FOR USE OF SUPERVISORS AS VERIFIERS DOCUMENTED IN ADVANCE OF VERIFICATION.

DESIGN RECORDS

- FORMAL DESIGN RECORD FILES (DRF'S) REQUIRED FOR ACTIVITIES SINCE 1975.
- DESIGN RECORD FILES TREATED AS PERMANENT LIFETIME RECORDS.
  - o MICROFILMED IN DUPLICATE.
  - o COPIES OF FILES MAINTAINED IN OFFSITE VAULT.
  - o RETAINED FOR LIFE OF POWER PLANT.

FIELD CHANGES CONTROL

- CHANGES RESULTING FROM FIELD DEVIATION DISPOSITION REQUESTS REVIEWED AND APPROVED BY ENGINEERING.
- ENGINEERING CHANGE NOTICES ISSUED TO CHANGE DESIGNS.
- CONFIGURATION RECORDS OF DESIGN CHANGES MAINTAINED AS PERMANENT RECORDS.

GE HANFORD 2 DESIGN CONTROL PROGRAM

DOCUMENT CONTROL

- DESIGNS FORMALLY DOCUMENTED, ISSUED AND CONTROLLED.
- DISTRIBUTION CONTROLLED TO USERS AND INTERFACING FUNCTIONS.
- DESIGN HISTORY MAINTAINED AS LIFETIME ARCHIVE RECORD FOR ORIGINAL DESIGN AND CHANGES THERETO.

CHANGE CONTROL

- MANAGEMENT CHANGE CONTROL BOARDS AND ADDITIONAL CHANGE CONTROL CHECK POINTS ADDED SINCE 1975 TO IMPROVE QUALITY AND APPLICATION.
- CHANGES AUTHORIZED ON ENGINEERING DOCUMENTS BY CONTROLLED ENGINEERING CHANGE NOTICES (ECN'S) ONLY.

NUCLEAR ENERGY BUSINESS OPERATIONS (NEBO)

AUDITING RESPONSIBILITIES AND AUDIT RESULTS RELATED TO DESIGN CONTROL

PRODUCT & QUALITY ASSURANCE OPERATION (RESPONSIBLE DIRECTLY TO THE VICE PRESIDENT AND GENERAL MANAGER, NEBO)

- AUDITING THE NEBO ENGINEERING AND PROJECT MANAGEMENT ORGANIZATIONS FOR COMPLIANCE WITH APPROVED QUALITY SYSTEMS, PROCEDURES AND INSTRUCTIONS.

YEARS OF AUDITS	NUMBER OF AUDITS	NUMBER OF FINDINGS	FINDINGS OPEN AT END OF 1981
1971-1981	47	552	8

RELIABILITY ENGINEERING OPERATION (RESPONSIBLE DIRECTLY TO THE VICE PRESIDENT AND GENERAL MANAGER, NUCLEAR ENGINEERING DIVISION)

- CONDUCTING PERIODIC AUDITS OF DESIGN ACTIVITIES THAT AFFECT PRODUCT QUALITY.

YEARS OF AUDITS	NUMBER OF AUDITS	NUMBER OF FINDINGS	FINDINGS OPEN AT END OF 1981
1976-1981	39	212	11

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APPENDIX B

APPENDIX B

INDEPENDENT TECHNICAL REVIEWS

The purpose of this Appendix is to present in one location a discussion of the completed or ongoing, major independent technical reviews of the Burns and Roe scope of design of WNP-2. The reviews have encompassed a large percentage of the Burns and Roe design. The depth of the reviews has varied; however, in general the depth has been sufficient to ensure a definite and positive contribution to the adequacy of design. The accomplishment of these reviews, in conjunction with their corrective action, provide an improved level of confidence in the quality of the design of WNP-2.

The following areas of independent technical review are discussed:

- o Burns and Roe off-project audits and Special Design Reviews,
- o General Electric reviews of Burns and Roe design,
- o Supply System reviews of Burns and Roe design,
- o Review of pipe hanger criteria and procedures, and
- o Bechtel Engineering Management reviews of Burns and Roe design.

A. Burns and Roe Off-Project Audits and Special Design Reviews

Since the beginning of the WNP-2 Project, Burns and Roe has performed regular Technical Engineering Audits on their design with off-project engineering personnel, i.e., personnel from corporate staffs or from other Burns and Roe projects. In addition, Quality Assurance Audits on the WNP-2 design process are frequently performed by the Burns and Roe Corporate QA organization. To address the issue of design verification raised during an NRC audit of Burns and Roe, in-depth Special Design Reviews have been performed on specific systems by off-project engineers. These audits and reviews are considered to be independent, specifically the auditing/reviewing engineers have not been previously involved with the design of WNP-2. It is concluded that the performance of the audits and reviews provide additional confidence in the design adequacy of WNP-2 (refer to the following paragraphs for details).

1. Technical Engineering Audits

To insure the adequacy of design, procedurally controlled, Technical Engineering Audits are scheduled semi-annually on each engineering discipline of the WNP-2 Project by engineers from the staff maintained by the Burns and Roe Engineering and Design Division. These audits are initiated and administered by the Burns and Roe Corporate and project Quality Assurance organizations and are under the technical control of the Burns and Roe Chief Engineers. The cognizant Chief Engineers assign off-project engineers from their staff or from other projects to perform the Technical Engineering Audits and specify the area to be audited. The objective of these audits is to assure that the detailed design complies with the basic criteria established for the design and that proper engineering practice is being used. The auditors review the design for compliance with such documents as the Engineering Criteria Document, PSAR/FSAR requirements, and NSSS requirements. The audits are formally documented and findings issued. Each finding issued requires that appropriate corrective action be specified and implemented to the satisfaction of the cognizant Chief Engineer.

Upon resolution of all findings, the auditor reviews the deficient areas and, if satisfactory, closes the audit. Documentation of these audits are contained in the Burns and Roe project files.

The Technical Engineering Audits were performed in accordance with Burns and Roe procedures 2808-Q-4.8 (home office) and WNP-2-043 (site).

The Scope of the individual audits has varied considerably; however, in general, the audits have been in-depth, i.e., to the detailed level. Typical documents associated with the audits are:

- o Burns and Roe Engineering Criteria Document,
- o WNP-2 PSAR/FSAR,

- General Electric P&IDs, Process Diagrams, Functional Control Diagrams, Design Specification Data Sheets, System and Component Design Specifications, etc.,
- Burns and Roe prepurchase and construction specifications,
- Burns and Roe calculations, and
- Burns and Roe general arrangements and flow, one line, logic, and elementary diagrams.

Representative categories of comments and findings from the Technical Engineering Audits include:

- Math errors,
- Improper assumptions and applications,
- Insufficient or erroneous design input and lack of reference to source data,
- Needed document revisions for reconciliation with design,
- Improper sequencing of events,
- Lack of reference to equation sources,
- Errors in drawings and diagrams,
- Improper function of hardware due to design error(s), and
- Lack of incorporation of NSSS/BOP interface requirements.

Refer to Attachment 1 for a typical Technical Engineering Audit. Since November 1972, ninety eight (98) of these audits have been performed. Refer to Attachment 2 for a list of the audit subjects.

2. Quality Assurance Audits

In accordance with 10CFR50, Appendix B, internal Quality Assurance Audits of WNP-2 Project activities are conducted by Burns and Roe Corporate Quality Assurance personnel. These personnel are not associated with the WNP-2 Project. The audits, which are procedurally controlled and documented, are performed to evaluate: 1) the adequacy and effectiveness of the Burns and Roe project related Quality Assurance Program, and 2) the implementation of the quality affecting procedures by project personnel. In cases where the project does not have its own procedures for specific areas, Burns and Roe Corporate standard procedures govern.

Deficiencies identified during the audits are documented and discussed with Burns and Roe Project Management to assure adequate understanding of the findings, so meaningful corrective actions are taken. Re-audits of deficient areas are performed on a timely basis to verify implementation of the corrective action. Audit closure is accomplished by memorandum to the Burns and Roe Project Manager. Documentation of these audits are contained in the Burns and Roe project files.

The Quality Assurance Audits were originally performed to a checklist with focus on compliance to and understanding of the general 10CFR50, Appendix B requirements. The areas audited were Engineering, Construction Management, Quality Assurance, and contractor (supplier) interface. Engineering activities (design process) were audited approximately twice each year. Later in the Project, the audits were performed with a standardized Audit Finding Report form which referenced the specific item or criterion of 10CFR50, Appendix B that was being audited. Refer to Attachments 3 and 4 for examples.

The Quality Assurance Audits were performed in accordance with Burns and Roe procedures 2808-Q-4.3 and WNP-2-QA-001.

Examples of engineering activities which are audited include:

- Implementation of procedure requirements,
- Control and implementation of design changes,
- Content and approvals of design information and documentation,
- Use of and reference to design input data,
- Use of as-builts,
- Use of stop work and engineering holds,
- Generation and changes to prepurchase and construction specifications,
- Design interface activities,
- Training and indoctrination,
- Changes to the Engineering Criteria Document,
- Use and applicability of Burns and Roe Technical Standards, and
- Use of commitment tracking systems and tickler files.

Since August 1971, thirty nine (39) of these audits have been performed on Burns and Roe engineering activities. Refer to Table 1 for a list of the engineering related audits.

3. Special Design Reviews

The Burns and Roe Engineering and Design Division contains a department responsible to perform design reviews in accordance with established procedures (WNP-2-ED-013). A number of these reviews were performed in compliance with ANSI N45.2.11 using a design input and design verification checklist. WNP-2 is not committed to ANSI N45.2.11; therefore, these design reviews are not performed on all systems.

Special Design Reviews are, and have been, performed at the request of Burns and Roe Project Management or a Chief Engineer. The design review is performed by a team of senior engineers selected from other projects or departments not associated with the design of WNP-2. This ensures an independent, third party check. The results of the review are documented and the review remains open until all findings are resolved.

Special Design Reviews, performed to WNP-2-ED-013 in compliance with ANSI N45.2.11, have been performed on the following systems:

- o High Pressure Core Spray,
- o Low Pressure Core Spray,
- o Residual Heat Removal,
- o Standby Service Water, and
- o Standby AC Power.

The review covered only items within the Burns and Roe scope of design.

In addressing the NRC audit issue of design verification, it was proposed that by Burns and Roe performing these reviews on random safety systems the results would demonstrate the adequacy of the Burns and Roe design process. The Special Design Reviews evaluated the design of the selected systems in the various operational modes against the Burns and Roe design criteria, the interface requirements from the NSSS, and applicable NRC requirements. If no safety significant findings were identified, then the conclusion would be that the design process was satisfactory.

The definition of a safety significant finding was the following:

- o If the finding had not been identified, would the functional capability of the system be impaired such that it could not perform its design safety function, and
- o If the answer to the above was yes, was the finding unknown and not being addressed prior to the Special Design Review.

Inherent with the second question is that the design was complete and not in-process.

From the five (5) Special Design Reviews, a total of forty nine (49) findings were identified and independently reviewed by Burns and Roe and the Supply System. It was determined by both organizations that none of the findings were safety significant. Those findings requiring followup action have, or are being completed and closed out.

Special Design Review SDR-80-6, Residual Heat Removal System, is provided as Attachment 5. The evaluations of the individual findings of SDR-80-6 are provided as Attachment 6.

B. General Electric Reviews of Burns and Roe Design

General Electric (GE) has a policy to ensure that the NSSS safety-related BOP interface requirements are understood and properly implemented by the Architect Engineer (Burns and Roe). This function prior to 1979 was performed by GE by diverse means: day-to-day project management correspondence, participation in the preoperational and power ascension procedures, physical review of the plant, and participation in the preoperational and power ascension tests.

Additionally in 1979, GE assigned qualified representatives to an independent, permanent design review team. This team, composed of members of domestic projects and systems engineering departments, review each project, including the NSSS/BOP interface, using selected questions that have been developed by the GE lead systems engineers based on importance to safety, operability, and problems previously identified on other projects.

The team assigned to review the WNP-2 design interface in 1979 submitted a list of questions to Burns and Roe which addressed the Nuclear Boiler, HPCS, RCIC, RHR, LPCS, and Off Gas, and specific environmental requirements for equipment.

The review was limited to the questions submitted by GE (refer to Attachment 7) and subjects that arose as a result of the in-process review.

The first review was conducted at the Burns and Roe offices in New York in December 1979 with participants from the Supply System, Burns and Roe, and GE. The review was concluded with seven (7) open items to be closed by the responsible project organization. These open items were subsequently resolved. Documentation of the findings and their resolution is contained in the Burns and Roe project files.

In December 1980, GE conducted another BOP interface review. The systems and equipment reviewed included:

- Refueling and servicing equipment,
- Drywell cooling requirements,
- Control Rod Drive System,
- Leakage Control System,
- Feedwater Control System,
- Emergency AC Power System,
- DC Power System,
- Turbine Generator Control System, and
- Main steam piping, contaiment to the turbine.

The review was held at the WNP-2 site with the Supply System, Burns and Roe, and GE in attendance. This review also concluded with a minimum number of open items to be addressed by the responsible project organization for resolution and closure.

In addition to these large BOP interface reviews, there have been frequently scheduled meetings addressing specific interface items and the general progress of the design of the project between the Supply System, Burns and Roe, and GE. Conference notes of these meetings are located in the Burns and Roe project files. Examples of specific Burns and Roe design areas discussed/reviewed in this manner include:

- Feedwater controls,
  - Flow element location
  - Mixing relative to enthalpy requirements
  - Transient response requirements
  - Low flow control
  - Operating logic
  - Feed pump details
- NSSS/turbine generator interface,
  - Turbine sequence monitoring
  - Turbine system analysis for interaction and compatibility with the NSSS (e.g., valve closure and load rejection)
  - Reactor Recirculation System transfer (auto to manual)
  - Interlocks
- Containment layout of pipe whip restraints,
- Drywell cooling (heat load),
- Main steam safety relief valve discharge line pressurization,
- Electrical separation,
- Containment vessel retrofit program in general,
- Hydrodynamic loads, and
- Loads on submerged structures.

In addition, certain areas of the BOP design which may affect the safety or performance of the NSSS were provided to GE for review and comment. Related problems or concerns identified by GE were primarily addressed to Burns and Roe by formal correspondence. Examples of these subject areas include:

- Water quality and sampling thereof,
- BOP accommodations,
  - Primary containment
  - Compatible seismic characteristics for NSSS components
  - Shielding of radiation sources
  - Compatible turbine generator and steam bypass capacity
  - Compatible wiring, cable, and tubing
  - Reactor pressure vessel (RPV) and NSSS piping thermal insulation
  - RPV to containment refueling bellows seal
  - RPV pedestal and sacrificial shield wall
  - NSSS equipment foundations
  - NSSS equipment drain lines
  - Details of radioactive waste processing
- Utility services for NSSS (mechanical),
  - Cooling water
  - Makeup water
  - Emergency equipment cooling water
  - Ventilating, heating, and cooling
  - Plant air
- Utility services for NSSS (electrical)
  - Standby AC power
  - Plant DC power (120V/240V)
  - 24V DC power.

C. Supply System Review of Burns and Roe Design

The Supply System has had extensive involvement in the review of the Burns and Roe scope of design. The types and focus of these reviews to be discussed, have varied over time. The main areas of review include the following:

- o Contract technical specifications,
- o Specific technical subjects,
- o Design of specific systems,
- o New design to address industry/NRC issues and concerns,
- o Changes to design, and
- o PSAR/FSAR (refer to Appendix A).

Each of these categories is discussed in the paragraphs below. It is believed that the broad scope of these reviews and their general depth have contributed to an improved quality of the design of WNP-2.

1. Contract Technical Specifications

The general process of producing contract technical specifications is discussed in Appendix A to this report. A flow chart of the Supply System internal review process in illustrated in Figure 1 (PMP 4-8.8).

The Supply System cognizant Reviewing Engineer had the following pertinent responsibilities:

- o Review the specification for technical adequacy,.
- o Prepare an Engineering Design Review Checklist (refer to Attachment 8) for Quality Class I Specifications, and
- o Document significant Supply System comments on an Comment/Resolution Form (refer to Attachment 9).

In the process of these reviews there were required supplementary reviewers. Their responsibilities were:

- o Licensing Engineer - Review the specification to ensure that PSAR/FSAR and Environmental Report commitments and regulatory requirements were included,
- o Operations - Review the specification for proper consideration of the operability and maintainability of equipment, systems, and/or structures, and
- o Quality Assurance - Review the specification to ensure the adequacy of the quality assurance requirements.

There reviews were performed by the Supply System through the time period that the Project was issuing construction and prepurchase contracts. As the issuance of design changed from major areas to bits and pieces, i.e., the design was essentially complete, the review was primarily turned to Project Change Notices and Project Engineering Directives. The discussion of the review of these documents is the subject of a following paragraph.

The Supply System review of the contract technical specifications is considered to have been a third party check of these documents.

2. Specific Technical Subjects

Numerous technical subjects within the Burns and Roe design scope were reviewed by the Supply System and discussed in meetings with Burns and Roe. Refer to Section II (addressing conference notes) of this Appendix for examples. It should be mentioned here that the Supply System has had extensive involvement in the development and progress of the Containment Vessel Retrofit Program (CVRP) for WNP-2. The CVRP addresses the results from the analyses of potential thermal-hydraulic loading conditions due to main steam safety/relief valve (SRV) discharge and postulated loss-of-coolant accidents (LOCA) in BWR plants having a Mark II pressure suppression containment system. The activities of this program include:

- SRV considerations,
  - Line clearing load
  - Quencher arrangement in the suppression pool
  - Quencher discharge load
  - Quencher condensation performance
  - Submerged structure loads
- LOCA considerations,
  - Pressure and temperature transients
  - Vent clearing and pool swell loads
  - Loads during condensation oscillation
  - Loads during chugging
  - Steam condensation loads on submerged structures
- Load combinations,
- Fatigue considerations.

In addition to the above, the Supply System performed a recent evaluation of the Burns and Roe hanger and stress activities. The objective of this evaluation was to assess the processes and methodologies currently being implemented by Burns and Roe in finalizing the piping and hanger designs and to make recommendations for improvement. This evaluation addressed administrative and technical matters. Pertinent issues warranting mention are:

- o Resolution of faulted-end movements (seismic, LOCA) as related to analyses of supports,
- o Resolution of loads to be included in seismic boundary anchors (non-seismic piping reaction to an earthquake),
- o Preparation of a stress design guide and a controlled reference summary to improve calculation quality, and
- o Improvements in the documentation of stress and pipe support calculations.

3. System Design Reviews

In June 1977, the Supply System initiated system design reviews. Input to these reviews consisted of: 1) recommendations based on the review of the initial pilot system, and 2) the review and understanding of the Burns and Roe design process. The review of the process included the flow of information between Burns and Roe engineering disciplines and the flow of information from vendors. In addition to the process review providing insight to the Supply System reviewing engineers, recommendations for improvements were made to Burns and Roe.

System design reviews were performed on thirty two (32) systems, refer to Table 2. The reviewing engineers were of the nuclear/mechanical, electrical, and instrumentation and control disciplines. The reviewing engineers were to focus on the identification of design errors that could prevent the system from operating as required or that could pose concerns relative to licensability.

Standard documents used in the process of this review consisted of:

- o Burns and Roe Engineering Criteria Document,
- o PSAR/FSAR,
- o Design specifications,
- o Flow, logic, elementary, process, and analog loop diagrams,
- o Instrument data sheets, and
- o Master Parts List (MPL).

The review typically consisted of the following (as applicable):

- o Interface between the General Electric (GE) Piping and Instrumentation Diagram and the Burns and Roe flow diagram,

- o Interface between the GE logic and elementary diagrams and the related Burns and Roe logic and elementary diagrams,

- o Interface between major equipment suppliers and the Burns and Roe design,

- o Interface between the Burns and Roe logic and elementary diagrams,

- o Interface between the GE logic and elementary diagrams, and

- o Review of instrument data sheets, MPL, design specifications, etc. for correctness.

The comments and findings identified during this review were documented (refer to example, Attachment 10) and resolved.

4. Project Change Notices and Project Engineering Directives

The use of the Project Change Notice (PCN) and Project Engineering Directive (PED) is discussed in Appendix A to this report. Briefly, these documents are used to implement new design or design changes. The Supply System initiated reviews of PCNs in July 1975, and of PEDs at their inception in August 1978.

Reviewing engineers originally performed reviews on all PCNs and used a checklist which addressed the reason/need, technical impact, cost, and schedule. The depth of the review was dependent on the magnitude and nature of the proposed new design or design change.

In 1977, the review of PCNs was further formalized by the issuance of a Project Management Procedure which governed this activity. Particular attention was drawn to the soundness of the proposed design change and its related details. Emphasis was applied to:

- o Revisions to regulatory commitments,

- o Revisions to drawings, specifications, and procurement documents,

- o Equipment procurement or modification, and

- o Equipment installation, test, and operating requirements.

In the performance of this review, the Supply System defined the PCN as a Design Change Notice (DCN), Design Change Review (DCR), or Design Change Study (DCS), depending on the nature of the PCN. Refer to Attachment 11 for details.

In August 1978, PEDs were initiated as a design change document. In the same time period, due to the volume of design changes (PEDs and PCNs) and the observed benefits from their review by the Supply System, minor design changes were eliminated from the formal review process. The Supply System criteria for requiring review became:

- o Deviation from SAR or environmental commitments,
- o Deviation from design criteria or from applicable codes and standards,
- o Change in safety or quality classifications,
- o Reduction in operability or maintainability,
- o Total cost of change exceeds $50,000, or
- o New design.

PCNs and PEDs were sent to the Supply System. The implementation of the criteria for review was performed by the Supply System reviewing engineers. As before, the reviews were performed in a formalized manner, refer to Attachment 12, with continued emphasis on technical adequacy.

During the next several years, in order to better control design changes (PCNs) originated by the Burns and Roe New York office, all PCNs issued during certain time periods were reviewed by the Supply System. Similar reviews were performed as discussed above.

In March 1981, a project reorganization occurred which placed the majority of the previous Supply System, WNP-2 Project Engineering staff directly into Burns and Roe as new employees. This change resulted in the remaining Supply System Project Engineering Staff being significantly reduced, retaining very senior engineering and engineering management personnel. Since this time, the focus of reviews has been on select engineering issues, not including the day-to-day design changes.

5. Quality Assurance Audits

Similar to the Burns and Roe Corporate Quality Assurance (QA) audits discussed in subsection I of this Appendix, the Supply System performs routine audits of the Burns and Roe WNP-2 Project to assess the compliance of the design process with SAR commitments, ANSI N45.2, 10CFR50, Appendix B, and implementing procedures. These audits are performed on each Burns and Roe design office (New York, site, and Richland offices) twice each year. Supply System Corporate Quality Assurance has performed the reviews on the New York office. Corporate and Project QA have shared the audit responsibilities for the Burns and Roe site and Richland offices.

The audits are procedurally controlled and documented. Identified deficiencies are discussed with Burns and Roe Project Management, resolved, and re-audited to verify implementation of corrective action.

Examples of areas audited include:

- o Implementing procedure compliance with SAR commitments, ANSI N45.2, and 10CFR50, Appendix B,
- o Review and approval of Burns and Roe drawings and diagrams,
- o QA requirements of specifications,
- o Consistency of QA documentation requirements and content,
- o Burns and Roe auditing performance,
- o Implementation of design changes,
- o Performance of calculations,
- o Management followup on corrective action,
- o Design control process used to produce the design of the standby service water system,
- o Training, and
- o Review and approval by Burns and Roe of vendor information.

The Supply System audits have identified Burns and Roe QA deficiencies throughtout the history of WNP-2; however, basic compliance with the SAR commitments, ANSI N45.2, and 10CFR50, Appendix B have been established. Of particular note is the reduction in QA findings in specific areas since 1978, e.g., improvements in procedure and instruction compliance, and corrective action implementation by Burns and Roe management. Continued deficiencies, however, have been observed in the stress discipline. Supply System management is aware of this problem and has recently taken additional corrective action to minimize recurrence.

D. Review of Pipe Hanger Criteria and Procedures

In June and July 1980, EDS Nuclear, Inc. under contract to the Supply System performed an independent, technical review of the large-bore pipe hanger design methods, criteria, and procedures being used at WNP-2. The review was performed in accordance with the EDS Nuclear Quality Assurance Program. The results of this review were documented in EDS Nuclear Report No. 01-0740-1101, dated July 31, 1980.

The scope of the EDS review was to examine the large-bore (2 1/2 inch and above) pipe hanger design criteria and procedures used at WNP-2 for their technical adequacy and to provide a comparison of those criteria and procedures with others being used in the nuclear industry. The procedure review was primarily limited to technical issues; however, some administrative areas were addressed.

The method employed in performing the task was to review the hanger criteria and procedures, and to conduct interviews with individuals in the hanger group, in order to identify areas warranting further investigation and to obtain background information.

The following documents were reviewed:

- Mechanical contract technical specification on pipe supports (Contract 215, Section 15Q),
- Burns and Roe Hanger Group General Procedure and Design Instruction,
- Pipe Support Design Guide and work procedures (M-400 through M-411),
- Hanger Group Engineering Standards,
- Burns and Roe internal hanger design review,
- Lists of hanger engineer concerns, and
- Hanger calculations.

Interviews were conducted with the following groups:

- Area engineers,
- Personnel responsible for base plate testing,
- Equipment qualification personnel,
- Hanger designers, and
- Burns and Roe site and home office management.

Based on the document reviews and personnel interviews discussed above, the following areas were identified for review and in-depth investigations were performed:

- o Support displacement,
- o Out-of-plane support design criteria,
- o Welded pipe attachments,
- o Valve/operator assembly modeling,
- o Base plates,
- o Load definition, and
- o Pipe clamp design.

From this review, EDS Nuclear concluded that the large-bore pipe hanger criteria and procedures used at WNP-2 were for the most part technically acceptable and in accordance with the standards used in the nuclear industry. Major areas of concern were:

- o The method used for modeling valve masses in piping analyses, and
- o The design, qualification, and documentation of welded pipe attachments.

Since this review, these areas of concern among others of less significance, have been resolved. The specifics of the in-depth reviews are provided in the EDS Nuclear Report (01-0740-1101).

E. Bechtel Engineering Management Group

The Bechtel Engineering Management Group is a branch of the Supply System WNP-2, Project Engineering organization and provides staff support. The role of this group is to assist the Supply System in ensuring that all to-go engineering has been identified and to ensure engineering approaches to specific issues, primarily NRC and industry concerns, are technically sound. In addition, specific areas of design, selected on the basis of history, and magnitude of concern are reviewed in-depth by this group to ensure technical adequacy. The Bechtel Engineering Management Group has a high degree of technical expertise with a number of years of recent nuclear experience. Refer to Table 3. In addition, the group has a direct interface, which is exercised frequently, with Bechtel staff support in their home office (San Francisco). This provides continuous input to the group of recent licensing positions, NRC actions and concerns, and changes in design methodology as they develop within Bechtel.

Early in Bechtel's involvement on WNP-2, a list of to-go or potential to-go engineering items was developed. Three principal sources were used for this list: 1) Burns and Roe and Supply System lists of remaining engineering activities; 2) Bechtel's Phase I Study of the WNP-2 Project; and 3) Bechtel's experience on other nuclear projects. The list is continually evolving as new items are identified and existing items are reviewed. Currently there are approximately 320 issues on the list with eighty percent (80%) of the entries having been assessed. Attachment 13 is an index of these items. Attachment 14 provides typical examples of the Bechtel Engineering Management Assessment Form which is being completed for each of the items on the list. The initial assessment is not a technical adequacy review, but rather it is an assessment to determine if Burns and Roe has recognized the task or problem and has a program in-place on WNP-2 to address it on a schedule compatible with construction completion.

In addition to the initial assessments, as mentioned above, certain areas have been reviewed for technical approach and technical adequacy of the existing design. In-depth design reviews are conducted based on Bechtel Engineering Management judgement of where the probability of design deficiencies are most likely. These areas are determined from Bechtel previous experience, industry, and NRC problem areas (IE Bulletins, Problem Alerts, etc.) and where design changes are being made.

The in-depth review areas include:

- Small-bore pipe and hanger design,
- Under grounded conditions on high resistance systems,
- Air line pressure drop to MSRV accumulators,
- Fire protection requirements to meet Appendix R,

- Radiation shielding analysis,
- Fatigue evaluation of MSRV,
- Main steam turbine trip,
- Annulus pressurization piping analysis,
- Hydrodynamic load application methodologies,
- Large-bore stress analysis on selected areas (LPCS, etc.),
- Hydrogen detonation effects on piping stress analysis,
- Zero period acceleration effects,
- Dynamic anchor movements,
- Raceway layout and cable presentation on drawings,
- Connection diagrams and scheme drawings (computerized cable schedules),
- Cable separation,
- Soil compaction, and
- AC motor control center circuit voltage drop studies.

A summary of the type of detailed review performed on two of the above subjects is provided in Attachments 15 and 16.

In addition, from the various reviews, assessments, and inputs from Bechtel experience, a number of design areas have been influenced/revised to varying degrees. The major areas are listed in Attachment 17; some overlap exists with the listing above.

Bechtel is currently initiating a program for the Supply System to review ASME Code piping/hanger designs. This review will look at a sample of pipe and hanger design calculations in detail by use of a documented checklist and is designed to give the Supply System a high degree of confidence in the technical adequacy and completeness of the design in this area. The checklists and governing procedure are provided as Attachments 18 and 19. Supply System engineers participate in this review.

TABLE 1

BURNS AND ROE

QUALITY ASSURANCE AUDITS

WNP-2 PROJECT ENGINEERING

AUDIT NO.	DATE	AREA REVIEWED
BR81-5	7/81	Home Office
BR81-4	7/81	Site and Richland Office
BR81-1S	4/81	Home Office (stress only)
BR81-2	2/81	Home Office
BR81-1	1/81	Site and Richland Office
BR80-8/9	9/80	Home Office
BR80-6/7	7/80	Site
BR80-1S	4/80	Site (Field Engineering)
BR80-3	2/80	Home Office
BR80-1/2	1/80	Site
BR79-8/9	7/79	Home Office
BR79-6/7	7/79	Site
BR79-4/5	3/79	Site
BR79-1/2	1/79	Home Office
BR78-11/12	11/78	Site
BR78-8	8/78	Home Office
BR78-6/7	8/78	Site
BR78-3/4	4/78	Site
BR78-1	1/78	Home Office
BR77-10	10/77	Site
BR77-8	9/77	Home Office
BR77-5	3/77	Site
BR77-2	2/77	Home Office

TABLE 1 (cont.)

BR76-11	10/76	Site
BR76-2S	9/76	Home Office
BR76-7	7/76	Home Office
BR76-5	3/76	Site
BR76-1	1/76	Home Office
BR75-8	8/75	Home Office
BR75-2S	8/75	Home Office
BR75-1S	7/75	Home Office
BR75-3	2/75	Home Office
No. 1-74	10/74	Home Office
------	8/73	Home Office
------	5/73	Home Office
------	2/73	Home Office
------	11/72	Home Office
------	4/72	Home Office
------	8/71	Home Office

TABLE 2

SUPPLY SYSTEM

SYSTEM DESIGN REVIEWS

SYSTEM TITLE

Main and Exhaust Steam
Extraction Steam and Heater Vents
Condensate and Feedwater
Heater Drains
Miscellaneous Drains, Vents and Sealing
Circulating Water
Plant Service Water
Control and Service Air
Gas and Air Removal
Auxiliary and Process Steam
Plant Makeup Water Treatment
Demineralized Water
Reactor Core Isolation Cooling
High Pressure Core Spray
Low Pressure Core Spray
Residual Heat Removal
Standby Liquid Control
Reactor Water Cleanup
Standby Service Water
Reactor Building Closed Cooling
Fuel Pool Cooling and Cleanup
Condensate Supply
Nuclear Boiler - Main Steam
Condensate Demineralization
Off Gas
Primary Containment Cooling
Standby Gas Treatment
Reactor Building HVAC
Radwaste Building HVAC
Containment Atmosphere Control
Miscellaneous HVAC
Miscellaneous HVAC Control and Switchgear

TABLE 3

BECHTEL ENGINEERING MANAGEMENT
GROUP EXPERIENCE

	No. Engineers	Total Years Experience	Average Years Experience
Pipe/Hangers/Stress	5	37	7
Mechanical/Nuclear	2	47	23
Electrical	3	56	19
Instrumentation	3	41	14
Project Engineering Management	2	45	22
Total	15	226	15

SPECIFICATION REVIEW AND APPROVAL

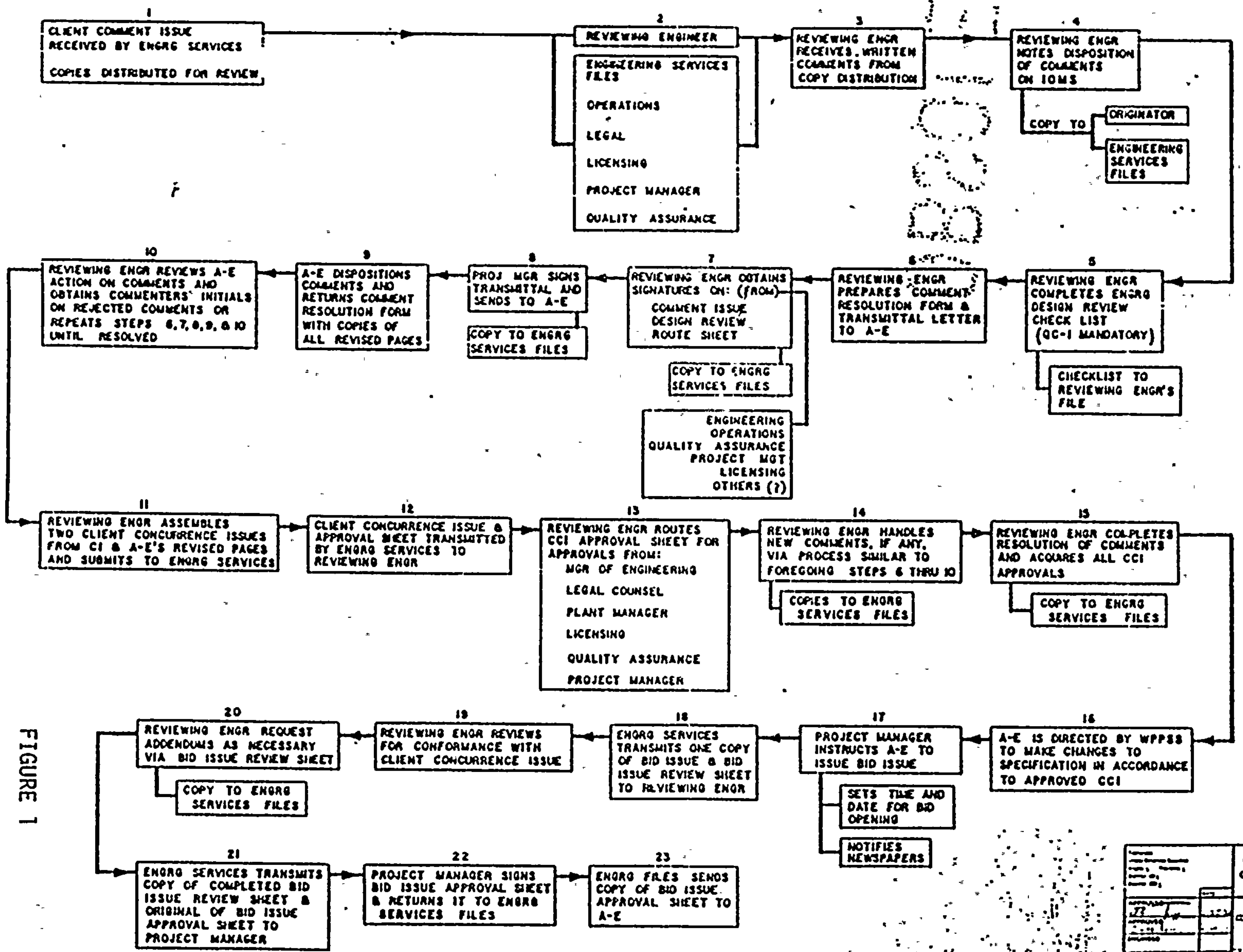

FIGURE 1

OBSOLETE

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
PROJECT PROCEDURES
SPECIFICATION REVIEW & APPROVAL
F-W-8-001
SCALE NONE

MEMORANDUM

BURNS and ROE, Inc.

DATE 9-26-74

TO J. Philipp

FROM G. Stribling/ S. George

SUBJECT W.O. 2808-02
Washington Public Power Supply System
Hanford Nuclear Project No.2
Engineering Audit No.3

COPIES TO:
AJ Fiehn
TA Hendrickson
db

A technical audit of the Project Engineering work covering the "Drywell Cooling System" was conducted by the Power Engineering Division. The audit was conducted in accordance with WPPSS Quality Assurance Procedure 2808-Q-4.8 Rev.0, with the exception that no procurement specifications were reviewed. The audited materials were:

1. B&R Calculations No.9.22.00 of Title "HVAC - Drywell Cooling System".

2. B&R Drawing No. M543, Rev.2 of Title "Flow Diagram - Reactor Building Primary Containment Cooling & Nitrogen Inerting System".

The following technical engineering documents were reviewed and referred to as basis for evaluating the audited materials:

1. WPPSS Engineering Criteria Document for Hanford No.2 Station (Revision 4).

2. Section E, Paragraph 7.0 "Heating, Ventilating and Air Conditioning".

2. WPPSS PSAR Volume 2, Addendum 9
   a. Section 5.2.3.7 "Primary Containment Normal Heating, Ventilating and Air Conditioning System."
   b. Section 5.2.3.8 "Primary Containment Environmental Conditions.

3. G.E. Document No.22A2715A, Rev.0 "Drywell Cooling System" which was referenced in calculations No.9.22.00

Attachment 1

The audited materials were found to meet the requirements of the Engineering Criteria Document and the PSAR. However, the following technical deficiencies were identified:

1. Calculations Number 9.22.00

   Sheet 1

   a. A list of the arrangement drawings used to perform the calculations is not included.

   b. The "closed cooling water" temperature entering the coil is given as 105°F. However, on sheet 12 of these calculations, the water temperature is shown to be 95°F.

   Sheet 3

   a. The source of the 657,000 Btu/h heat released from the reactor pressure vessel should be identified as "G.E. Document No.22A2715A, Rev.0" instead of "Received from G.E.".

   Sheet 6

   a. In the table shown, the columns titled "Sensible Heat, Btu/h 10% S.F. added" and "Air Quantity CFM = S.H./20.7" should be marked "VOID" since the alternate scheme in sheet 12 of these calculations is using 25% S.F.

   b. The "Scram Condition" shown at the bottom of the sheet, should be marked "VOID" since this condition is described in the alternate scheme, Sheet 13 of these calculations.

   Sheet 7

   a. The entire sheet should be marked "VOID - Use Alternate Scheme - Sheet 12".

   Sheet 12

   a. State the basis for using the constant "0.96" to develop the "Air Quantity/Unit".

   b. State the source of the 95°F. design temperature of supply water. Note that in Sheet 1, of these calculations, you use 105°F. entering water temperature.

   Sheet 13

   a. The source of the 1,128,000 Btu/h released to the drywell during "Scram Condition" is not stated.

To: J. Philipp

9-26-74

Sheet 14

a. The "Units" for air flows and heat loads are not shown.

Sheet 15

a. The "475,000" figure listed as heat release in Zone 2B is shown as 425,000 Btu/h in Sheet 5 of these calculations.

b. The air quantity "3370 CFM", shown in the middle of the sheet, should be "33,680 CFM".

c. Under the heading "Supply to Zone 2C", the 27°F. given as "Supply air temperature" is actually "The air temperature rise".

2. B&R Dwg. No. M543, Rev.2

a. In Sheet 15 of calculation No.9.22.00, the capacity of each of the upper and lower level cooling units is calculated to be 32,000 CFM. However, in B&R Dwg. No. M543 Rev.2, the capacity of each of the lower level cooling units, at high fan speed, is indicated to be 36,250 CFM, and the capacity of each of the upper level cooling units is indicated to be 35,000 CFM. State the reason for the difference.

SG:jh

Date 9/17/80
Revised: 12/17/81

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 1

Engineering Discipline Audited	Subject	Date of Audit
Civil	Reactor Building Foundation Mat development and final design	12/29/72
Electrical	Auxiliary Power Transformers Calculations	8/13/73
HVAC	None Performed	
Instrumentation	Control Valve Sizing Calculations	11/9/72
Mechanical	Turbine Generator Steam Bypass System and associated Relief Valve Augmented Bypass (REVAB) System & Sizing	1/16/73
Nuclear	Fuel Pool Cooling and Clean-up System-Sizing, Water Quality and Pump capacities	2/2/73
Stress	Main Steam and Reactor Feedwater Piping Flow Calculations	12/29/72

ATTACHMENT 2

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 2

Engineering Discipline Audited	Subject	Date of Audit
Civil	Spray Ponds and Standby Service Water Pump House	12/10/73
Electrical	None Performed	
HVAC	Reactor Building, Reactor Building Sump Exhaust, and Standby Gas Treatment HVAC Calculations	1/16/74
Instrumentation	Control Valve and Instrumentation and Control Board Specification - Contract 42 and 59 respectively	1/22/74
Mechanical	Condenser and Auxiliaries Interfaces	1/21/74
Nuclear	Solid Radwaste System	2/6/74
Stress	Containment Penetration Design Loads	12/27/73

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 3

Engineering Discipline Audited	Subject	Date of Audit
Civil	Reactor Building Roof Structural Steel	3/22/76
Electrical	Separation of Electrical Circuits	10/7/74
HVAC	Drywell Cooling System	9/26/74
Instrumentation	Instrumentation and Controls Compliance with AEC Regulatory Guides	10/15/74
Mechanical	Pipe Stress/Mechanical Engineering Interface Data Traceability	4/28/75
Nuclear	Reactor Building Closed Cooling Water System	11/14/74
Stress	(See Mechanical)	

Page 4 Cont'd on 5

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 76-3

Engineering Discipline Audited	Subject	Date of Audit
Civil	Turbine Generator mat and walls, Reactor building mat	5/14/76
Electrical	Calculations performed for the Reactor building and the Turbine Generator building	4/6/76
HVAC	Diesel Generator building HVAC System	2/10/76
Instrumentation	Instrumentation and Control Spec. 2808-92, Section 50A	8/23/77
Mechanical	Calculations for the Turbine Generator building	4/23/76
Nuclear	Standby service water system	5/14/76
Stress	Safety Related pi[illegible]ng (Interim Analyses)	2/8/78

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 76-6

Engineering Discipline Audited	Subject	Date of Audit
Civil	Sensitivity studies for Reactor Building soil/structure interaction element seismic analysis (Parametric Studies)	12/28/77
Electrical	Certify compliance with 10CFR50, Appendix A, Criterion 17 and Regulatory Guide 1.32 with regard to power provisions of the main one-line diagram. Reliability of the diesel engine generator and auxiliary power system.	7/2/76
HVAC	Standby gas treatment system	2/4/77
Instrumentation	Instrumentation and Control Specification 3808-92, Section 50B.	8/26/77
Mechanical	Circulating water system	1/28/77
Nuclear	Nuclear resin, sludge and concentrate handling	9/23/76
Stress	Primary containment vessel	2/23/77

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 76-9

Engineering Discipline Audited	Subject	Date of Audit
Civil	Turbine Building steel bents; crane griders Turbine Generator Pedestal	10/11/76
Electrical	Determine the reliability of the standby service water system.	12/7/76
HVAC	Containment.atmosphere control system	2/14/77
Instrumentation	Project Flow Calculations	10/21/76
Mechanical	Condensate and feedwater system, extraction steam and heater vents, water drain system-reactor feed pump turbine drain.	12/2/76
Nuclear	Fuel Pool Cooling and Cleanup System	3/25/77
Stress	Piping Stress Analysis	11/11/77

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 76-12

Engineering Discipline Audited	Subject	Date of Audit
Civil	Downcomer Bracing	2/11/77
Electrical	Certify the compliance with Regulatory Guide 1.75 of associated circuits.	12/21/76
HVAC	Primary containment cooling and purging system	9/21/77
Instrumentation	Instrumentation and Control Specification 2808-92, Section 52C	9/6/77
Mechanical	Plant service water system description	11/28/77
Nuclear	Control Rod Drive System	4/6/77
Stress	Pipe rupture criteria document	6/23/77

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 77-15

Engineering Discipline Audited	Subject	Date of Audit
Civil	Miscellaneous civil/structural calculations	6/16/77
Electrical	Examine several electrical calculations and their adherence with project procedures	2/5/77
HVAC.	Miscellaneous HVAC safety related calculations	6/30/77
Instrumentation	Miscellaneous Instrumentation calculations	6/24/77
Mechanical	Miscellaneous Mechanical calculations	6/28/77
Nuclear	Not performed	–
Stress	Calculation No. 8-[illegible].91, Thermal Growth of Sacrificial Shiel[illegible]	7/6/77

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 77-6

Engineering Discipline Audited	Subject	Date of Audit
Civil	Calculation of seismic input loads for NSSS Evaluation by General Electric Company.	12/28/77
Electrical	Electrical aspects of sequential loading of the diesel generator when operating under total loss of off-site power conditions	11/16/77
HVAC	Reactor building safety related calculation 9.21.00	4/12/78
Instrumentation	Instrumentation and Control, Specification 2808-57	11/11/78
Mechanical	Plant makeup water system Drawing 516 Revision 7	2/23/78
Nuclear	Emergency core cooling systems (ECCS)	3/1/78
Stress	Off-gas system	3/5/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 78-13

Engineering Discipline Audited	Subject	Date of Audit
Civil	Calculations of loads on submerged structures	To Be Performed
Electrical	Calculations to the sizing of batteries, battery chargers and inverters	1/8/79
HVAC	HVAC off-gas charcoal absorber vault	10/19/79
Instrumentation	Instrumentation and Control Specification 2808-42 (Control Valves)	6/9/80
Mechanical	Main and exhaust steam systems	3/11/80
Nuclear	Nuclear steam supply system	5/15/79
Stress	Reactor Water Clear[illegible] system	3/14/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 78-14

Engineering Discipline Audited	Subject	Date of Audit
Civil	Reactor Pressure Vessel cap space frame	11/7/79
Electrical	Diesel generator start-up provisions for loss of off-site power and accident conditions	1/8/79
HVAC	Radwaste building HVAC system	2/13/80
Instrumentation	Instrumentation and Control Specification 2808-42	6/9/80
Mechanical	Extraction piping systems	4/10/80
Nuclear	Condensate supply system	5/9/79
Stress	Nuclear steam supply system	3/25/80

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 79-13

Engineering Discipline Audited	Subject	Date of Audit
Civil	"Roof Survival for probable maximum precipitation ponding"	7/9/79
Electrical	Security system, calculations	5/22/79
HVAC	Control Room Habitability	6/24/80
Instrumentation	Instrumentation and Control Specification 2808-42A (Control Valves)	6/9/80
Mechanical	Turbine and extraction steam piping drainage	4/15/80
Nuclear	Reactor building closed cooling water	5/9/79
Stress	Turbine building [illegible]tems	4/8/80

Date 9/17/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 79-14

Engineering Discipline Audited	Subject	Date of Audit
Civil	Main Security guard house	6/19/80
Electrical	Protection of electrical auxiliary systems and proposed reloy setting	12/17/79
HVAC	Containment purge isolation/vacuum breaking system	6/5/80
Instrumentation	Instrumentation and Control Specification 2808-42 (Control Valves)	6/9/80
Mechanical	Plant service water system	5/1/80
Nuclear	Off-gas system	2/26/80
Stress	Turbine building and containment piping	5/1/80

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. BR81-8

Engineering Discipline Audited	Subject	Date of Audit
Civil	Pipe Hanger Support Expansion Bolts	6/10/81
Electrical	Addition of third non-safety related battery to the D-C distribution system.	3/27/81
HVAC	Construction Potable Water Fire Protection System	5/15/81
Instrumentation	1. Relocation of Instrument Rack No. 10. 2. Replacement of Rotameters with Orifice Plates on the Stand-By Service Water System.	4/24/81
Mechanical	Waste Transfer System	6/3/81
Nuclear	Standby Service Water System	5/22/81
Stress	Standby Service Water System Pipe Supports	6/3/81

WNP-2 TECHNICAL ENGINEERING AUDIT

AUDIT NO. 81-9

Engineering Discipline Audited	Subject	Date of Audit
Civil		
Electrical	Retag of RPS Cables (Task #3410)	10/21/81
HVAC	Containment Inerting System Tie-in's to Penetrations	10/15/81
Instrumentation	Evaluation of Instrumentation Reliability (Task #3420)	9/24/81
Mechanical	Conformance to WNP-2 Procedure #WNP-2-012, Rev. 3 and Project Management Instructions #PMl 4-4, Rev. 7 and PMl 4-4.1, Rev. 2	10/21/81
Nuclear	Reactor and Radwaste Building closed Cooling Water System	10/8/81
Stress	Reactor Building closed Cooling Water System	

V. MGR.

TO: ~~K. Lish~~ M. Jones R. White

J. [redacted]Byrnes M. Z za T. Hendrickson

Office of the [redacted]s. File db

Form BR 8402
Sheet 1 of 8

Date 4/19/73

QUALITY ASSURANCE
ENGINEERING AUDIT
CHECKLIST

INSTRUCTION - I

The Chief Quality Assurance Engineer will indicate in the space below, the specific areas to be audited, who shall perform the audit, any assisting personnel, the completion date and all other instructions required.

An audit of the WPPSS Hanford No. 2 Project will be performed in the areas of Criterion IV, Procurement Document Control and Criterion VI, Document Control; the week of April 30, 1973. The audit team leader will be K. Lish assisted by M. Jones.

(WORK ORDER CHARGE SHALL BE TO: 2808-08)

COMPLETION DATE 5/11/73

Chief Quality Assurance Engineer

INSTRUCTION - II

The audit team, guided by the information above, will audit the designated section. They will develop a memorandum type report. A copy of the report and this form will be clipped together to form the completed report to be submitted to the Chief Quality Assurance Engineer.

Assess the effectiveness of the procedures applicable to the area(s) audited.

QUALITY ASSURANCE
RECEIVED
APR 19 1973

Attachment 3

WPPSS HANFORD NO. 2 PROJECT

PROJECT ENGINEERING AUDIT REPORT

CRITERION IV - Procurement Document Control

Preface: Procurement documents were examined in order to verify that performance of engineering and QA review/approval was in accordance with applicable project engineering procedures. The areas of; bid evaluations, contractor approvals, change notices, drawings and associated records were also examined for proper review/approval.

1. Document: Specification 2808-16 "Condensate Filter Demineralizer System"

   Findings: a. Change orders to the specification were issued by memorandum. However, no receipt was specified to assure that the change orders were received.

   b. Procedure E-24 requires change orders to be sent to the contractor/client in triplicate. They have only been sent in duplicate.

   c. The numbering of change orders was not in agreement with procedures.

   d. Procedure E-24 requires, as a minimum, Quality Plan I and II specifications to be routed to the lead QA engineer and the QA group for review and approval. It was found that some Class II specifications have not been approved by the QA group.

2. Document: Drawing A506, Rev. B

   Fingings: Drawing marked "information", dated 11/12/73 and signed. Engineering did not have a procedure that defines/controls a drawing indentified as "information".

3. Document: Specification 2808-43 "Standard Casting or Forged Steel Valves" copy number 2 of bid review routing sheet.

   Findings: The supervising engineer signed routing sheet on line designated for the QA supervising engineer. This was done because the routing sheet does not provide space for the supervising engineer's signature.

4. Document: Specification 2808-31 "Overhead Traveling Cranes"

Findings: This is a quality Class I specification which was reviewed by QA but not approved by QA as required per E-24 paragraph 7.5.2.

CRITERION VI - Document Control

Preface: Documents were chosen for review of traceability from a revision to a change notice in order to verify implementation of changes in accordance with applicable Project Engineering Procedures.

5. Document: Drawing A506 "Ground Floor Plan", Rev. B, was traced back to PCN #145 dated 1/17/73 which initiated the change to Rev. A.

Findings: a. No signatures of approval in the title block by squad leader and designer nor where the initials of the cognizant engineer indicated in the release block prior to issuance of drawing.

b. No sign-off of PCN status log indicating "work complete" as required per E-15 paragraph 6.5.

c. PCN Completion Form not available as required per E-15 paragraph 6.6 and 6.6.1.

d. Approvals, Item 7 of PCN, not signed-off as required per E-15 paragraph 6.2.1.

e. Manhour estimate, Item 6 of PCN, sign-offs of various disciplines, as indicated by an x symbol, have not been completed prior to release. Engineering stated that procedures stipulated that for this type of drawing no signatures were required. No procedures were produced to support this statement.

6. Document: Drawing S-M053 "Study-Circulating Water Pump Hose" (Bid copy).

Findings: a. Procedure E-7 paragraph 4-1 states that a minimum of 3 signatures are required on the drawing. The required signatures were verified. No discrepancy.

b. A printed statement above the title box, on the procedure, indicates that there exists a revision dated 7/12/72 over the original release dated 12/16/71. There were no revision letters or numbers listed in the revision box nor was there any discription change to reflect the indicated revision of 7/12/72. A PCN to reflect this change could

not be located. A lead engineer verbally indicated the nonexistance of a revised issue and concurred that the revisal notice should be deleted from all drawings.

7. Document: Drawing 223-3 "Study-Cooling Tower Basins" (Bid copy)

Findings: a. The drawing has been signed-off by design and the cognizant engineer, however, the squad leader's signature was not annotated as required per E-7 paragraph 4-1.

b. Prefix, Section letters and study numbers, as required per E-3 paragraph 3-1 and 3-2, were not in title box of the drawing.

c. The drawing number used for identification is a specification number which is not in accordance with the procedure. Engineering stated that it is the practice, in some instances, that specification numbers be placed on drawings to support actual specifications. No procedure was available to support this statement.

8. Document: Drawing M608 "Weld End Details" Rev. 2 (Bid copy)

Findings: Drawing status is revision 2 as indicated on print dated 1/19/73. Project engineering's sign-off is dated 7/20/72 and the cognizant engineer's sign-off is dated 4/12/73. All title blocks and revision columns are complete, however, there was no PCN's available to substantiate authorization of revisions 1 or 2. The validity of the drawing revisions could not be verified due to the lack of PCN's and associated documents as required per E-15.

9. Document: Specification 2808-51 "Batteries and Battery Charges". The bidding documents, plans and specifications were checked for approval of client in accordance with engineering procedure E-24, paragraph 7.6.9 and 7.6.10.

Findings: a. The bid issue date of specification was prior to approval of client as indicated on bid issue approval sheet.

b. Specification 2808-51 was also checked to verify that distribution of deviations/changes to Project SAR/ER and client approval letters was made as required per E-17 paragraph 6.1.6 and 7.2.3. There was no evidence that distribution of the client approval letter was made to the various disciplines examined.

Summary:

In the reaudit of the above findings each of the areas which the findings cover will be included plus interfacing areas which influenced the findings.

AUDIT REPORT

Project WPPSS/WNP-2 | Page 1 of 4

Facility/Function Audited H.O./QA Engineering | Audit No. BR81-5

Performed by C. Roemer | Report Date 7/20/81

Audit Date 7/6 to 7/9

I. PURPOSE

The purpose of this audit was to evaluate Project Quality Assurance/ Project Engineering compliance with the Quality Assurance Program; as prescribed by the identified criteria of 10CFR50, Appendix B, and applicable project instructions or procedures.

In addition, the audit scope was to include the review of corrective actions taken against previous audit findings.

- BR81-2, Finding No. 1
- Management Assessment Audit, Finding No. 38

II. CONTACTS

*R. Snaith	Senior Project Engineer
*G. Satir	Project Engineer
D. Baker	Project Engineer
*M. Kahn	Assistant Project Engineer
*J. Blas	Project QA Manager
D. Moshier	QA Engineer
P. Stadelman	QA Engineer

*Exit Meeting Attendees (7/8/81)

III. AUDIT SUMMARY

This audit resulted in the issue of three (3) new findings and the closeout of findings from previous audit BR81-2 and the 1979 Management Assessment Audit. Details of audit coverage achieved are provided under the appropriate criterion listed below.

Criterion I - Organization

The draft copy of Project's update of the Project Plan (Rev. 9) contains the updated Organization Charts which appear to reflect both Home Office and Site organizations.

This area is considered satisfactory.

Project WPPSS/WNP-2 Audit No. BR81-5

Criterion II - Quality Assurance Program

Except for the findings issued against specific elements of the QA Program, Project's compliance is considered satisfactory.

Training records related to the items listed were reviewed and the area is considered satisfactory. It is recommended, however, that the training matrix be updated to reflect the overall current status of training activity.

- WNP-2-E-010 (Rev. 4), Calculations
  - Engineering Standard P015104G1
  - Engineering Standard P015105G1
  - Engineering Standard C015104G2

NOTE:
- Above areas covered by QA Department sponsored training sessions on July 1-2, 1981.
- All disciplines represented; fifty-eight attendees.

- WNP-2-ED-004 (Rev. 0), Engineering Hold

Criterion III - Design Control

A review of Project's performance relative to the listed items was accomplished. Except for the items cited as deficient, this area is considered satisfactory.

Area Reviewed	Documents	Evaluation/Comments
Calculations reviewed included microfilm activity (WNP-2-038/2)	Electrical Discipline 2.01.01 2.01.02 2.01.06 2.01.07	Satisfactory
	Mechanical Discipline 4.25.06 4.25.08 4.99.01	Satisfactory
	Civil Discipline 6.18.02 6.18.03 6.39.01	Satisfactory

Project WPPSS/WNP-2 Audit No. BR81-5

Area Reviewed	Documents	Evaluation/Comments
	Nuclear Discipline 5.17.11 5.17.14 5.17.24 5.18.01 5.18.06 5.18.07 5.18.08	Satisfactory
	Thermal Discipline T12.01 T12.02 T12.03 *T12.09	Unsatisfactory *See QAFR No. 1 and REMARKS information (3) pertinent to all calculations.
Specification	2808-28 Rev. 1, 3/31/81	Satisfactory (WPPSS Transmittal)
	Centrifugal Fans and Essential Fan Coil Units	HVAC modified to Change Order EH draft.
Engineering Criteria Document, Rev. 10	Section H Technical Standards Applicability List	Satisfactory
	Criteria Advance Changes - Electrical 5/12/81 - Mechanical 2/26/81 - Civil/Structural 4/1/81	

Criterion IV - Procurement Document Control

Criterion VII - Control of Purchased Material, Equipment, & Services

Area Reviewed	Spec/Contract	Evaluation/Comments
Prepurchased Documentation Deficiencies	2808-18 2808-24 2808-42B	Unsatisfactory See QAFR No. 2.

Project WPPSS/WNP-2 Audit No. BR81-5

Criterion XV - Nonconforming Materials, Parts, or Components

Area Reviewed	Information	Evaluation/Comments
Contract Waiver Requests	The CWR Log appears to reflect a number of blank areas; seven (7) in 1979 and two (2) in 1980. The issue and/or cancel status of the CWRs (QAFR No. 3) listed were indeterminate. The listed, dispositioned CWRs for contract C-12409 are considered satisfactory. W-132 W-134 W-136 W-147 W-133 W-135 W-145 W-149 W-150 It is recommended that Project review other contract/CWR files to assure the deficiency is not generic.	Unsatisfactory See QAFR No. 3.

Criterion XVII - QA Records

The examination of various records related to the engineering standards and procedures employed during this audit were appropriately filed and maintained.

This area is considered satisfactory.

Criterion XVIII - Audits

- Audit Follow-up: Satisfactory

Audit	Status
- BR81-2, Finding No. 1	Closed
- MAA (1979, Finding No. 38	Closed

Procedure WNP-2-ED-010 (Rev. 5) provides all necessary corrective actions to satisfy and close the finding.

IV. RECOMMENDATIONS

Included in the QAFR information and within this report; as necessary.

CR:map

[signature]

BURNS AND ROE, INC.
ENGINEERS AND CONSTRUCTORS

QUALITY AUDIT FINDING REPORT

Project WPPSS/WNP-2 Audit No. BR BR81-5

Facility/Function Audited H.O./QA Engineering Finding 1 of 3

STATEMENT OF REQUIREMENTS

- 10CFR50/B, Criterion III, Design Control; as contained therein.
- Project Instruction WNP-2-ED-010 (Rev. 5), Calculations, as contained therein.

FINDING

Thermal Calculation T12.09 is an unapproved calculation. The calculation, however, is being readied for microfilming and reflects two annotations which appear to warrant voiding of the calculation. See the Remarks below and Finding attachment.

Issued by For C. Roemer Date 7/8/81 Receipt Acknowledged Oraginal Signed By R. Snaith Date 7/8/81

QUALITY ASSURANCE RECOMMENDATION

It is recommended that Project review the calculation and provide a determination concerning its status.

CORRECTIVE ACTION

Taken ☐ Proposed ☒ Scheduled Completion Date 11/1/81

Engineering will review the calculation, determine the status, and make the calculation acceptable as a "final" calculation.

Corrective Action Assigned to R. Vondrasek Cognizant Manager G. J. Satin

Proposed Corrective Action		Corrective Action Verification	
1. Acceptable-pending verification	☐	1. Acceptable-finding closed	☐
2. Unacceptable	☐	2. Ineffective/Incomplete-finding open	☐
Signature/date		Signature/date	

REMARKS

1. Per the originator's statement, the effort was aborted 8/11/75.
2. Calculation Sheet 0, dated 1/20/77, also reflects a statement wherein Calculation T12.09 not used by Project at this date, 1/20/77.
3. This calculation and others reviewed (see report) do not reflect the calculation date or the checker's function.

FINDING CLASSIFICATION

Inadequate Proc./Instr./Guide/Plan	☐	Personnel Error	☐
Noncompliance to Proc./Instr./Guide/Plan	☐	Instr./Proc./Direction Required	☒
System Deficiency	☐	Ineffective Corrective Action	☐

BURNS AND ROE, INC.
ENGINEERS AND CONSTRUCTORS

QUALITY AUDIT FINDING REPORT

Project WPPSS/WNP-2 Audit No. BR 81-5
Facility/Function Audited H.O./QA Engineering Finding 2 of 3

STATEMENT OF REQUIREMENTS

. 10CFR50/B, Criterion V, Instructions, Procedures, and Drawings; as contained therein.

FINDING

Project QA activity relative to the Prepurchased Document Deficiency List is not covered by B&R project instructions and/or procedures.

Original Signed
Issued by / FOR C E ROEMER Date 7/8/81 Receipt Acknowledged By R. Snaith Date 7/8/81

QUALITY ASSURANCE RECOMMENDATION

It is recommended that Project provide a project instruction covering this area.

CORRECTIVE ACTION

Taken ☐ Proposed ☒ Scheduled Completion Date 9/1/81

Project Management will issue a project instruction covering the Prepurchased Document Deficiency List.

Corrective Action Assigned to J. Blas Cognizant Manager [signature]

Proposed Corrective Action		Corrective Action Verification	
1. Acceptable-pending verification	☐	1. Acceptable-finding closed	☐
2. Unacceptable	☐	2. Ineffective/Incomplete-finding open	☐
Signature/date		Signature/date	

REMARKS

WPPSS PMI 5-5 (Rev. 3), Documentation Deficiencies of Prepurchased Equipment, is currently employed as a guideline to the effort.

FINDING CLASSIFICATION

Inadequate Proc./Instr./Guide/Plan	☐	Personnel Error	☐
Noncompliance to Proc./Instr./Guide/Plan	☐	Instr./Proc./Direction Required	☒
System Deficiency	☐	Ineffective Corrective Action	☐

BR8460 (2/1/79)

BURNS AND ROE, INC.
ENGINEERS AND CONSTRUCTORS

QUALITY AUDIT FINDING REPORT

Project WPPSS/WNP-2 Audit No. BR 81-5

Facility/Function Audited H.O./QA Engineering Finding 3 of 3

STATEMENT OF REQUIREMENTS

- 10CFR50/B, Criterion XV, Nonconforming Materials, Parts, or Components; as contained therein.
- Project Instruction WNP-2-023 (Rev. 1), Contractor Waiver Requests; as contained therein.

FINDING

Project's CWR Log of activity contains a number of blank areas; identified* below. Indeterminate was whether or not a CWR was issued against the number or the item was cancelled.

Original Signed

Issued by Eric C Roemer Date 7/8/81 Receipt Acknowledged By R. Snaith Date 7/8/81

QUALITY ASSURANCE RECOMMENDATION

It is recommended that Project review the areas cited and determine whether or not outstanding CWRs exist which were not inputted to the control system or cancelled.

CORRECTIVE ACTION

Taken ☐ Proposed ☒ Scheduled Completion Date 12/1/81

Project Management, with the assistance of the Group Supervisors, will review the status of the "blank" CWR's to ensure that the log is complete.

Corrective Action Assigned to M. Kahn/G.S. Cognizant Manager

Proposed Corrective Action		Corrective Action Verification	
1. Acceptable-pending verification	☐	1. Acceptable-finding closed	☐
2. Unacceptable	☐	2. Ineffective/Incomplete-finding open	☐
Signature/date		Signature/date	

REMARKS

*Contract C-12409

1979: W-12, W-17, W-18, W-19, W-21, W-36, and W-60
1980: W-130 and W-151

FINDING CLASSIFICATION

Inadequate Proc./Instr./Guide/Plan	☐	Personnel Error	☐
Noncompliance to Proc./Instr./Guide/Plan	☐	Instr./Proc./Direction Required	☒
System Deficiency	☐	Ineffective Corrective Action	☐

BR8460 (2/1/79)

ATTACHMENT 5

SPECIAL DESIGN REVIEW SDR-80-6

RESIDUAL HEAT REMOVAL SYSTEM
WPPSS NUCLEAR PROJECT NO. 2

February 27, 1981

Prepared by M. KUSHNER

Approved by M. Crane

GENERAL COMMENTS

The Residual Heat Removal System (RHR) design was reviewed for conformance to the input documents listed on Attachment 1. The specific output documents reviewed for conformance to criteria are listed in Attachment 2. All required process criteria* have been met. The review covered only those items that are within the Burns and Roe scope of design.

Pipe support work and the confirmation of hydrodynamic loads from suppression pool discharges are not complete; final system walk down has not yet been performed. A check for conformance to GE seismic criteria should be performed as part of the final stress analysis work subsequent to the walk down.

Equipment start-up and valve opening items in the RHR were checked and are analytically satisfactory. It is recommended that all equipment start-up and valve opening items for the system be verified by field tests.

* The term "process criteria" is interpreted to mean the aspects of design depicted on flow diagrams such as flows, pressures, temperatures, etc.

SPECIFIC COMMENTS

The following are specific comments:

1. Note 12 of GE P&ID, input item 731E961AD, states that thermal expansion of water contained in the pipeline between valves F-008 (RHR-V-8) and F-009 (RHR-V-9) should be considered. However, no calculations addressing this consideration could be found. Also, PED-215-M-2832 directs that a thermal relief valve be added between these valves to comply with Note 12.

   Recommendation:

   A calculation should be made to determine the pressure increase associated with the volumetric expansion of the trapped fluid for the case of maximum temperature increase. A thermal relief valve should be added to the design drawings as per PED-215-M-2832.

2. Note 18 of GE P&ID, input item 731E961AD, states that adequate piping surface should be allowed for cooling Water Leg Pump C003 (RHR-P-3). The note also appears in Note 9 of Burns and Roe flow diagram, output document M521. However, no calculation addressing this requirement could be found.

   Recommendation:

   A calculation should be made to establish that the heat load from the Water Leg Pump can be dissipated through the connecting piping surface shown on the design drawings.

3. Note 4 of GE P&ID, input item 731E961AD, states that temporary strainer screens should be provided on the suction side of all pumps. Burns and Roe flow diagram, output document M521, does not show such a strainer for the Water Leg Pump nor does Mechanical Installation Specification 215 (output item 20) provide for the purchase thereof.

   Recommendation:

   Provide for the purchase of the temporary strainer for the Water Leg Pump and add to design drawings.

4. Temporary strainers in the suction of all pumps required by Note 4 of GE P&ID, input item 731E961AD, are specified in paragraph 3.1.5.1, page 15G-6 of Specification 215. However, the potential differential pressure loading is not specified.

   Recommendation:

   Perform calculations to determine the maximum potential pressure loading on the conical strainer element and add this item to the requirements in Specification 215.

5. Paragraph 4.2.2.11 of GE input document, Design Spec. 22A2817, states that each RHR Pump be equipped with a line to drain the leakoff from the shaft seal to permit measurement and visual inspection of any leakoff. These requirements have not been addressed.

Recommendation:

Provide facilities for shaft leakoff observation and measurement.

6. Paragraph 4.2.5.3.1 of GE input document 22A2817 states that suction piping from the suppression pool be designed so that when any one suction strainer is 50% clogged, the minimum NPSH is provided to RHR pumps during LPCI or Containment Cooling Operation. Calculation 5.17.9, Sheet B-9 does not account for pressure drop through suction strainer at 50% clogged condition. There are two 100% strainers which make the clogged condition negligible.

Recommendation:

Add clogged condition to calcs. for record purposes.

7. Paragraph 4.5.2 of GE input document 22A2817AY states that valve F036 (RHR-RV-36) be sized to maintain up-stream pressure at 75 psig and 10% accumulation. However, Table 11C, page 15G-71 of Specification 215 incorrectly specifies the set pressure at 125 psig.

Recommendation:

Specification 215 should be corrected.

8. Table 4.3-3 on page 4.3-6 of project document "Plant Design Assessment Report for SRV and LOCA" reports

that 24" RHR 'A' & 'B' suction lines in the suppression pool have not yet been proven acceptable to withstand the loads due to LOCA downcomer discharges. The analysis of these lines is in progress.

Recommendation:

Add the results to Table 4.3-3 when the analysis has determined an acceptable condition and, if necessary as determined by the analysis, reroute the suction lines on the design drawing.

9. Note 11 of GE P&ID, input item 731E961AD, states that valves F088 (RHR-RV-88A, B & C) shall be 1" relief valves. Page 15G-71, Table 11C of Specification 215 and output drawing M521 specify 3/4" size.

Recommendation:

Justify the 3/4" size.

10. When the emergency diesel generator is operating in parallel with the normal preferred power source for routine exercising of the diesel, the 5KV switchgear short circuit rating given in calculations 2.03.10 and 2.03.11 could be exceeded. This could occur when the RHR is in operation. This condition can be avoided if the diesel generator is exercised in other electrical operating modes which are identified in calcs. 2.03.10 and 2.03.11. However, the design documents for construction do not convey the operating restrictions to assure that the

5KV switchgear rating is not exceeded. In addition, there are no alarms provided in the design to alert the operators if the proscribed operating mode is attempted.

Recommendation:

The design documents should describe the diesel generator testing limitations. Also, alarms should be added.

11. PCN 7081 addresses restriction orifices in the RHR System to prevent runout of the RHR Pumps. Calculations for the orifices could not be found. Also, no provision for purchase nor inclusion on the design drawing could be found.

Recommendation:

Implement the PCN to provide the restriction orifices and add them to the design drawings.

12. Paragraph 4.2.1.5 of GE input document 22A2817 states that the RHR System piping and components shall be designed to withstand the thermal cycling experienced in the various operational modes. The numbers of thermal cycles for design are given in paragraphs 4.1.2.3, 4.1.3.2, 4.1.4.4 and 4.1.5.7. In addition to these cycling requirements, the system design shall make allowance for pressure and thermal cycling factors related to plant startup and shutdown. Calculations addressing these requirements could not be found.

Recommendation:

Perform the thermal analyses and implement the results as may be necessary.

13. Paragraph 4.2.1.4 of GE input document 22A2817 states that hydraulic shock calculations should be incorporated in the component design to ensure hydraulic balance and system stability. However, no calculations addressing this requirement could be found.

Recommendation:

Perform the hydraulic shock calculations and implement the results as may be necessary.

ATTACHMENT 2

OUTPUT DOCUMENTS

1.	Flow Diagram	M521, Rev 25
2.	RHR System Pressure Drop Calculation	5.17.19
3.	General Arrangement, Plan Elev. 422'-3", 441'-0", and 444'-0"	M567, Rev 6A
4.	General Arrangement, Plan Elev. 522' and 548'-0"	M569, Rev 19
5.	General Arrangement, Plan Elev. 572'-0" and 606'-10 1/2"	M570, Rev 12
6.	General Arrangements, Section "10-10"	M571, Rev 10
7.	General Arrangements, Section "8-8" and "9-9"	M572, Rev 10
8.	Plans, Sections and Details Elev. 422'	M701, Rev 15
9.	Plans, Sections and Details Elev. 444' and 441'	M702, Rev 14
10.	Plans, Sections and Details Elev. 471'	M703, Rev 12
11.	Plans, Sections and Details Elev. 501'	M704, Rev 16
12.	Plans, Section and Details Elev. 522'	M705, Rev 14
13.	Plans, Sections and Details Elev. 548'	M706, Rev 23
14.	Plans, Sections and Details, Elev. 572'	M707, Rev 11
15.	Partial Plans Section and Details	M708, Rev. 19
	Sections and Details	M709, Rev 23
16.	Partial Plans and Sections	M710, Rev 3
17.	Spec. 2808-35 Miscellaneous Pumps	
18.	Spec. 2808-41 A&B Nuclear Valves	
19.	Spec. 2808-69 Testable Check Valves	
20.	Spec. 2808-215 Mechanical Equipment Installation & Piping	
21.	Spec. 2808-42A Miscellaneous Control Valves, Controllers and Accessories	

BURNS AND ROE, INC.
DESIGN VERIFICATION CHECKLIST

W.O. No. 39[illegible] Project WPPSS NUCLEAR PLANT NO. 2
Design Verification Plan Item Number [illegible] Sheet 1 of 3

Item Being Verified RHR SYSTEM – PROCESS CRITERIA

No.	QUESTION	Verifier's Finding, * Initials and Date
1.0	Were the following inputs correctly selected and incorporated into design?	
1.1	Basic functions of each structure, system and component.	YES [illegible] 3/11/81
1.2	Performance requirements such as capacity, rating, system output.	YES [illegible] 3/11/81
1.3	Codes, standards, and regulatory requirements including the applicable issue and/or addenda.	YES [illegible] 3/11/81
1.4	Design conditions such as pressure, temperature, fluid chemistry and voltage.	YES [illegible] 3/11/81
1.5	Loads such as seismic, wind, thermal and dynamic.	N.A.
1.6	Environmental conditions anticipated during ~~storage~~, ~~construction and~~ operation such as pressure, temperature, humidity, corrosiveness, site elevation, wind direction, nuclear radiation, electromagnetic radiation and duration of exposure.	YES [illegible] 3/11/81
1.7	Interface requirements including definition of the functional and physical interfaces involving structures, systems and components.	No See Report Comments Nos. 1, 2, 6, 7, 8, 10
1.8	Material requirements including such items as compatibility, electrical insulation properties, protective coating and corrosion resistance.	YES JMC 3/16/81
1.9	Mechanical requirements such as vibration, stress, shock and reaction forces.	N.A.
1.10	Structural requirements covering such items as equipment foundations and pipe supports	N.A.
1.11	Hydraulic requirements such as pump net positive suction heads (NPSH), allowable pressure drops, and allowable fluid velocities.	YES [illegible] 3/11/81
1.12	Chemistry requirements such as provisions for sampling and limitations on water chemistry.	YES [illegible] 3/11/81
1.13	Electrical requirements such as source of power, voltage, raceway requirements, electrical insulation and motor requirements.	N.A.
1.14	Layout and arrangement requirements	YES [illegible] 3/11/81
1.15	Operational requirements under various conditions, such as plant startup, normal plant operation, plant shutdown, plant emergency operation, special or infrequent operation, and system abnormal or emergency operation.	YES [illegible] 3/11/81
1.16	Instrumentation and control requirements including indicating instruments, controls and alarms required for operation, testing, and maintenance. Other requirements such as the type of instrument, installed spares, range of measurements, and location of indication should also be included.	NA GE RESPONSIBILITY 3/12/81 JMC
1.17	Access and administrative control requirements for plant security.	N.A.
1.18	Redundancy, diversity and separation requirements of structures, systems and components.	YES [illegible] 3/11/81
1.19	Failure effects requirements of structures, systems and components, including a definition of those events and accidents which they must be designed to withstand.	YES [illegible] 3/11/81

* Checklist questions that do not apply to the item being verified shall be noted as "NA", not applicable.

Form C01511001

BURNS AND ROE, INC.
DESIGN VERIFICATION CHECKLIST

W.O. No. 3900-16 Project WNP-2
Design Verification Plan Item Number [illegible] Sheet 2 of 3
Item Being Verified R H R SYSTEM

No.	QUESTION	Verifier's Finding,* Initials and Date
1.20	Test requirements including in-plant tests, and the conditions under which they will be performed.	N.A.
1.21	Accessibility, maintenance, repair and inservice inspection requirements for the plant including the conditions under which these will be performed.	N.A.
1.22	Personnel requirements and limitations including the qualification and number of personnel available for plant operation, maintenance, testing and inspection and permissable personnel radiation exposure for specified areas and conditions.	N.A.
1.23	Transportability requirements such as size and shipping weight, limitations, I.C.C. regulations.	N.A.
1.24	Fire protection or resistance requirements.	N.A.
1.25	Handling, storage and shipping requirements.	N.A.
1.26	Other requirements to prevent undue risk to the health and safety of the public.	N.A.
1.27	Materials, processes, parts and equipment suitable for application.	YES mc 3/16/81
1.28	Safety requirements for preventing personnel injury including such items as radiation hazards, restricting the use of dangerous materials, escape provisions from enclosures, and grounding of electrical systems.	N A.
2.0	Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent re-verifications when the detailed design activities are completed?	YES [illegible] 3/11/81
3.0	Are the appropriate quality and quality assurance requirements specified?	YES [illegible] 3/11/81
4.0	Are the applicable codes, standards and regulatory requirements including issue and addenda properly identified and are their requirements for design met?	YES [illegible] 3/11/81
5.0	Have applicable construction and operating experience been considered?	N.A
6.0	Have the design interface requirements been satisfied?	NO - SEE COMMENTS 1,2,3,5, 7,9,12,13 OF RHR SDR [illegible]
7.0	Was an appropriate design method used?	YES [illegible] 3/11/81
8.0	Is the output reasonable compared to inputs?	YES [illegible] 3/11/81
9.0	Are the specified parts, equipment, and processes suitable for the required application?	YES [illegible] 3/11/81
10.0	Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?	YES [illegible] 3/11/81
11.0	Have adequate maintenance features and requirements been specified?	N.A

*Checklist questions that do not apply to the item being verified shall be noted as "NA", not applicable.

Form C015110G1

BURNS AND ROE, INC.
DESIGN VERIFICATION CHECKLIST

W.O. No. 3901-16 Project WNP-2
Design Verification Plan Item Number DVP-NS-7 Sheet 3 of 3

Item Being Verified RHR SYSTEM

No.	QUESTION	Verifier's Finding,* Initials and Date
12.0	Are accessibility and other design provisions adequate for performance of needed maintenance and repair?	N.A.
13.0	Has adequate accessibility been provided to perform the inservice inspection expected to be required during the plant life?	N.A.
14.0	Has the design properly considered radiation exposure to the public and plant personnel?	YES [illegible] 3/11/81
15.0	Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished?	YES [illegible] 3/11/81
16.0	Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?	N.A.
17.0	Are adequate handling, storage, cleaning and shipping requirements specified?	N.A.
18.0	Are adequate identification requirements specified?	N.A.
19.0	Are requirements for record preparation, review, approval, retention, etc., adequately specified?	N.A.
20.0	Are the necessary supporting calculations completed, checked and approved?	See Report Comments No. 1, 2, 8, 9, 11, 12, [illegible]

M. Crane
Verifier for all items not initialed above

3/16/81
Date

*Checklist questions that do not apply to the item being verified shall be noted as "NA", not applicable.

Form C015110G1

DRAFT

ATTACHMENT 6

SDR-80-6, FINDING 1

Finding

Note 12 of GE P&ID, input item 73 E961AD, states that thermal expansion of water contained in the pipeline between Valves F-008 (RHR-V-8) and F-009 (RHR-V-9) should be considered. However, no calculations addressing this consideration could be found. Also, PED-215-M-2832 directs that a thermal relief valve be added between these valves to comply with Note 12.

Nature of Concern

For the shutdown cooling mode of the RHR system, a common suction line for Pumps RHR-P-2A and RHR-P-2B extracts reactor water from recirculation Loop A through Valves RHR-V-8 and RHR-V-9. The water is cooled on the shell side of the RHR heat exchangers and injected back into both reactor recirculation lines. RHR-V-8 and RHR-V-9 are motor actuated gate valves. Since they isolate the RHR system from the containment, these valves are normally closed. Their valve actuators are designed to work against differential seat pressures up to 150 psid.

When the reactor has been cooled down to about 350°F (saturation pressure at that temperature is 135 psia), these valves are opened in order to start the shutdown cooling mode. Without calculations to the contrary, it is conceivable that trapped water between RHR-V-8 (outboard) and RHR-V-9 (inboard) could be under pressure (because of thermal expansion) and prevent opening of these valves.

Finding Evaluation

The need for consideration of thermal expansion between the two valves (RHR-V-8 and RHR-V-9) was identified very early by GE on their P&ID. Burns and Roe addressed the thermal expansion potential by providing pressure relief on that leg of pipe rather than performing detailed calculations justifying the need to do nothing. Checkvalve RHR-V-290 now relieves potential pressure around RHR-V-9 towards the recirculation line. They took a positive action to preclude potential pressure buildup problems.

Safety Significance

The caution noted by GE could be addressed in one of two ways: (1) Calculation of pressure differentials between the valves, and demonstration they are less than 150 psid; and (2) provision of pressure relief. The lack of a calculation has no safety significance since valve operability was assured by pressure relief.

DRAFT

SDR-80-6, FINDING 2

Finding

Note 18 of GE P&ID, input item 731E961AO, states that adequate piping surface should be allowed for cooling Water Leg Pump C003 (RHR-P-3). The note also appears in Note 9 of Burns and Roe flow diagram, output document M521. However, no calculation addressing this requirement could be found.

Nature of Concern

If the piping surface for heat dissipation for the RHR water leg pump is not sufficient, the water leg pump could run too hot and suffer damage or even failure.

Finding Evaluation

In the consideration of this aspect of the water leg pump system, engineering judgment was used. Burns and Roe performed confirmatory calculation 5.17.28 (after the SDR) which shows that adequate cooling is available for the water leg pump. It is likely that the system designer did not perform this calculation originally because it was obvious to him that there is a large margin for heat dissipation in the design. The water leg pump is very small relative to the RHR system; its suction line diameter is 2.0 inches, its discharge line diameter is 1.5 inches. The pump keeps the RHR loops filled, where typical pipe diameters are 18 inches, 20 inches, and 24 inches. Thus, the water mass and heat conduction paths available are very large compared to the pump work of the water leg pump.

Safety Significance

This finding has no safety significance, as verified by Calculation 5.17.28.

DRAFT

SDR-80-6, FINDING 3

Finding

Note 4 of GE P&ID, input item 731E961AD, states that temporary strainer screens should be provided on the suction side of all pumps. Burns and Roe flow diagram, output document M521, does not show such a strainer for the Water Leg Pump nor does Mechanical Installation Specification 215 (output item 20) provide for the purchase thereof.

Nature of Concern

Temporary strainers are used in suction lines of pumps during initial system test runs in order to collect any debris which otherwise might be flushed into the pump, so that possible pump damage is prevented. The concern here is that by not using these temporary startup strainers for the water leg pump, the pump might suffer damage from debris which otherwise would be collected in the temporary strainer.

Finding Evaluation

It cannot be said that any damage or component failure would be expected if no startup strainers are used. However, it is good practice to use the strainers. Whether the water leg pumps should be included in this practice is a question which can best be answered by field expertise.

Comparing the data of the water leg pump and the system pumps, it appears highly unlikely that a strainer on the water leg pump will collect any debris at all. Since this finding does not impact plant safety, it has been judged to be not safety significant.

During startup testing of the water leg pump, its capability to fulfill its function will be verified. The strainer protects the pump during flushing and startup testing but is removed after the system has been shown by test to meet its design function. While the safety of the plant is not affected by the presence or absence of a strainer (water leg pump system will, in any case, pass startup test prior to operation phase), a change has been made to include the strainer during startup testing.

Safety Significance

The strainers are for temporary use during flushing and startup testing, and their presence or absence is not safety significant.

DRAFT

SDR-80-6, FINDING 4

Finding

Temporary strainers in the suction of all pumps required by Note 4 of GE P&ID input item 731E961AD, are specified in paragraph 3.1.5.1, page 15G-6 of Specification 215. However, the potential differential pressure loading is not specified.

Nature of Concern

The concern here is the amount of differential pressure caused by the temporary strainer fluid resistance. This pressure differential decreases the available net positive suction head of the pump. In an extreme case, pump cavitation might be envisioned.

Finding Evaluation

Strainers for this temporary application are selected such that the percentage decrease in flow area is not excessive. Good engineering judgment in strainer sizing combined with good system design, where an adequate margin in the available net positive suction head is assured, make it unnecessary to perform hydraulic analysis on these strainers. The temporary strainers are selected to have a low head loss relative to NPSH requirements.

Even if pump cavitation should occur during initial test runs, the strainer would be removed and either cleaned or replaced.

Safety Significance

After flushing and testing of the system is completed, all temporary strainers are removed. They are not used for normal system operation. For that reason and those discussed above, this finding is not safety significant.

DRAFT

SDR-80-6, FINDING 5

Finding

Paragraph 4.2.2.11 of GE input documents, Design Spec. 22A2817, states that each RHR Pump be equipped with a line to drain the leakoff from the shaft seal to permit measurement and visual inspection of any leakoff. These requirements have not been addressed.

Nature of Concern

The concern here is the same as in Finding 6 of SDR-80-5. The RHR pumps are equipped with a mechanical seal, and they are vertically mounted, just like the LPCS and the HPCS pumps.

Finding Evaluation

The same evaluation as in Finding 6 of SDR-80-5 applies.

Safety Significance

This finding is not safety significant (Reference SDR-80-5, Finding 6 evaluation).

DRAFT

SDR-80-6, FINDING 6

Finding

Paragraph 4.2.5.3.1 of GE input document 22A2817 states that suction piping from the suppression pool be designed so that when any one suction strainer is 50% clogged, the minimum NPSH is provided to RHR pumps during LPCI or Containment Cooling Operation. Calculation 5.17.9, Sheet B-9 does not account for pressure drop through suction strainer at 50% clogged condition. There are two 100% strainers which make the clogged condition negligible.

Nature of Concern

The concern here is the same as in Finding 8 of SDR-80-5.

Finding Evaluation

Calculation 5.17.9 uses one unclogged 100% strainer which is equivalent to two 50% clogged strainers.

Safety Significance

Calculation 5.17.9 is correct as is, and this finding has no safety significance.

DRAFT

SDR-80-6, FINDING 7

Finding

Paragraph 4.5.2 of GE input document 22A2817AY states that valve F036 (RHR-RV-36) be sized to maintain upstream pressure at 75 psig and 10% accumulation. However, Table 11C, page 15G-71 of Specification 215 incorrectly specifies the set pressure at 125 psig.

Nature of Concern

This finding applies to the steam condensing mode of the RHR system. RHR-RV-36 relieves condensate from both RHR heat exchangers into an 8.0 inch line, where the condensate flashes and is routed to the suppression pool where it again condenses. RHR-RV-36 will actuate if 1) the steam condensing mode is being used, and 2) one of the level control valves (RHR-LCV-65A or RHR-LCV-65B) fails open.

In that case, the relief valve protects the condensate piping from overpressurization. The concern here is that the relief valve setpoint could mistakenly be set higher than the design pressure of the piping.

Finding Evaluation

The design pressure for the tube side of the RHR heat exchangers is 150 psig. The design pressure for the piping is 125 psig. The correct setpoint for the relief valve is 75 psig, and the certified vendor drawing reflects 75 psig for the valve supplied.

Safety Significance

This finding is not safety significant.

DRAFT

SDR-80-6, FINDING 8

Finding

Table 4.3-3 on page 4.3-6 of project document "Plant Design Assessment Report for SRV and LOCA" reports that 24" RHR 'A' & 'B' suction lines in the suppression pool have not yet been proven acceptable to withstand the loads due to LOCA downcomer discharges. The analysis of these lines is in progress.

Nature of Concern

The concern here is about lack of completed stress analysis of the RHR suction lines under conditions of high downcomer discharges.

Finding Evaluation

This finding simply indicates that the design is still in progress, and stress analysis is presently being performed. The entire issue of containment hydrodynamic loads was identified several years ago as a 10 CFR 50.55(e) deficiency, and the overriding issue is safety significant. The issue is being addressed in the Design Assessment Report and no design changes are expected.

Safety Significance

This finding in itself is not safety significant, since it merely points out that analyses are underway to demonstrate adequacy.

DRAFT

SDR-80-6, FINDING 9

Finding

Note 11 of GE P&ID, input item 731E961AD, states that valves F088 (RHR-RV-88A, B, &C) shall be 1" relief valves. Page 15G-71, Table 11C of Specification 215 and output drawing M521 specify 3/4" size.

Nature of Concern

RHR-RV-88A, RHR-RV-88B, and RHR-RV-88C are for overpressure protection of the pump suction lines in case sufficient backleakage occurs through checkvalves RHR-V-31A, RHR-V-31B, and RHR-V-31C. However, pressurization can occur only when suction valves RHR-V-4A, RHR-V-4B, and RHR-V-4C are closed. These suction valves are motor actuated gate valves which are normally open. In loops A and B they would be closed when the shutdown cooling mode is being used, which is relatively infrequent. The concern here is that the 0.75 inch relief valve might not provide sufficient relieving capacity, whereas the 1.0 inch valve would.

Finding Evaluation

The concern about possible insufficient relieving capacity is unfounded since the backleakage through the checkvalves is very small. Calculation 5.17.17 estimates this backflow at 180 cm^3/hr, which is so small that even a smaller size relief valve would be sufficient.

Safety Significance

There is no safety significance to this finding.

DRAFT

SDR-80-6, FINDING 10

Finding

When the emergency diesel generator is operating in parallel with the normal preferred power source for routine exercising of the diesel, the 5KV switchgear short circuit rating given in calculations 2.03.10 and 2.03.11 could be exceeded. This could occur when the RHR is in operation. This condition can be avoided if the diesel generator is exercised in other electrical operating modes which are identified in calculations 2.03.10 and 2.03.11. However, the design documents for construction do not convey the operating restrictions to assure that the 5.0 KV switchgear rating is not exceeded. In addition, there are no alarms provided in the design to alert the operators if the prescribed operating mode is attempted.

Nature of Concern

This concern is identical to the one raised in Finding 1 of SDR-80-8, and it is discussed there.

DRAFT

SDR-80-6, FINDING 11

Finding

PCN 7081 addresses restriction orifices in the RHR system to prevent runout of the RHR pumps. Calculations for the orifices could not be found. Also, no provision for purchase nor inclusion on the design drawing could be found.

Nature of Concern

The concern here is that the restricting orifices might not be properly sized, might not be included on design documents, and/or might not be installed.

Finding Evaluation

It has been found on some systems at WNP-2 that conservative pump sizing has led to excess capability. This finding comments on an item which, at the time, was in the design process. Calculation 5.17.29 has since been performed. In cases where conditions may lead to pump runout or flow balancing problems during system lineup and startup testing, it is normal to take measures such as orificing or throttling of the flow. Test procedures result in the identification and correction of any runout conditions.

Safety Significance

The RHR system will be tested and proper flow rates established during startup testing. The lack of orifice calculations at the point in design noted in the finding is not safety significant because the test program would assure adequate system function and, in fact, this is one of the purposes of the test program.

DRAFT

SDR-80-6, FINDING 12

Finding

Paragraph 4.2.1.5 of GE input document 22A2817 states that the RHR system piping and components shall be designed to withstand the thermal cycling experienced in the various operational modes. The numbers of thermal cycles for design are given in paragraphs 4.1.2.3, 4.1.3.2, 4.1.4.4 and 4.1.5.7. In addition to these cycling requirements, the system design shall amke allowance for pressure and thermal cycling factors related to plant startup and shutdown. Calculations addressing these requirements could not be found.

Nature of Concern

The concern here is that thermal fatigue calculations were not available to the reviewer.

Finding Evaluation

This finding comments on an item which is still in the normal design process. Stress cycling fatigue calculations are being performed, and will be included in the stress report on Class 1 systems that has not been filed yet. The certified stress report, a document normally completed just prior to operation, will address thermal cycling stresses, and will verify adequacy of Class 1 systems from this standpoint.

Safety Significance

This finding occurred because the reviewer asked for calculations which, in the normal design process, may be performed at a later point in time. This finding is, therefore, not safety significant.

DRAFT

SDR-80-6, FINDING 13

Finding

Paragraph 4.2.1.4 of GE input document 22A2817 states that hydraulic shock calculations should be incorporated in the component design to ensure hydraulic balance and system stability. However, no calculations addressing this requirement could be found.

Nature of Concern

The concern here is that hydraulic shocks (waterhammer) might occur in the system which have not been analyzed, so that unexpected system damage could result.

Finding Evaluation

This item is presently being resolved. Provisions in the design make it very unlikely that hydraulic shock could cause system disabling damage. Reasons for this are: (1) there are no fast moving valves in the system, and (2) the design objective of the water leg pump is to keep the system filled at all times for the purpose of precluding hydraulic shock. General Electric suggests calculations but they are not a specific requirement. Stress calculations do address valve closing times in critical areas. In addition, exercising of the system during pre-operational and operational testing will identify any tendencies toward hydraulic shock and their causes.

Safety Significance

Considering the precautions that have been taken and the testing programs that lie ahead for the system, this finding is not considered to be safety significant.

HANFORD 2

BOP INTERFACE REVIEW

NUCLEAR BOILER SYSTEM

1. Has the air supply to the MSIV's and SRV's been specified to meet the requirements of the Plant Air Specification?

2. Are the pneumatic lines and fittings between the SRV actuators and accumulators flexible to accommodate the motion of the main steam lines relative to the accumulators?

3. Do the check valves on the SRV and MSIV accumulator inlet lines have resilient seats and are they spring loaded?

4. Is each MSIV accumulator capacity 35 gallons, minimum?

5. Are the SRV accumulators 10 gallon capacity for the relief function and 42 gallons for the ADS function?

6. Are the temperature elements in the SRV discharge line specified to be 3 to 6 feet from the valve body?

7. Are the steam line drains capable of equalizing pressure across the MSIV's prior to restart following steam line isolation?

8. Is the condensing chamber B21-D002 center line elevation specified to be 20" ± 1" above the vessel head nozzel flange face?

9. Are the center line elevations of condensing chamber B21-D004 A-D± 1 1/2" relative to the centerline of the vessel nozzle with a slope to place the chamber about 3 feet from the nozzle.

10. Are the electric circuits for the outboard MSIV protected against downstream breaks as required by the Electrical Equipment Separation Safeguard System design Specification?

11. Are the ADS valve solenoid circuits protected against jet impingement from a small HPCS injection line break?

12. Is the pneumatic supply line from each accumulator to the safety/relief valve 10 feet maximum equivalent length and 1 1/4 inch miniuum nominal pipe size?

AFD:cas/6HS
10/4/79

HANFORD 2

BOP INTERFACE REVIEW

HIGH PRESSURE CORE SPRAY SYSTEM

1. Are HPCS pump E22-C001 nozzle loads within specified limits?

2. Have the HPCS System environmental requirements been adequately considered in the design of the equipment areas?

3. Have line losses plus elevation rises plus reactor pressure been determined to be less than the pump TDH values specified on the process diagram?

4. Is restricting orifice E22-D002 sized to simplify pre-operational test sizing (slightly smaller restriction diameter) and to meet the requirements of the process diagram?

5. Is the suppression pool suction strainer sized consistent with the requirements in the design specification?

6. Are the suction lines (suppression pool and condensate storage) sized to provide the NPSH specified on the process diagram?

7. Are the condensate storage tanks, condensate supply line, and level transfer instrumentation arranged so that the minimum condensate water storage reserve is available to the HPCS System?

8. Are the flushing connections arranged close to the isolation valves to maximize the flushing volume?

9. Is the "water leg pump" (E22-C003) designed to operate post LOCA as required by the design specification?

AFD:cas/6H2
10/4/79

HANFORD 2

BOP INTERFACE REVIEW

RHR SYSTEM

1. Adequacy of RHR pump NPSH should be evaluated at condition of 50% plugged suction strainer, and of that specified in system design specification (see Table I for paragraph number).

2. Suction strainer mesh should be sized so as to eliminate foreign particles of sufficient size to clog the containment spray nozzles or suppression pool spray nozzles.

3. Suction strainers and pool return lines should be arranged for uniform pool cooling.

4. Stroke times of LPCI injection valve(s) and shutdown isolation valve(s) should be within time specified in system design spec. data sheet (Table I).

5. Were injection valves specified to open against max. ΔP (vessel pressure minus pump shutoff head minus elevation difference between min. pool level and valve, or as specified in system design spec. data sheet)?

6. Are steam relief valves sized for the the maximum credible failure of the steam supply system?

7. Water weight of both shutdown loop should be within the maximum specified in the process diagram. (Table I)

8. Do RHR equipment areas meet Electrical and Mechanical Separation requirements?

AFD:cas/6H6
10/4/79

HANFORD 2

BOP INTERFACE REVIEW

REACTOR CORE ISOLATION COOLING SYSTEM

1. Has the minimum NPSH been satisfied from both condensate storage tank and suppression pool for all modes on the process diagram?

2. Are line losses + elevation rises + reactor pressure within total pump dynamic pump head values (both high & low head values)?

3. Has the 15 psi pressure drop between the reactor vessel and the RCIC turbine been evaluated for modes A & B on the process diagram?

4. Has back pressure at turbine exhaust been specified not to exceed process diagram value starting with pool pressure and working back to turbine considering line losses?

5. Are "all" components of the RCIC System analyzed to be category 1 seismic except condensate storage tank?

6. Are steam supply and exhaust lines sloped as indicated to prevent water hammer damage on fast start?

7. Has a vertical hold down restraint been supplied to prevent line movement on Tb. Exhaust considering 20 psi unbalanced pressure?

8. Have the pump minimum flow bypass valves been specified to open and close in required time against full pressure?

9. Have the RCIC environmental requirements been considered in the design of the equipment areas?

10. Can RCIC start up and deliver rated flow independent of AC power?

AFD:cas/6H1
10/4/79

HANFORD 2

BOP INTERFACE REVIEW

LOW PRESSURE CORE SPRAY SYSTEM

1. Are the suction strainers and suction piping sized such that the required NPSH will be provided to the LPCS pumps under all process diagram conditions even when the strainers are 50% plugged?

2. Is the LPCS suction strainer mesh sized so as to prevent foreign particles of sufficient size to enter the suction piping and plug the LPCS cyclone separator orifices?

3. Does the LPCS line fill system function before and after a LOCA?

4. Was the injection valve bought to the speed requirements of the system data sheet?

5. Do all LPCS components & piping meet Seismic category 1 requirements?

6. Have environmental requirements been accounted for in the area of the LPCS equipment?

AFD:cas/6H7
10/4/79

HANFORD 2

BOP INTERFACE REVIEW

OFFGAS SYSTEM

1. Are all process drains routed back to the main condenser (by gravity flow for preheater, recombiner, and condenser) with normally operating drains 2" minimum and incorporating a strainer, trap and trap bypass?

2. For the loop seals (if any), what are the provisions for non-siphoning, flushing, and blow out protection and are they tall enough for their particular purpose?

3. Does the appropriate piping class extend to the first root valve on process drains and to the exit of the H_2 analyzers, and where, if anywhere, on the process was the classification changed because $L/D \leq 7.0$?

4. How do you insure that the required dilution steam is always supplied to the SJAE train and that isolation will occur on low dilution flow?

5. Does the valving sequences used to switch preheater-recombiner-condenser trains allow for steam warming of standby train before switchover and air purging of shutdown train after switchover?

6. Have any provisions been made such as color coding to signify which pipes and equipment possibly contain detonable mixtures?

AFD:cas:at/6H3
10/8/79

HANFORD 2

BOP INTERFACE REVIEW

ENVIRONMENTAL SPECIFICATION

1. What is the highest integrated radiation dose and maximum temperature at the RHR Pump Motor that occurs during the full shutdown period following the recirculation line break DBA.

2. What is the maximum temperature at the RCIC Turbine speed controller if there is a loss of HVAC when the RCIC is required to operate?

AFD:cas/6H4
10/4/79

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

ENGINEERING DESIGN REVIEW CHECKLIST

PROJECT NO. ______________ OBSOLETE

SPECIFICATION NO. ______________

TITLE ______________________________________

____

REVIEWED BY ________________________ DATE ______________

A. Design Requirements

1. Applicable sections of PSAR are: ______________________________

____

____

____

2. Does the specification properly cover the following items:

a) NSSS imposed requirements? ______________

b) AEC Regulatory Requirements? ______________

c) State and other regulatory requirements? ______________

3. Has suitable information been provided by the A/E to support selection and sizing of equipment? ______________________

4. Are system isolation points adequate and accessible? ______________

5. Is operator information sufficient locally? ______________

6. Is operator information sufficient remotely? ______________

7. Have precautions been taken to minimize the spread of contamination?

Operation ______________

Maintenance ______________

8. Is shielding adequate? ______________

9. Is accessibility adequate for the needs of radioactive maintenance? _____

ATTACHMENT 8

EXHIBIT 4-8.3 (page 1 of 6)
(Rev. 1, April 1, 1975)

00 0 1 4 2 4

10. Does equipment have unnecessary traps for the concentration of radioactive material? __________

11. Does equipment have necessary vents, drains, make-up supplies, etc. for radioactive service? __________

12. Are necessary controls provided? __________

13. Are numerical requirements reasonable? (Where suitable, perform simplified check calculations) __________

14. Are interfaces with other systems proper? __________

15. Are safety and relief provisions adequate? __________

16. Is there adequate redundancy and separation? __________

17. Are redundant systems, protection devices, alarms, or adequate monitoring instrumentation incorporated in the design, where required for safe operation and/or shutdown of the plant? __________

18. Is identification adequate? __________

19. Are necessary interlocks specified? __________

20. Are provisions made for in-service inspection? __________

21. Are the construction features suitable for the service contemplated? __________

22. Is scheduling reasonable? __________

23. Are special tools adequately specified? __________

24. Are installation requirements stated? __________

25. Have instrumentation data and control functions been adequately and sufficiently provided to assure equipment integrity, as well as efficient and safe operation? __________

26. Are circuits with maintained contacts utilized to prevent drop out of motors on voltage dips or momentary loss of voltage? __________

27. Are the sizes, ratings, capacities of components, motors, fuses, wires, relays, etc., adequate to carry the burden imposed? __________

28. Are cables and conductors terminated and identified correctly? __________

29. Are sensors selected to meet specified accuracy, reproducibility, operational limits, drift (time effect), response time, sensitivity and minimum output? __________

30. Do sensors and associated equipment have adequate noise suppression circuits to meet computer input requirements? __________

31. Do power supplies for I & C systems meet requirements to IEEE Criteria for Class IE Electrical Systems for Nuclear Power Generating Stations? __________

32. Are all instrumentation wiring and components grounded according to the approved grounding scheme to minimize noise pickup? __________

33. Are the loading, stress, strength, and structural design requirements reasonable? __________

34. Is the layout adequate for accommodation of equipment? __________

    a) Is lay-down area provided for disassembly? __________

    b) Is clearance available for shaft removal or tube pull? __________

35. Do relevant structural components contain provisions required by piping and equipment? __________

    a) Openings large enough to pass equipment? __________

    b) Provision for personnel access? __________

    c) Support pads, anchor bolts, dowels? __________

    d) Box-outs, sleeves, or penetrations? __________

    e) Embedments in concrete for support or anchor? __________

OBSOLETE

B. Code Requirements

1. Have proper codes been specified and are they consistent with PSAR Section 3.2? __________

2. Are proper revisions specified? __________

3. Are specified requirements consistent with industry standard practices? __________

4. Does the document conform with applicable IEEE standards? __________

5. Does all protection system instrumentation conform to the requirements to IEEE #279? __________

C. Classification of Characteristics

1. Are seismic requirements correct and in agreement with PSAR Section 3.2? __________

2. Are electrical requirements correct? __________

3. Is the equipment clearly identified as to its Quality Class 3? __________

4. Are the safety and quality classifications correct and consistent with the ANS Safety Class and USAEC Regulatory Guide 1.26, Quality Group, as listed in PSAR Tables 3.2-1 and 3.3-2? __________

5. Are reports requirements correct? __________

OBSOLETE

D. Materials

1. Have the proper materials been selected and the appropriate code references (e.g., ASME Section II or ASTM) stated? __________

2. Are the materials specified adequate for radiation resistance? __________

3. Are the materials adequate for corrosion resistance and/or minimum contribution to radioactivation? __________

4. Are points and coatings adequate? __________

E. Testing

1. Are required tests specified? __________

2. Are test tolerances and limits given? __________

3. Are provisions made for in-service testing? __________

4. Are provisions made for witnessing tests? __________

OBSOLETE

F. Welding

1. Are welding requirements stated? __________

2. Are acceptance standards given? __________

3. Is proper welding "boiler plate" referenced and attached? __________

0 0 0 1 4 2 8

G. Part Identification and Serialization

1. Is equipment marking specified? __________
2. Are spare parts requirements included? __________
3. Are code stamps required where appropriate? __________
4. Is terminology and item identification consistent and correct? __________

OBSOLETE

H. Preservation, Packaging, and Handling

1. Is proper cleaning "boiler plate" referenced and attached? __________
2. Are cleanliness classes specified properly? __________
3. Is proper packaging "boiler plate" referenced and attached? __________
4. Are special cleaning, packaging, etc. requirements needed? __________

0 0 1 4 3 0

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO._____
COMMENT / RESOLUTION FORM

COMMENTS ON: ________________

LETTER NO. ________________

PAGE ____ OF ____

DATE ________________

		WASHINGTON PUBLIC POWER SUPPLY SYSTEM	ARCHITECT ENGINEER			WPPSS	
ITEM #	PAGE	COMMENTS	ACCEPT	REJECT	REASON	ACCEPT	REJECT
					OBSOLETE		

WP 515 Rev. 1

ATTACHMENT 9
EXHIBIT PMP 4-8.4 (Rev. 0, May 17, 1974)

22

SYSTEM: REACTOR BUILDING CLOSED COOLING WATER

Reference: M525, Rev. 15
M 620-525, Rev. 0 and Rev. 1
E518 Sheet 3, Rev. 2
E519 Sheets 9(R5) and 15(R7)

ELECTRICAL/I&C PROBLEMS

1. The elementary diagram (ED) for valve RCC-SPV-48 shows a control switch that is not shown on the logic diagram. The logic diagram should be revised to show the control switch and seal-in. (M620-525-4)

   Resolution:

2. The ED shows valves 71A, B, C and 72A, B as interlocked with the associated fan controls with an auto position on the switch. This funciton is not shown on the logic diagram or flow diagram. (M620-525-5).

   Resolution:

(2)

Reactor Building Closed Cooling Water
Electrical/I&C Problems (cont.)

3. Valve RCC-V-101 closes on high radiation signal to shut the surge tank atmospheric vent. This protective funciton is bypassed due to the piping design of an open funnel overflow line. The Engineering Criteria Document states that the atmospheric vents shall be closed and the tank vented to the radwaste system upon radiation signal. This design requirement is not implmented, please correct.

   Resolution:

4. Valves RCC-V-fA, B, C have an analog position readout that serves no useful purpose. The valve circuit will only allow full open-full close operation. The analog position indication should be removed.

   Resolution:

5. The logic diagram shows valve RCC-V-40 as having a second pair of indicating lights at board S. This is not shown on the ED.

   Resolution:

0 2 3 5 0 0 9 5 3

2

Reactor Building Closed Cooling Water
Electrical/I&C Problems (cont.)

6. The logic diagrams do not show switch action, i.e. spring return maintained.

Resolution:

7. The design standard symbols are not being followed for the flow diagram. There are three different symbols shown for the same type of flow element (annubar).

Resolution:

8. According to information received during the previous review, B&R follows standard industry practice for instrument identification. The industry practice is not being followed correctly for identification of flow or level transmitters. A flow transmitter using a differential pressure method of measurement is not a differential pressure transmitter. The primary measured variable is flow, and the standard industry identification is flow transmitter. This is explained and documented in ISA standard S5.1 paragraph 3.2.2 (Instrument Symbols & Identification). B&R should correct the errors and implement the industry standard referenced.

Resolution:

U 2 5 U U 1 5 4

(25)

8. Resolution: (cont.)

9. A false low pressure alarm will sound each time the RPCCW system is started up. Putting a 52/a contact between the pressure switch and the 63X relay and using a time delay pickup on relay 63X/RCC-PS1A will rectify this design problem. The logic diagram does not show the alarm interlock with pump starting as shown on the ED. (E518, sheet 3, R2)

Resolution:

OBSOLETE

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

DCN/DCR/DCS CHECKLIST

		CONTRACT NO.
DATE	WNP NO.	AE/CMO PCN/PCR NO.

WPPSS DESIGN CHANGE DESIGNATION DCN ______ DCR ______ DCS ______

ENGINEERING REVIEW

1. SCOPE OF CHANGE IS SUMMARIZED AS FOLLOWS:

ADDITIONS/DELETIONS ______________________________

2. NECESSITY FOR THE CHANGES — DESCRIBE WHY THE CHANGE IS NECESSARY: (E.G., TO MEET LICENSING REQUIREMENTS, TO MEET COMMITTED STANDARDS, TO SATISFY OTHER CONTRACT COMMITMENTS, ESSENTIAL TO COMPLETE PROJECT, ETC.)

3. REASON — (NARRATIVE DESCRIPTION, E. G., OMISSION FROM ORIGINAL PLANS AND SPECIFICATIONS, REDESIGN FOR SPECIFIC REASON, ETC.)

	YES	NO
4. HAS THE CHANGE BEEN PHYSICALLY REVIEWED IN THE FIELD?	☐	☐
5. IS THE SCOPE OF THIS CHANGE COMPLETE SO ALL AFFECTED TECHNICAL DOCUMENTS ARE IDENTIFIED?	☐	☐
6. IS THIS CHANGE NECESSARY FOR EITHER INITIAL PLANT OPERABILITY OR LICENSING?	☐	☐
7. IS THE SUBJECT CHANGE A TECHNICALLY SATISFACTORY SOLUTION TO THIS PROBLEM?	☐	☐
8. IS ADDITIONAL TECHNICAL REVIEW REQUIRED BY QA, LICENSING, OPERATIONS OR STARTUP?	☐	☐
9. ARE A/E MANHOURS LISTED AND REASONABLE?	☐	☐

10. CONCLUSION OF ENGINEERING REVIEW

☐ APPROVED ☐ DISAPPROVED

ACTION TAKEN:

______________________ REVIEWING ENGINEER ______ DATE

WP-440 R1 (PMP 5-111)

EXHIBIT I
(SHEET 1 OF 2)

ATTACHMENT 11

OBSOLETE

CONSTRUCTION REVIEW (CONSTRUCTION CONTRACTS ONLY)

	YES	NO
1. REQUIRED START DATE FOR WORK ______		
2. DOES THE COMPLETION DATE INDICATED ON PCN/PCR SUPPORT THE CONSTRUCTION SCHEDULE?	☐	☐
3. CAN WORK BE PERFORMED CONCURRENTLY WITH OTHER CONTRACT WORK WITHOUT IMPACT ON OVERALL CONTRACT COMPLETION?	☐	☐
4. HAS THE PROPER CONTRACTOR(S) BEEN SELECTED TO DO THE CHANGED WORK?	☐	☐

IF NO, ______ ADDITIONAL DAYS ARE ESTIMATED TO BE REQUIRED.

5. CONCLUSION OF CONSTRUCTION REVIEW

☐ APPROVED ☐ DISAPPROVED

ACTION TAKEN:

______

______ CONSTRUCTION ENGINEER ______ DATE

CONTRACT ADMINISTRATION REVIEW

	YES	NO
1. IS THE PROPOSED CHANGE WITHIN THE GENERAL SCOPE OF THE LISTED CONTRACTS?	☐	☐

2. RANGE ESTIMATE GIVEN FOR THE PROPOSED CHANGE $ ______
(A/E AND CONTRACTOR COSTS)

3. FUNDS FOR THE PROPOSED CHANGE FROM

ANTICIPATED CHANGES $ ______ CONTINGENCY $ ______

4. AMOUNT OF FUNDS REMAINING IN

ANTICIPATED CHANGES $ ______ CONTINGENCY $ ______

5. CONCLUSION OF CONTRACT ADMINISTRATION REVIEW

☐ APPROVED ☐ DISAPPROVED

ACTION TAKEN:

______

______ CONTRACT ADMINISTRATION ______ DATE

APPROVED: ______ PROJECT ENGINEERING MGR./CONSTRUCTION MGR.

EXHIBIT I
(SHEET 2 OF 2)

ATTACHMENT 12

INTER OFFICE MEMORANDUM

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

Distribution:
- ☐ EDC WNP-1/4
- ☐ EDC WNP-2
- ☐ EDC WNP-3/5
- ☐ Admin File

HL Bennett
RL Besser
GW Brastad
BM Boyum
WG Conn
EA Fredenburg
DL Gano
RE Green
WH Holle
AN Kugler
GR Lawrence
FE Maddy
JA Ogawa
DC Timmins
MF Wiitala
IA Rodriquez
KDC/lb
EAF/lb

Date: November 8, 1978

To: DISTRIBUTION

KDCowan

From: KD Cowan, Project Engineering Manager, WNP-2

Subject: PROCEDURE FOR AUDITING AE CONFORMANCE TO CRITERIA FOR WPPSS APPROVAL OF DESIGN CHANGES

Reference: ME Witherspoon IOM, dated May 17, 1978 same subject

This instruction supersedes the Reference. The procedure transmitted by the Reference is voided.

Effective immediately, all PCN's and PED's which are determined by the AE and the Burns and Roe Technical Support group to not require approval by the WPPSS Site organization shall be reviewed by cognizant engineers for compliance with the criteria contained in Exhibit I of PMP 5-111-1. This reivew shall be evidenced by completing the attached form. The design change document with review form attached will be routed, and filed by Irma Rodriquez. RFI's will be routed for information only since any design changes resulting from RFI's will be issued and reviewed as PED's.

This change in procedure should cut down on the amount of paperwork being distributed and routed.

All design changes shall continue to be reviewed from the standpoint of cost, schedule, and technical adequacy. Cognizant engineers have a responsibility to cull changes which are not in the best interests of the Supply System regardless of whether or not WPPSS site approval is required.

CONCURRENCE: DL Gano for (AN)
A. N. Kugler

WG Conn
W. G. CONN

KDC:cah

Evaluation of Compliance with WPPSS Review Criteria

PCN ______________ Date to Reviewer ________________

PED ______________

WPPSS Review Criteria (from PMP 5-111-1):

(1) Deviation from commitments in SAR, ER, EFSEC.*
(2) Deviation from design criteria or from applicable codes and standards.
(3) Change in safety or quality classifications
(4) Sacrifice of operability or maintainability
(5) Estimated engineering and capital construction costs exceed $50,000.
(6) New Work (See 8-21-78 IOM from WG Conn)

* (Refer to WPBR-78-274, dated 4-13-78)

☐ Based on criteria above, WPPSS review is not required.

☐ Based on criteria above, WPPSS review is required.

REVIEWER: ________________________ DATE: ________________

January 25, 1982

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION	
					IDENTI-FIED	COMPLETE
	*INDICATES DUPLICATE ITEM					
1	POST TMI ENGINEERING	------	--	--	--	--
1a	CONTROL ROOM DESIGN REVIEW AND CHANGES	CAREY	7-23-81	YES	NO	5-3-82
1b	PLANT SHIELDING - II.B-2	JOHNSON	8-10-81	YES	NO	--
1c	POST ACCIDENT SAMPLING	CAREY	12-15-81	YES	YES	5-4-82
1d	CONTAINMENT INERTING	JOHNSON	8-04-81	YES	NO	--
1e	PERFORMANCE TESTING OF SAFETY RELIEF VALVES	BOSTRTOM	5-81	YES	NO	--
1f	SRV POSITION INDICATION	CAREY	~~7-23-81~~ 5-3-82	YES	~~NO~~ Yes	--
1g	RCIC LEAK DETECTION LOGIC (IIk.3.15)	CAREY	8-04-81	NO	YES	
1h	REDUCE CHALLENGES TO SRV's	~~ROGOZA~~ WILSEY	1-27-82	NO	NO	——
1i	MODIFICATION OF ADS LOGIC	CAREY	8-05-81	NO	NO	--
1j	RESTART OF CORE SPRAY & LPCS ON LOW LEVEL	CAREY	8-05-81	NO	NO	--
1k	QUALIFICATION OF ADS ACCUMULATORS 11.k3.28	ROGOZA	11-6-81	NO	YES	
1l	TECHNICAL SUPPORT CENTER	WILSEY	8-20-81	YES	YES	
1m	DEGRADED CORE ACCIDENT	JOHNSON	8-17-81	NO	NO	--
1n	RADIATION SOURCE CONTROL	JOHNSON	8-18-81	NO	NO	--
1o	RCIC SWITCHOVER	JOHNSON	8-10-81	NO	NO	--
1p	TDAS (TMI & NON-TMI ASPECTS)	CAREY	8-10-81	YES	YES	
1q	PROGRAM CENTRAL PROCESS COMPUTER (TDAS)	CAREY				

ATTACHMENT 13

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTIFIED	FOLLOW-UP ACTION COMPLETE
2	PIPE BREAK MISSILE EVALUATION	JOHNSON	8-27-81	YES	YES	
3	POTENTIAL CHANGE IN SEISMIC GROUND MOTION	JOHNSON	12-23-80	NO	YES	
4	ATWS	S. JOHNSON	6-09-81	YES	YES	
5	ENVIRONMENTAL QUALIFICATIONS	THAKUR	8-10-81	YES		
6	CVRP - ANNULUS PRESSURIZATON	BOSTROM	5-81	YES	YES	Yes
7	SITE ENGINEERING PIPE SUPPORT DESIGN PROGRAM	SKINNER	8-06-81	YES	NO	--
8	CONTRACT 215 LG. DIA. PIPING SYS. DESIGN (NPS PIPING)	HAYNES	7-81	YES	NO	--
9	SQRT EVALUATION	REF. ITEM 5	ON MASTER	LIST		
10	AS BUILT PROGRAM, LG. DIAMETER PIPING	BOSTROM	7-81	YES	NO	--
11	FIRE PROTECTION	CAREY/ROGOZA	5-28/8-03-81	YES	NO	--
12	CVRP -CHUGGING LOAD DEFINITION	BOSTROM	8-14-81	YES		
13	IE BULLETIN 79-02	SKINNER	7-06-81	NO	NO	--
14	ULTIMATE HEAT SINK	POWELL	8-03-81	YES	YES	
15	DELETED - FLEXIBLE CONDUIT PROBLEM	THAKUR	8-19-81	NO	NO	--
16	CVRP-FATIGUE EVALUATION, SRV LINES, FTC.	BOSTROM	5-81	YES	YES	Yes
17	CVRP - CONDENSATION OSCILLATION LOAD DEFINITION	BOSTROM	8-14-81	YES	NO	--
18	PIPING CLASS 1 STRESS REPORTS	HAYNES	7-81	YES	NO	--
19	SEISMIC CATEGORY I PIPING FINAL CALC. (NON-CLASS 1)	HAYNES	7-81	YES	YES	
20	EQUIPMENT NOZZLE LOADS	HAYNES	7-81	YES	NO	--
21	NRC QUESTION 130.48; SEISMIC METHODS	JOHNSON	12-16-81	NO	NO	--
22	POSSIBLE VALVE MODELING PROBLEM	HAYNES	7-81	YES	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
23	QUALITY CLASS II ITEMS IN SEISMIC I AREAS(MECHANICAL)	BOSTROM	11-02-81	NO	NO	--
24	RIGID CONDUIT CLAMP ADEQUACY	THAKUR	8-03-81	NO	NO	--
25	CVRP - SUPPRESSION POOL TEMPERATURE LIMITS	JOHNSON	8-10-81	NO	YES	
26	SMALL DIAMETER PIPING AS-BUILT EVALUATION	HAYNES	7-81	YES	NO	--
27	VOLCANIC EVENT EVALUATION	WILSEY	8-06-81	YES	YES	
28	CVRP - DESIGN ASSESSMENT REPORT REVISIONS	BOSTROM	8-06-81	YES	NO	--
29	RHR TRANSIENT ANALYSIS	HAYNES	7-81	NO	NO	--
30	RCIC MOISTURE CARRYOVER PROBLEM	J. ROGOZA	8-03-81	NO	NO	--
31	TURBINE TRIP ANALYSIS	HAYNES	7-81	YES	NO	--
32	CVRP - VACUUM BREAKER CYCLING PROBLEM	J. ROGOZA	8-04-81	YES	YES	YES
33	RIGID SWAY STRUT PROBLEM	SKINNER	6-29-81	NO	YES	
34	CVRP - NSSS EVALUATION	HAYNES	7-81	YES	YES	
35	SRV LINE TRANSIENT ANALYSES	HAYNES	7-81	YES	NO	--
36	STANDBY SERVICE WATER PUMP MOTOR	THAKUR	8-05-81	NO	YES	
37	CVRP - FUNCTIONAL CAPABILITY EVALUATION	HAYNES	7-81	NO	NO	--
38	MOD. OF DRAINS TO MS AND FW TRAPS	ROGOZA				
39	REVIEW & MOD. TO RADWASTE CONTROL PANELS	HAWHEN	12-17-81	NO	YES	5-3-82
40	CVRP - IN PLANT SRV TESTING	BOSTROM	5-81	YES	NO	--
41	FUEL POOL COOLING UPGRADE	JOHNSON	8-26-81	YES	NO	--
42	MISCELLANEOUS LICENSING ISSUES	JOHNSON	8-26-81	YES	NO	--
43	PREPARE PROCESS DIAGRAMS FOR FLOW AND TEMP. INFO.	ROGOZA	8-05-81	NO	NO	--
44	SACRIFICIAL SHIELD WALL	WILSEY	11-17-81	NO	NO	--
45	DELETED - PERSONNEL ACCESS CAPACITY IN GUARD HOUSE	CAREY	12-14-81	YES	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
46	RIGID CONDUIT TO SWITCHGEAR	THAKUR	8-19-81	NO	YES	
47	COMPLETE TECHNICAL SPECIFICATIONS	HAWKEN	12-15-81	NO	YES	5-3-82
48	LOOSE PARTS MONITORING EQUIPMENT	HAWKEN	10-12-81	YES	NO	--
49	DELETED - INSERVICE INSPECTION - SEE ITEM 144	*	---	--	--	--
50	CONTAINMENT INTEGRATED LEAK RATE TEST	WILSEY	10-30-81	YES	YES	
51	FENCING CONTRACT	POWELL				
52	PAVING AND GRADING CONTRACT	~~WILSON~~ WILSEY	12-28-81	YES	NO	--
53	SOLID RADWASTE SYSTEM	JOHNSON	12-23-81	YES	NO	--
54	DELETED - SECURITY LIGHTING	CAREY	12-15-81	YES	NO	--
55	AUTOMATIC WETWELL SPRAY/DRYWELL FLOOR BYPASS LEAKAGE	JOHNSON	12-16-81	NO	NO	--
56	RPS - MG SETS	THAKUR	8-06-81	NO	YES	
57	RFW PUMP VORTEX STRAIGHTENERS	ROGOZA				
58	CONTROL ROOM VENTILATION	ROGOZA	11-9-81	YES	NO	--
59	DELETED - SEWAGE TREATMENT PLANT	WILSEY	11-18-81	NO	NO	--
60	POTABLE WATER/FIRE PROTECTION SYSTEM (FPS) BUILDING	J. ROGOZA	3-25-80		NO	--
61	DELETED - NEW DC BATTERY SYSTEM	THAKUR	8-14-81	NO	NO	--
62	DELETED - GE SEPERATION CHANGES	THAKUR	11-3-81	YES	YES	
63	QA VAULT MODIFICATIONS	WILSEY	11-17-81	NO	NO	--
64	DELETED - QC UPGRADE OF 10"	BOSTROM	8-19-81	NO	NO	--
65	PIPING WITH INSUFFICIENTLY THICK WALLS	BOSTROM	5-81	NO	YES	
66	DELETED-CIRC. WTR PIPE & PLENUM LEAK. UNDER T/G FLOOR	WILSEY	11-17-81	NO	NO	--
67	TG MISSILES AND ISI	WILSEY	10-30-81	YES	YES	
68	PIPE MOTION MONITORING SYSTEM	BOSTROM	5-81	NO	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
69	CONDENSATE IN-LINE RESERVOIR FOR HPCS AND RCIC	S. JOHNSON	6-09-81		NO	--
70	CVRP - SRSS	BOSTROM	8-17-81	NO	NO	--
71	CLASS 1E EQUIPMENT LIST	THAKUR	8-07-81	YES	NO	--
72	ELECTRICAL EQUIPMENT TAGGING	THAKUR	9-17-81	NO	YES	
73	DELETED - MISCELLANEOUS SECURITY SYSTEM CHANGES		REF. ITEM 114 ON THE MASTER LIST			
74	DRAWING INDEX OF DEVICES ELECTRICAL (DIODE) PROGRAM	THAKUR	8-07-81	NO	NO	--
75	DELETED - VENDOR DRAWING UPDATE PROGRAM	HAWKEN	12-15-81	NO	YES	[illegible]
76	SUPERVISED WIRING	THAKUR	9-03-81	NO	NO	--
77	VIBRATION MONITORING	BOSTROM	5-81	NO	YES	Yes
78	TORNADO/DUCTWORK PROBLEM (SEE WPBR-81-39)	POWELL				
79	EOF	CAREY	12-28-81	Yes	Yes	
80	SIMULATOR	HAWKEN	10-05-81	NO	NO	--
81	EMERGENCY PLAN	CAREY	1-21-82	YES	Yes	
82	DELETED - CONTRACT 2 (GE) ADMIN. (TECH. INTERFACE)	GIUSTI				
83	DELETED - CONTRACT ADMIN. PREPURCHASED CONTRACTS	GIUSTI				
84	SYSTEM DESCRIPTIONS	WILSEY	11-16-81	NO	YES	
85	MASTER DOCUMENTS LIST	GIUSTI				
86	EWD's	THAKUR	8-13-81	NO	YES	
87	TEN CYCLE SEISMIC CRITERIA	POWELL				
88	STRUCTURAL STEEL CRACKING	POWELL				
89	DELETED - SINGLE FAILURE OF REMOTE AIR INTAKE VALVES	CAREY	12-18-81	NO	NO	--
90	RHR DIFFERENTIALS, STEAM CONDENSING	JOHNSON				

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
91	RCC HEAT EXCHANGER DIFFERENTIALS	JOHNSON	12-23-81	NO	YES	
92	SUMPS IN ECCS PUMP ROOM	ROGOZA				
93	SECONDARY CONTAINMENT PRESSURIZATION	WILSEY				
94	MSRV PIPING ISI	BOSTROM	6-81	NO	YES	YES
95	FUNCTIONALITY OF ISOLATION VALVES	HAYNES	7-81	NO	NO	--
96	JET IMPINGEMENT MSRV's	JOHNSON				
97	DELETED - WETWELL COATING ABOVE WATER LEVEL	WILSEY	11-17-81	NO	NO	--
98	NON-CLASS IE CONDUITS & TRAYS IN CLASS I AREA	THAKUR	8-19-81	NO	YES	
99	DELETED - CONTROL ROOM INFILTRATION THRU HVAC	ROGOZA				
100	SBGT INFILTRATION TEST	JOHNSON	12-23-81	NO	YES	
101	HYDROGEN MIXING	JOHNSON	8-11-81	NO	NO	--
102	CRD DISCHARGE VOLUME DESIGN	JOHNSON	8-11-81	YES	NO	--
103	HOT RRC TEST VS. INITIAL VIBRATION TEST	JOHNSON				
104	ODYN CODE ANALYSIS	JOHNSON	8-21-81	NO	NO	--
105	MASS ENERGY STUDIES	WILSEY				
106	DELETED - RCIC & HPCS TRANSFER-SAME AS ITEM 69	*	--	--	--	--
107	STRESS CORROSION CRACKING	ROGOZA				
108	CONTAINMENT BUCKLING ANALYSIS	POWELL				
109	DELETED - CONTAINMENT INERTING-COVERED BY ITEM 1d	*	--	--		
110	REG. GUIDE 1.47 PANEL DESIGN	CAREY	7-23-81	YES	NO	--
111	STATION BLACKOUT	PLAGGE	12-3-81	NO	NO	--
112	LUBE OIL CONSUMPTION OF DGS	ROGOZA				

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
113	POST ACCIDENT MONITORING INSTRUMENTATION, R.G. 1.97	CAREY	7-29-81	YES	YES	5-3-82
114	SECURITY-MISC. ITEMS, INCLUDING SECURITY LIGHTING	CAREY	12-15-81	YES	NO	--
115	BINGHAM AMMENDMENT	S. JOHNSON	6-09-81		NO	--
116	DELETED - CONSTRUCTION QUALITY	WILSEY	11-16-81	NO	NO	--
117	DELETED - PROVIDE 2ND LVL OF UNDERVOLTAGE PROTECTION	THAKUR	10-29-81	NO	NO	--
118	SITE ACCEPTANCE TESTS FOR DIESEL GENERATORS (PSB-2)	ROGOZA				
119	EVALUATE CONTAINMENT ELECTRICAL PENETRATIONS FOR SINGLE FAILURE VULNERABILITY (PSB-3)	THAKUR	11-9-81	NO	YES	
120	JUSTIFY THERMAL OVERLOAD MARGIN FOR MOTORS (PSB-5)	PLAGGE	10-12-81	NO	NO	--
121	PUMP AND VALVE OPERABILITY; DEMONSTRATE BY TEST OR ANALYSIS (MEB-6)	WILSEY				
122	REQUIRE INDICATION OF NRC CONCURRENCE WITH ~~(ICSB-7)~~ WNP-2 SEPARATION CRITERIA (ICSB-2)	HAWKEN	12-21-81	NO	YES	5-3-82
123	UPGRADING OF RCIC SYSTEM INCLUDING AUTOSTART (ICSB-7)	ROGOZA				
124	DETECTION OF INTERSYSTEM LEAKAGE (RSB-5)	WILSEY				
125	RCIC PUMP SUCTION (RSB-6)	ROGOZA				
126	SHUTDOWN UNINTENTIONALLY OF THE RCIC SYSTEM (RSB-7)	CAREY	8-06-81	NO	NO	--
127	CATEGORIZATION OF VALVES WHICH ISOLATE RHR FROM REACTOR COOLANT SYSTEM (RSB-9)	JOHNSON	10-02-81	NO	NO	--
128	AVAILABLE NET POSITIVE SUCTION HEAD (RSB-10)	JOHNSON	8-25-81	NO	NO	--
129	OPERATILITY OF ECCS PUMPS (RSB-14)	JOHNSON	8-25-81	NO	NO	--
130	ADDITIONAL LOCAL BREAK SPECTRUM	POWELL				
131	DIVERSION OF LOW PRESSURE COOLANT INJECTION SYSTEM	WILSEY				
132	USE OF NON-RELIABLE EQUIPMENT IN ANTICIPATED OPERATIONAL TRANSIENTS	JOHNSON	10-02-81	NO	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
133	PEACH BOTTOM TURBINE TRIP TESTS	JOHNSON	8-21-81	NO	NO	--
134	MINIMUM CRITICAL POWER RATIO	WILSEY				
135	GEXL CORRELATION	JOHNSON				
136	STABILITY EVALUATION	JOHNSON				
137	EXEMPTIONS FROM APPENDIX G TO 10CFR50	JOHNSON				
138	EXEMPTIONS FROM APPENDIX H TO 10CFR50	JOHNSON				
139	CONTAINMENT PURGE SYSTEM AND ISOLATION	JOHNSON	12-23-81	NO	NO	--
140	COMBUSTIBLE GAS CONTROL	JOHNSON	8-11-81	NO	NO	--
141	ALARA	JOHNSON	8-10-81	NO	YES	
142	DELETED - TDAS REF. ITEM 1p	*	--	--	--	--
143	DELETED - INSTRUMENT SETPOINT	HAWKEN	12-17-81	YES	YES	5-3-82
144	INSERVICE INSPECTION	SKINNER	11-11-81	YES	NO	--
145	SUPPRESSION POOL MIXING	REF. ITEM 25	ON MASTER	LIST		
146	BOP SEPARATION CRITERIA	THAKUR	8-13-81	YES	YES	
147	CONDUIT TAGGING	THAKUR	8-13-81	NO	YES	
148	DELETED - VOLTAGE DROP CASES	THAKUR	12-4-81	NO	YES	
149	ELECTRIC RACEWAY PROXIMITY TO HOT PIPE	THAKUR	8-07-81	NO	YES	
150	DELETED - RCC HEAT EXCH. DIFFER. - SAME AS ITEM 91	*	--	--	--	--
151	TERMINATION DOCUMENT PGCC	THAKUR	8-19-81	YES	YES	
152	ITT HYDROMOTERS NOT QUALIFIED	HAWKEN	10-13-81	NO	NO	--
153	DOUBLE LOADED CLAMPS		REF. ITEM 115	ON MASTER LIST		
154	SPENT FUEL RACK VENTING	REF. ITEM 11	46 ON MASTER	LIST		

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
155	LEAKAGE MITIGATION SUMP IN R.B.	ROGOZA				
156	DELETED - EQUIP. QUALIFICATIONS - SAME AS ITEM 5	*	--	--	--	--
157	CONTROL ROOM HABITABILITY	ROGOZA				
158	SAFETY PARAMETERS DISPLAY CONSOLE	CAREY	12-16-81	YES	YES	Yes
159	PENETRATION ANALYSIS (SHIELDING)	JOHNSON				
160	DELETED - ANALYSIS OF CLASS 1 SMALL O PIPING SYSTEM - SAME AS ITEM 19	*	--	--	--	--
161	ASME SECTION III N STAMP CERTIFICATION	BOSTROM	8-06-81	NO	NO	--
162	DELETED - LITIGATION 206, 215	WILSEY	12-28-81	NO	NO	--
163	INSTRUMENT LIST UPDATE	CAREY	7-29-81	NO	NO	--
164	T.F. II, CONTRACTOR TASK GROUP (TASK 0107)	GIUSTI				
165	CONTRACT 218 RETROFIT (TASK 0117)	THAKUR				
166	STEAM DRAIN AND CONDENSATE (TASK 1190)	BOSTROM	11-02-81	YES	NO	--
167	VENT AND DRAIN REVIEW (TASK 1210)	BOSTROM	8-06-81	YES	NO	--
168	CONTRACT 217 REVIEW COMMENTS (TASK 1280)	ROGOZA				
169	OFF-GAS HOLDUP LINE WELDS (TASK 1330)	BOSTROM	8-06-81	YES	NO	--
170	PIPE DEFECT REMOVAL (TASK 1350) SAME AS ITEM 65	*	--	--	--	--
171	CLASS 1E LIST (TASK 1560)	REF. ITEM 71	ON MASTER	LIST		--
172	PCN 6779 - MSLC PHYSICAL SEPARATION (TASK 1580)	THAKUR	9-17-81	NO	NO	--
173	RADIAL BEAM SUPPORT ATTACHMENTS (TASK 1660)	WILSEY	11-12-81	NO	NO	--
174	PRIMARY CONTAINMENT VESSEL ATTACHMENT (TASK 1670)	SKINNER	9-29-81	NO	NO	--
175	SPACE VIOLATION FOR CONCRETE INSERTS (TASK 1680)	SKINNER	8-14-81	YES	NO	--
176	AS-BUILT REVISIONS, OTHER CONTRACTS (TASK 1700)	BOSTROM	8-19-81	YES	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	COMPLETE
177	CADWELD EVALUATION (TASK 1780)	WILSEY	11-12-81	YES	NO	--
178	QUALITY CLASS II ENGINEERING VERIFICATION OF PIPING AND SUPPORTS (TASK 1810)	SKINNER	7-30-81	YES	YES	
179	QUALITY CLASS I AS BUILT SUPPORTS (TASK 1820)	REF. ITEM 10	ON MASTER	LIST		
180	AS BUILT LARGE BORE HANGER DETAILS (TASK 1860)	REF.ITEM 182	, 183 ON MAS	TER LIST		
181	M200 GEOMETRY REVIEW, DW ANALYSIS, AND NPS ANALYSIS REVIEW (TASK 1910)	HAYNES	7-81	YES	NO	--
182	HANGER DESIGN AND DRAFTING	SKINNER	7-31-81	YES	YES	
183	REVIEW AND DRAFTING OF WBG LARGE BORE HANGER ISO'S (TASK 1950)	SKINNER	7-31-81	YES	YES	
184	REVIEW AND APPROVAL OF CONTRACT 220 SMALL BORE STRESS REPORT (TASK 2000)	HAYNES	7-81	YES	NO	--
185	PCN 6859 REVIEW CLASS 1E CABLE (TASK 1590)	THAKUR	9-18-81	YES	YES	5-3-82
186	REVIEW INSTRUMENT DRAWINGS (TASK 1620)	HAWKEN	10-19-81	YES	YES	5-4-82
187	REACTOR BUILDING, INSIDE CONTAINMENT HANGER STUDY (TASK 2030)	SKINNER	8-03-81	NO	NO	--
188	CALCULATION REVIEW (TASK 2040)	BOSTROM	8-19-81	YES	NO	--
189	PENETRATION SEALING/FIRE BARRIER (TASK 3020)	PLAGGE	10-07-81	NO	NO	--
190	EMBEDDED PLATES (TASK 3030)	POWELL				
191	HEAT TRACING (TASK 3130)	PLAGGE	11-20-81	YES	NO	--
192	CONTRACT 206 CLOSE OUT (TASK 3170)	WILSEY	12-21-81	NO	YES	
193	VERIFY AND UPDATE HANGER GRID DRAWINGS (TASK 3210)	SKINNER	8-07-81	NO	NO	--
194	SUPPORT OF TEMP. WETWELL FLUSH. RING (TASK 3220)	SKINNER	8-04-81	NO	NO	--
195	213A TASK FORCE II TEAM (TASK 3230)	WILSEY	8-20-81	NO	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS TO PLANT COMPLETION

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
196	NEW LOADS/DEFLECTIONS IMPACT ON HANGER DESIGN (TASK 3290)	SKINNER	8-13-81	YES	NO	--
197	LUBRITE PLATES (TASK 3300)	SKINNER	8-13-81	YES	NO	--
198.	PIPE WHIP RESTRAINT ANALYSIS (TASK 3370)	HAYNES	8-81	YES	YES	
199	TSW CAVITATION RESOLUTION (TASK 3520)	WILSEY	11-25-81	NO	NO	--
200	ENGINEERING INVESTIGATION OF LOCAL BEARING STRESS	SKINNER	8-26-81	YES	NO	--
201	NUREG-0612 CONT. OF HEAVY LOADS AT NUCLEAR PWR PLANTS	JOHNSON	12-23-81	YES	NO	--

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1001	MISSILE & HIGH ENERGY INPACT BREAK	REF.ITEM 2	ON MASTER	LIST		
1002	FIRE PROTECTION EVALUATION	REF.ITEM 11	ON MASTER	LIST		
1003	PIPE ANCHORS TO SLEEVES	SKINNER	8-18-81	YES	NO	--
1004	VOLTAGE DROP CALCULATIONS	REF.ITEM 148	ON MASTER	LIST		
1005	ELECTRICAL RACEWAY PROXIMITY TO HOT PIPE	REF.ITEM 149	ON MASTER	LIST		
1006	TRAY COVERS	REF. ITEM 1095 ON THIS LIST				
1007	BOLTING MATERIALS (ASME III)	BOSTROM	7-81	NO	NO	--
1008	CABLE SEPARATION PER IEEE-384 & REG G.1.75	REF.ITEM 122	ON MASTER	LIST		
1009	TMI HYDROGEN VENTING	REF.ITEM 1d	ON MASTER	LIST		
1010	ELECTRICAL PENETRATION OVERLOAD/REG GUIDE 1.63	WILSEY	1-28-81	NO	NO	--
1011	MAIN STEAM LINE FLUED HEAD TO MSIV	HAYNES	8-81	YES	YES	
1012	VENDOR PANELS	REF. ITEM 1025 ON MASTER LIST				
1013	SUPPORT DESIGN CRITERIA VS AS-BUILTS	SKINNER	8-17-81	YES	NO	--
1014	ALARA REVIEW	REF.ITEM 141	ON MASTER	LIST		
1015	SEAL INJECTION FOR RECIRCULATING PUMP	WILSEY	1-28-81	NO	NO	--
1016	WESTINGHOUSE LIMITS OF LOW NA IN MS	WISLEY	1-28-81	NO	NO	--
1017	SPRAY POND EFFICIENCY	REF.ITEM 14	ON MASTER	LIST		
1018	SEISMIC ANALYSIS	REF.ITEM 3	ON MASTER	LIST		
1019	PAVING AND GRADING	REF.ITEM 52	ON MASTER	LIST		
1020	ELECTRICAL CONDUIT SUPPORTS	THAKUR				
1021	CONTROL ROOM FLOOR	REF. ITEM 1119 ON THIS LIST				
1022	TORNADO DESIGN INCLUDING INTERNAL COMPARTMENT	POWELL				
1023	PENETRATION & BLOCKOUT SEALING	REF.ITEM 189	ON MASTER	LIST		
1024	INTEGRATED LEAK RATE TEST & STRUCTURAL INTEGRITY	REF.ITEM 50	ON MASTER	LIST		
1025	VENDOR DRAWING AS-BUILTS	HAWKEN	9-21-81	NO	YES	1-71

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1026	SEISMIC MONITORING INSTRUMENTATION	WILSEY	7-10-81	NO	NO	--
1027	ELECTRICAL SUPPORTS - BASE PLATE ANCHORS	THAKUR				
1028	TURBINE LUBE OIL FLUSH	WILSEY	10-29-81	NO	NO	--
1029	FUEL POOL LINER CLEANING	JOHNSON	8-11-81	NO	YES	
1030	INSTALLATION OF FUEL TRACKS	JOHNSON	8-12-81	NO	NO	--
	NOTE: ITEMS 1031 THRU 1092 FROM "PHASE 1 STUDY ITEMS"					
1031	DRAWING CONTROL	SEAMANS	8-27-81	NO	YES	--
1032	SPECIFICATION CONTROL	SEAMANS	8-27-81	NO	YES	--
1033	CORRESPONDENCE CONTROL	SEAMANS	12-2-81	NO	YES	
1034	VENDOR PRINT CONTROL	SEAMANS	1-30-82	NO	NO	--
1035	MICROFILM PROGRAM	SEAMANS	12-8-81	NO	NO	--
1036	RECORDS TURNOVER	SEAMANS	8-27-81	NO	YES	--
1037	CONTRACTOR STICK FILES	SEAMANS	5-5-82	NO	NO	—
1038	PED PROCESSING	SEAMANS	8-27-81	NO	NO	--
1039	ENGR. PLANNING AND CONTROL	WILSEY	12-22-81	NO	NO	--
1040	TMI-MODIFICATIONS	REF.ITEM 1	ON MASTER	LIST		
1041	PAVING & GRADING	REF.ITEM 52	ON MASTER	LIST		
1042	SEISMIC QUALIFICATION OF ELECT. CONDUIT CLAMPS	REF.ITEM 24	ON MASTER	LIST		
1043	INTERNAL COMPARTMENT TORNADO DESIGN	REF. ITEM 1022 ON THIS LIST				
1044	PENETRATION SEALS	REF.ITEM 189	ON MASTER	LIST		
1045	B&R REVIEW OF SMALL PIPE HANGER DESIGN	SKINNER	8-07-81	NO	NO	--
1046	LOADS OUTSIDE CONTAINMENT DUE TO HYDRODYNAMIC	BOSTROM	8-14-81	NO		
1047	NEED FOR MASTER EQUIP. DOCUMENT REFERENCE LIST	REF. ITEM [illegible] ON MASTER [illegible]				

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1048	NEED FOR FLOW DIAGRAMS	REF.ITEM 43	ON MASTER	LIST		
1049.	PRE-OP PROCEDURE REVIEW	WILSEY				
1050	REVIEW OUTSTANDING PURCHASE ORDERS	POWELL				
1051	PIPE BREAK HAZARD ANALYSIS	REF.ITEM 2	ON MASTER	LIST		
1052	MONITOR ENGR. BACKLOG OF RFI/NCR/CAR	WILSEY	12-22-81	NO	NO	--
1053	ALARA	REF.ITEM 141	ON MASTER	LIST		
1054	ISI	REF.ITEM 144	ON MASTER	LIST		
1055	NEW LOADS	REF.ITEM 17	ON MASTER	LIST		
1056	EQUIPMENT NOZZLE LOADS	REF.ITEM 20	ON MASTER	LIST		
1057	AS-BUILT PROGRAM FOR PIPE HANGER STRESS	REF.ITEM 179	ON MASTER	LIST		
1058	RFI TURNAROUND TIME	BOSTROM	5-82	NO	Yes	
1059	SEISMIC CATEGORY II OVER I	REF.ITEM 23	ON MASTER	LIST		
1060	REVIEW STATUS AND USE OF MODEL	BOSTROM	8-21-81	NO	NO	--
1061	CROSS REF. ON ELEC. DWGS. IS LACKING INCL. DCL & TCL	THAKUR	12-9-81	NO	NO	--
1062	CONTROL OF RACEWAY AND CABLE SCHEDULE	THAKUR	12-10-81	NO	NO	--
1063	SWITCHGEAR WITH RIDGID RACEWAY CONNECTIONS	REF.ITEM 46	ON MASTER	LIST		
1064	SEISMIC CATEGORY 1 CONDUIT SUPPORTS	THAKUR				
1065	LIGHTING FIXTURES IN SEISMIC CATEGORY 1 AREAS	REF.ITEM 98	ON MASTER	LIST		
1066	SEPARATION	REF.ITEM 122	ON MASTER	LIST		
1067	ENVIRONMENTAL QUALIFICATIONS	REF.ITEM 5	ON MASTER	LIST		
1068	SEISMIC QUALIFICATIONS	REF.ITEM 5	ON MASTER	LIST		
1069	MOV OVERLOAD PROTECTION	REF. ITEM 120 ON MASTER LIST				
1070	FIRE PROTECTION	REF.ITEM 11	ON MASTER	LIST		
1071	BATTERY TESTING AND MAINTENANCE	THAKUR	11-10-81	NO	NO	--
1072	REDUNDANT CLASS 1E OVERLOAD PROTECTION	REF. ITEM 119 ON MASTER LIST				

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTIFIED	FOLLOW-UP ACTION COMPLETE
1073	LOGIC DIAGRAMS FOR ELEC. SYSTEMS	THAKUR	11-12-81	NO	NO	--
1074.	INCOMPLETE INSTRUMENT LIST	REF. ITEM 163 ON MASTER LIST				
1075	INSTRUMENT ANALOG WIRING	HAWKEN	9-21-81	NO	NO	--
1076	INSTRUMENT LINE INTERFERENCE	CAREY	12-15-81	NO	NO	--
1077	CONTROL ROOM CHANGES	HAWKEN	12-15-81	YES	YES	5-3-82
1078	BOUNDARY ANCHORS SEISMIC II TO I	SKINNER	8-05-81	NO	YES	
1079	AS BUILT PIPING HANGER PROGRAM	REF.ITEM 179	,180,10 ON M	ASTER LIST		
1080	HYDRODYNAMIC LOADS	REF.ITEM 6,	16,19 ON MAS	TER LIST		
1081	PIPING LOADS ON EQUIPMENT NOZZLES	REF.ITEM 20	ON MASTER	LIST		
1082	COMPLIANCE WITH R.G. 1.68 & 1.68.1	REF. ITEM 77	ON MASTER	LIST		
1083	FIELD INTERFERENCE DESIGN PROBLEMS	HAYNES	8-81	NO	YES	
1084	PIPE MINIMUM WALL REQUIREMENTS	REF.ITEM 65	ON MASTER	LIST		
1085	ATWS	REF. ITEM 4	ON MASTER	LIST		
1086	ALARA	REF.ITEM 141	ON MASTER	LIST		
1087	ISI	REF.ITEM 144	ON MASTER	LIST		
1088	LICENSING STATUS	REF.ITEM 42	ON MASTER	LIST		
1089	POST TMI	REF.ITEM 1	ON MASTER	LIST		
1090	I.E. BULLETINS AND CIRCULARS	JOHNSON	8-25-81	NO	NO	--
1091	FIRE PROTECTION	REF.ITEM 11	ON MASTER	LIST		
1092	SECURITY	REF.ITEM 114	ON MASTER	LIST		
1093	FLOODING	ROGOZA				
1094	BLOCK WALLS	WILSEY	12-1-81	NO	NO	
1095	CABLE DERATING BEACUSE OF TRAY INSUL. AT PENETRA. ETC	THAKUR	11-5-81	NO	YES	
1096	CABLE SEPARATION INSIDE CABINETS	THAKUR	11-17-81	YES	YES	
1097	TMI HYDROGEN VENTING	REF. ITEM 1d	ON MASTER	LIST		

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1098	PLATFORM ANCHORS WITH PIPE ATTACHED TO PLATFORMS	SKINNER	8-19-81	NO	NO	--
1099	OVALITY OF PIPE	BOSTROM	7-81	NO	NO	--
1100	RADIOGRAPHS B31.1 PIP. & REWK.(ENGLERT SEE TASK 1220)	BOSTROM	8-07-81	NO	NO	--
1101	CONTROL ROOM CEILING REWORK (MEAD, FREDENBURG)	POWELL	8-24-81	NO	NO	--
1102	RWCU(REACTOR WTR CLEANUP) PIPE CHNG.(GRINDEL,MCKINEY)	BOSTROM	8-10-81	NO	NO	--
1103	PWR (PIP WHIP RESTRAINT) CLEARANCE MONITORING) (FREDENBURG, GRANINNI)	REF. ITEM 68	ON MASTER	LIST		
1104	CONTROL RM. FIRE PROTECTION (SONI, BURSZTEIN)	ROGOZA				
1105	REACTOR PROTECTION SYS. MOTOR GEN. SET BARRIERS (FREDENBURG, GRANINNI)	POWELL				
1106	REACTOR FEED WATER PUMPS VORTEX STRAIGHTNESS (KUGLER, POPLARCZYK, SCHLOSSER)	WILSEY				
1107	STANDBY GAS TREAT. LEAK TEST (BENNETT, POPLARCZYK)	WILSEY				
1108	POTABLE WTR/FIRE PROT. SYS BLDG.(FREDENBURG, ENGLERT)	ROGOZA				
1109	CABLE INVENTORY DISCREPANCIES (BURSZTEIN)	THAKUR	9-18-81	NO	NO	--
1110	QA VAULT MODS (BAHL, ENGLERT)	REF.ITEM 63	ON MASTER	LIST		
1111	CONTROL ROOM HVAC MODS.	ROGOZA				
1112	INCORRECT INSTALLATION IN EXTRACTION & HEATER DRAIN PIPING (SCHLOSSER)	BOSTROM	8-19-81	NO	NO	--
1113	REWORK CONCRETE EQUIP. PADS (L. GOOD)	POWELL				
1114	CONTROL ROOM CLASS 1 CHILLERS (PEISTRUP)	ROGOZA				
1115	TURBINE DRAIN (RIFAEY)	REF.ITEM 166	ON MASTER	LIST		
1116	STRUCTURAL STEEL IN CONTAINMENT	POWELL				
1117	SRV-TWO PHASE FLOW - DISCHARGE LINE DESIGN	REF. ITEM 1e	ON MASTER	LIST		
1118	TURBINE BUILDING DESIGN SUITABLE FOR EARTHQUAKE	POWELL				

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1119	CONTROL ROOM BUILT UP FLOOR MODIFICATIONS	WILSEY	11-30-81	NO	NO	--
1120	POTENTIAL DEFECTS IN THE MAIN STEAM CONDENSOR TUBES	ROGOZA	11-20-81	NO	YES	
1121	PROBABILITY RISK ANALYSIS (FAILURE MODES EFFECTS)	JOHNSON	8-18-81	NO	NO	--
1122	TMI TASK - PLANT SAFETY PARAMETER DISPLAY CONSOLE	CAREY	10-06-81	YES	NO	--
1123	TMI TASK - REACTOR COOLANT SYSTEM VENTS	JOHNSON	8-18-81	NO	NO	--
1124	TMI TASK - DEDICATED HYDROGEN PENETRATIONS	JOHNSON	8-18-81	NO	NO	--
1125	TMI TASK - CONTAINMENT ISOLATION DEPENDABILITY	HAWHEN	12-16-81	NO	YES	
1126	TMI TASK - ACCIDENT-MONITORING INSTRUMENTATION	HAWKEN	9-21-81	NO	YES	5-3-82
1127	TMI TASK - INSTR. FOR DETECT. OF INADEQUATE CORE-COOL	HAWKEN	12-15-81	YES	YES	5-3-82
1128	TMI TASK - REVIEW ESF VALVES	HAWKEN	9-22-81	NO	YES	
1129	TMI TASK - HPCI AND RCIC INITIATION LEVELS	HAWKEN	9-22-81	NO	YES	5-3-82
1130	TMI TASK - SPACE COOLING FOR HPCI & RCIC SYSTEMS	ROGOZA				
1131	TMI TASK - EFFECT OF LOSS OF AC POWER TO PUMP SEALS	THAKUR	11-6-81	NO	NO	
1132	TMI TASK - COMMON REF. LEVELS FOR VESSEL LEVEL	HAWKEN	12-15-81	YES	YES	5-3-82
1133	TMI TASK - SMALL BREAK LOCA METHODS	BOSTROM	8-06-81	YES	NO	--
1134	TMI TASK - PLANT SPECIFIC SB LOCA METHODS	BOSTROM	8-06-81	YES	NO	--
1135	TMI TASK - EVALUATE TRANSIENTS WITH SINGLE FAILURE	BOSTROM	8-06-81	YES	NO	--
1136	TMI TASK - MANUAL DEPRESSURIZATION	HAWKEN	9/22/81	NO	YES	
1137	TMI TASK - MICHELSON CONCERNS	JOHNSON	8-18-81	NO	NO	--
1138	TMI TASK - OPERATIONAL SUPPORT CENTER	WILSEY				
1139	TMI TASK - EMERGENCY OPERATIONS FACILITY	REF.ITEM 79	ON MASTER	LIST		
1140	TMI TASK - PRIMARY COOLANT OUTSIDE CONTAINMENT	ROGOZA				
1141	TMI TASK - IN-PLANT H_2 RADIATION MONITORING	HAWKEN	12-15-81	YES	NO	--
1142	TMI TASK - CONTROL ROOM HABITABILITY	ROGOZA				
	PIPE BREAK IN SCRAM DISCHARGE VOLUME HEADERS					

MASTER LIST

MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1144	BASE PLATE GROUTING QUALITY	WILSEY	12-23-81	YES	NO	--
1145	GE MEASUREMENTS OF CORE SUPPORT STRUCTURE IN RPV	WILSEY	8-31-81	NO	YES	
1146	HIGH DENSITY FUEL RACK VENTING	JOHNSON	7-30-81	NO	NO	--
1147	AIR SUPPLY LINE TO MSRV FITTING PROBLEM	WILSEY	8-03-81	NO	NO	--
1148	WELDED ATTACHMENTS ON PIPING	HAYNES	8-81	YES	YES	
1149	RESTRAINT FLEXIBILITY ON PIPING ANALYSIS	HAYNES	8-81	NO	YES	
1150	FAULTED END MOVEMENT INCLUDED RESTRAINT LOADING	HAYNES	8-81	NO	YES	
1151	MULTI-DIRECTIONAL LOADS ON PIPE CLAMPS	SKINNER	8-17-81	YES	NO	--
1152	OPERATIONAL TRANSIENT LOADS ON PIPING/SUPPORTS	HAYNES	8-81	NO	YES	
1153	ANCHOR BOLT SPACING PROBLEM	REF. ITEM 17	5 ON MASTER	LIST		
1154	HYDROGEN DETONATIONS IN OFFGAS PIPING	BOSTROM	8-04-81	NO	YES	
1155	ZPA (ZERO PERIOD ACCELERATION)	HAYNES	8-81	NO	YES	
1156	STATE OF WASHINGTON INVOLVEMENT IN CODE ITEMS	BOSTROM	8-03-81	NO	NO	--
1157	MAIN STEAM MINIMUM WALL PROBLEM	BOSTROM	8-04-81	NO	NO	--
1158	SOCKET WELD INSERTION & GRINDING PREP. PROBLEMS	BOSTROM	8-04-81	NO	NO	--
1159	DRAWING H-501 - PIPING & HANGER INSTALLATION	HAYNES	8-81	NO	NO	--
1160	DYNAMIC MOVEMENT EFFECTS ON SPRING HANGER DESIGN	HAYNES	8-81	NO	YES	
1161	NPS BENDING PROCEDURE	BOSTROM	8-19-81	NO	NO	--
1162	CONDENSOR SEISMIC SHEAR LUG DISCREPANCY	WILSEY	8-27-81	NO	NO	--
1163	EXCESSIVE ROOM TEMPERATURES	ROGOZA				
1164	POOR WORKMANSHIP BY PUMP MANUFACTURERS	WILSEY	9-05-81	NO	NO	--
1165	LOAD CAPAICITY DATA SHEETS	SKINNER	10-09-81	YES	NO	--
1166	VALVE END WELD AND SOCKET WELD REQUIREMENTS	BOSTROM	10-23-81	NO	NO	--
116[illegible]	PREOPERATIONAL TESTING PRIOR TO CODE STAMPING	BOSTROM	11-3-81	NO	NO	--
11[illegible]	CABLE SHORTAGE AND DELAYS IN SHIPMENT	THAKUR	11-23-81	NO	NO	--

MASTER LIST
MAJOR ENGINEERING TASKS BROUGHT UP BY BECHTEL

ITEM NO.	DESCRIPTION	RESPONSIBLE ENGINEER	ASSESSMENT DATE	ENGR. SCHEDULE AVAIL.	FOLLOW-UP ACTION IDENTI-FIED	FOLLOW-UP ACTION COMPLETE
1169	HANGIT	HAYNES	1-82	NO	NO	--
1170	SWAGE NIPPLES	HAYNES	1-82	NO	YES	
1171	JOHNSON CONTROL STRESS ANALYSIS	HAYNES	1-82	YES	YES	
1172	CRDHS WATERHAMMER	HAYNES	1-82	YES	YES	
1173	Seismic Effects OF PIPING SYSTEMS WITH VALVE REACH RODS	ROSS	2-82	NO	NO	—
1174	FLOW DIAGRAM MARKUP	ROSS	3-82	NO	NO	—
1175	DISSIMILAR METAL SOCKET AND FILLET WELDS	ROSS	3-82	NO	NO	—

BECHTEL ENGINEERING

MANAGEMENT ASSESSMENT

DATE OF ASSESSMENT 8·18·81

BY R. SKINNER

TASK/ITEM TITLE: LOADING ON PIPE SLEEVES

REFERENCES: MASTER TASK LIST NO. 1003
BURNS & ROE TASK OR ACTIVITY NO. 3280
OTHER: F-80-6311

SCHEDULE AVAILABLE IV
SCHEDULE CONTROL NO. SYSTEM

CONTACTS: BURNS & ROE — MIAN HAQ, ROB CHAPIN
SUPPLY SYSTEM —

BACKGROUND: B&R INITIATED A STUDY OF PIPING LOADING TRANSMITTED THRU. PIPE SUPPORT ATTACMENTS TO PIPE SLEEVES.

ACTION TO-DATE: STUDY BY CIVIL IS COMPLETE. CIVIL RELEASED TO HANGER GROUP ALLOWABLE COMBINATION OF LOADING ON PIPE SLEEVES (REF. F-80-6311)

ACTION TO-GO: ON GOING REVIEW BY SYSTEMS BASIS. MORE DETAILED REVIEW BY CIVIL IF LOADING EXCEEDS RECOMMENDED LOADS.

BECHTEL ASSESSMENT:

REVIEW OF AS-BUILT APPROX 80% COMPLETE. RESULTS TO DATE SHOW NO MODIFICATION REQUIRED TO HANGERS. IMPACT OF CONSTR. SHOULD BE MINIMAL.

BECHTEL FOLLOW-UP REQUIRED:

ACTION TRACKING: YES ☐ NO ☒

FOLLOW-UP DATE:

LIST NO. 1003

BECHTEL ENGINEERING

MANAGEMENT ASSESSMENT

DATE OF ASSESSMENT 11-6-81

BY J. ROGOZA

TASK/ITEM TITLE: QUALIFICATION OF ADS ACCUMULATORS

REFERENCES: MASTER TASK LIST NO. 1K
BURNS & ROE TASK OR ACTIVITY NO. ______
OTHER: II.K.3.28 (NUREG-0737)

SCHEDULE AVAILABLE NO
SCHEDULE CONTROL NO. —

CONTACTS: BURNS & ROE — S. KIRKENDALL/RHLD
SUPPLY SYSTEM —

BACKGROUND: ADS ACCUMULATORS, VALVES, ETC., REQUIRED TO PERFORM FUNCTIONS FOR 100 DAYS AFTER ACCIDENT. CURRENT N_2 SUPPLY FOR ADS SYSTEM PROVIDES ONLY 30 DAYS OPERATING CAPABILITY.

ACTION TO-DATE: B&R RECOMMENDED INSTALLING REMOTE CONNECTION OUTSIDE RB FOR PORTABLE N_2 SUPPLY. SUPPLY SYSTEM HAS AGREED & REQUESTED B&R TO IMPLEMENT. CONCEPTUAL DESIGN COMPL

ACTION TO-GO: B&R/SITE TO PREPARE FINAL DESIGN & ISSUE PED, CURRENTLY SCHEDULED 4/82. FSAR TO BE UPDATED. B&R/RHLD TO SUBMIT DOCUMENTATION TO NRC BY 12/81.

BECHTEL ASSESSMENT:

SELECTED FIX WILL MEET INTENT OF NUREG-0737. WNP-2 TMI PROGRAM CLOSURE PLAN & STATUS REPORT (D.L. GANO, 5/1/81) STATES SCHEDULE AS: COMPLETE PRIOR TO FUEL LOAD; NOT CRITICAL PATH. PRESENT ACTION TO-GO PLAN APPEARS OK TO MEET THIS SCHEDULE.

BECHTEL FOLLOW-UP REQUIRED: CHECK OCI LOG PERIODICALLY; CONTACT B&R/SITE ENGRG.

ACTION TRACKING: YES ☒ NO ☐

FOLLOW-UP DATE: 12/81

LIST NO. 1K

BECHTEL ENGINEERING

MANAGEMENT ASSESSMENT

DATE OF ASSESSMENT 8-17-81

BY BOSTROM

TASK/ITEM TITLE: CVRP-SRSS LOAD COMBINATION FOR DYNAMIC LOADS.

REFERENCES: MASTER TASK LIST NO. 70

BURNS & ROE TASK OR ACTIVITY NO. NONE

OTHER: ——

SCHEDULE AVAILABLE NO

SCHEDULE CONTROL NO. N/A

CONTACTS: BURNS & ROE — D.C. BAKER

SUPPLY SYSTEM — E.A. FREDENBERG

BACKGROUND: THE NRC REQUIRES THAT PLANTS WITH A HIGHER SEISMIC LOADING OR A DIFFERENT CONTAINMENT STRUCTURE FROM THOSE EVALUATED IN NEDE-24010-P HAVE ADDITIONAL JUSTIFICATION TO VERIFY THE ADEQUACEY OF SRSS FOR SRV PLUS SEISMIC.

ACTION TO-DATE: TECH MEMO 1226 OUTLINES THE DYNAMIC LOADING COMBINATIONS TO BE USED WHEN COMBINING DYNAMIC RESPONS FOR WNP-2. WHEN COMBINING 2 DYNAMIC EVENTS, THE SUM OF ABSOLUTE VALUES COMBINATION IS TO BE USED.

ACTION TO-GO: WHEN COMBINING 3 OR MORE DYNAMIC LOADS, THE SRSS COMBINATION METHOD IS TO BE USED.

BECHTEL ASSESSMENT: THIS METHOD IS CONSERVATIVE, AND WILL NOT REQUIRE JUSTIFICATION. IF THIS CONSERVATIVE METHOD RESULTS IN THE INABILITY TO VERIFY THE EXISTING PIPING WITHOUT MODIFICATIONS, THE SRSS COMBINATION METHOD WILL BE REQUIRED WHEN COMBINING TWO DYNAMI EVENTS. JUSTIFICATION WILL THEREFORE BE REQUIRED.

E.A. FREDENBERG AS THE CVRP TASK MANAGER MONITORS THIS WORK CLOSELY.

BECHTEL FOLLOW-UP REQUIRED:

ACTION TRACKING: YES ☐ NO ☑

FOLLOW-UP DATE:

LIST NO. 70

ATTACHMENT 15

SMALL-BORE PIPING ANALYSIS FOR HYDRODYNAMIC LOADS

Bechtel Engineering Management Group (BEMG) identified the need for Gilbert/Commonwealth (G/C) to prepare a design guide for hydrodynamic affected small bore piping systems in the drywell.[1] The design guide was issued by G/C and reviewed by BEMG for technical adequacy.[2] The results of this review indicated several significant findings affecting the design of the piping and pipe supports. The findings were correlated and all analyses utilizing the non-conservative analytical approaches were reperformed to a revised design guide that adequately addressed the findings.

SCOPE AND METHODOLOGY: The G/C Design Guide (GC-C000-24) contained a sample calculation illustrating the procedure to be used for hydrodynamic analysis. This sample calculation utilized the T PIPE computer code and represented a complete piping stress analysis calculation. Pipe support design was not included in the design guide or the review.

The sample calculation that BEMG analyzed was a 3/4 inch vent line from RRC-V-67B to an EDR drain header as depicted on isometrics RRC 1550-1, -2, -3, and -4. Input data was provided by Burns and Roe via the 208 Contract Specification and applicable Project Engineering Directives (PEDs). The BEMG review utilized the input data and isometric drawing to duplicate the sample calculation using the Bechtel inhouse piping analysis computer code ME101. The ME101 analysis was performed for two cases: the first being to simply duplicate the G/C (T PIPE) analysis, and the second incorporating revised analytical approaches to demonstrate the effects of employing methodologies that adequately addressed the design requirements for piping stress analysis. The first analysis confirmed the results of the sample calculation. However, the second analysis clearly indicated certain deficiencies in the G/C methodology and resulting non-conservative results.

RESOLUTION OF FINDINGS: G/C Procedure 0000-24 was revised to incorporate corrected methodologies and to also address the findings of a subsequent audit conducted by Burns and Roe Engineering.[3] The BEMG design review together with G/C and Burns and Roe technical audits have provided assurance that Gilbert/Commonwealth has adequately addressed the design requirements for small piping analysis subjected to hydrodynamic loads.

[1]BECWNP2-81-0061, 4/28/81
[2]BECWNP2-81-0085, 6/5/81
[3]BR Audit No. B/R-5-81-1, 11/12/81

ATTACHMENT 16

AC MOTOR CONTROL CENTER CONTROL CIRCUIT VOLTAGE DROP STUDIES

A study was performed to determine whether the circuits were adequately designed so that motor starters would pull-in for all anticipated conditions. Generic calculations were made to determine actual maximum allowable circuit length for various circuit configurations. Specific drawings were reviewed to determine circuit lengths and connected loads. The drawings were compared with actual field hardware to ensure accuracy. Some drawing discrepancies were discovered. It became apparent from the study that the voltage drop problem could actually be realized on some WNP-2 circuits.

The Burns and Roe calculations were reviewed to assure that they were complete and did include the effects of main bus voltage variations, control power transformer impedance, considered all auxiliary loads such as lights and relays, etc., which may also be powered during the circuit operation.

The findings of the Bechtel study were discussed with Burns and Roe and the Supply System. They reviewed the findings and agreed with the conclusions. Burns and Roe is now investigating to determine the extent of the problem based on the as-built conditions. This problem has been reported as a potential 10CFR50.55(e) item to the NRC. The number of actual deficiencies appears to be very limited.

ATTACHMENT 17

AREAS WHERE WNP-2 DESIGN WAS INFLUENCED BY BECHTEL REVIEWS

SYSTEMS

1. HPCS/RCIC Switchover (Eliminating Loops)

   - Original design required "loops" and separate instrument standpipes for HPCS and RCIC suction lines.
   - Bechtel questioned if adequate water supply to eliminate loops was available and if combined instrument standpipes for both systems could be used.
   - Burns and Roe recalculated supply, eliminated loops, and combined standpipes.

2. Off Gas Line (Detonation Pressure)

   - Bechtel had studied this problem extensively and provided assistance to expedite the calculations.

3. Fire Protection

   - Use of TSI Thermo-Lag in place of Kaowool to wrap cable trays/conduit (ampacity derating, construction cost, and schedule, space restrictions) and assistance regarding the Thermo-Lag Test Program.
   - Initiated contact with the NRC to clarify 3-hour fire barrier option in Appendix "R", which also led to possible exemption for omitting sprinkler systems in low fire load areas.
   - Application of Thermo-Lag coating on entire length of raceway support members.

4. Penetration Sealing

   - Existing design specification was lacking for today's material availability, i.e., non-toxic materials.
   - Provided input/recommendations for specification improvement.

5. Vacuum Breaker Cycling Test Program

   - Assisting in coordination of Mark II Owner's test program administered by San Francisco Home Office Limerick projects.

6. HVAC

- o Identified need to conduct control room pressurization test per SRP 6.4. Assisted in specifying instrumentation required.
- o Verified that ductwork leak integrity testing by contractors during balancing was adequate.

<u>CIVIL</u>

1. Spray Pond Leakage Fix

- o Recommended approach for repairing expansion joints, waterseal damage was identified and materials recommended.

2. Spray Pond Vortex Breaker Design

- o Indentified vortexing as potential problem on siphon line connecting spray ponds.
- o Burns and Roe generated a vortex breaker design.

3. Soil Compaction Approach

- o Questionable records and compaction practices existed. Critiqued test program to verify past work.
- o Scoped areas where Class I backfill was required.
- o Recommended backfill lifts/restrictions to assure compaction.

4. Structural Steel in the Drywell

- o Provided team leader for resolution of deficiencies.
- o Salvaged significant amount of existing work through engineering and documentation review. Established baseline documentation.
- o Established evaluation criteria and acceptance base.
- o Established direction for repair of remaining items.

5. Containment Vessel Pressure Test

- o Eliminated need for a second structural integrity test of containment.
- o Processed code case through ASME Code Committee to support this position.

PIPING AND HANGERS

1. Identification of piping requiring transient analysis.

2. Refinements in steam-hammer analysis and identification of analytical deficiencies. (Main steam lines for turbine trip.)

3. Delineation of pipe and hanger as-built requirements.

4. Refined stress methodologies:

   - Zero period acceleration. (High frequency phenomenon for rigid systems.)

   - Fifteen percent (15%) expansion/contraction in time/history analysis which reduced significantly their analytical and computer costs.

   - Faulted building movements.

   - Incorrect stress intensification factors, should reduce hardware rework.

   - Inclusion and phasing of dynamic end movements.

   - Off Gas system detonation effects on hangers.

   - Dynamic effects on spring hanger limits.

   - Selection and envelopment of response spectra.

   - Valve stem flexibility, operability, and pipe stress.

   - Damping being over-conservative.

5. Eliminating small-bore piping analysis deficiencies in Gilbert/Commonwealth (G/C).

6. Accelerated schedule and provided engineering assistance on safety relief valve fatigue analysis.

7. Assisted Burns and Roe in the formation of piping thermal expansion and steady state vibration testing program.

ELECTRICAL

1. Modified design to decrease voltage drop on the control circuits on a critical system.

2. Initiated a review of the plant electrical power distribution systems and potential FSAR violation which may cause damage to cable and equipment during specific modes of operation.

3. Reviewed containment penetration protection

   - Standardization of backup protection fuse size.

   - The need for backup protection for MCC control circuits were shown as not being necessary.

PIPE SUPPORT REVIEW
FOR COMPLETENESS AND ADEQUACY

Project Name: WNP-2 Review By: __________

Date: __________

The purpose is to review six major areas as follows:

1. Design Specification and Codes in Compliance with Project FSAR.
2. Design and Calculation Standards.
3. Computer Programs Used.
4. Procedure and Control.
5. Review of Design and Calculation.
6. Coordination, Review and Interface Procedure with other Groups such as Stress and Civil/Structural.

PIPE SUPPORT REVIEW
FOR COMPLETENESS AND ADEQUACY

CHECKLIST #1
DESIGN SPEC., CODES & STANDARDS

Project: WNP-2

Review By: ______________

Date: ______________

Sht. No: ______________

Hanger No: ______________

Stress iso/Rev: ______________

☐ QC-I ☐ QC-II

Data Point: ______________

Code & Class ______________

Item No.	Name of Document		Document No. & Rev.	Compliance with FSAR		Remarks
				YES	NO	
1.	ASME Code					
2.	B31.1 Code					
3.	Design Spec.	Large Pipe				
4	Design Spec.	Small Pipe				
5.						
6.	Drawing Standard					
7.	LCDs					
8.	Catalogs					
9.	Small Pipe Support Manual					

PIPE SUPPORT REVIEW
FOR COMPLETENESS AND ADEQUACY

CHECKLIST #2
REVIEW OF DESIGN AND CALCULATION

Project: WNP-2

Review By: ____________

Date: ____________

Sht. No: 1 of 2

Hanger No: ____________

☐ QC-I ☐ QC-II

Code & Class ____________

Stress iso/Rev: ____________

Data Point: ____________

Item No.	Description	Adequate		Remarks
		YES	NO	
1.	Design vs. Verified Load			
2.	Friction Force Considered			
3.	a. Weld Allowable b. Shear Stress Allowable c. Bending Stress Allowable d. Axial Stress Allowable e. CEB Allowables			
4.	Component Std Suppt. vs. Verified Design Load			
5.	Weld Calculation			
6.	Structural Analysis			
7.	Base Plate Analysis			Meets 79-02 Requirements
8.	CEB Analysis			
9.	Intermediate Plate Analysis			

CHECKLIST #2

Item No.	Description	Adequate YES	Adequate NO	Remarks
10.	Special Clamp			
11.	Special Component			
12.	Deflection Check			
13.	Status As-Built/F.W. Det.			
14.	Final As-Built			
15.	Minimum Weld			
16.	Skewed Weld			
17.	More Force Component Considered due to Swing of Assembly			
18.	Load Combination or Worst Load Justification			
19.	Proper application of Component			
20.	Proper Typical Number Called Out			
21.	Proper application of Typical			
22.	Interpretation of Computer results			
23.	Torsion Stress Check			
24.	Buckling Check			
25.	Embedment Capacities Check			
26.	Pipe Support Drawings			SE1.3-7
27.	Hanger Mark-up Dwg.			
28.	Hydro Load (Flush)			
29.	Jurisdictional Boundaries			

PIPE SUPPORT REVIEW
FOR COMPLETENESS AND ADEQUACY

CHECKLIST #3
COMPUTER PROGRAMS

Project: WNP-2

Review By: ____________

Date: ____________

Sht. No: ____________

Item No.	Program Name	Documentation per Spec.	Chief Engr's Approval For Use	Meeting Project Criteria	Remarks
1.	STRUDL				
2.	ANSYS				
3.	*				

* OTHER PROJECT COMPUTER PROGRAMS

PIPE SUPPORT REVIEW
FOR COMPLETENESS AND ADEQUACY

CHECKLIST #4
PROCEDURE & CONTROL

Project: WNP-2

Review By: ______

Date: ______

Sht. No: 1 of 2

Individuals Contacted:

Name

Title:

Item No.	Description	Meets Applicable Project Procedure		System Adequate	Remarks
		YES	NO		
1.	Isometric Control				
2.					
3.	Load Defl. Sht. control				
4.	Retention/Storage				
5.	Civil Review				
6.	Stress Review				
7.	Pipe Support dwg. control				SE1.3-7
8.	Pipe Supports Calc. Control				
9.	Revision Work				
10.	"Hold" Control				

CHECKLIST #4

Item No.	Description	Meets Applicable Project Procedure		System Adequate		Remarks
		YES	NO	YES	NO	
11.	Civil & Layout dwg. Control					
12.	Small Pipe Support Cycle					
13.	Other discipline drawing control					
14.	Outstanding Doc. Complete PED FRPED RFI NCR PRR					
15.	Documentation of Communication					
16.	Valve Support and Interface with Valve Vendor					
17.	Nuclear Class I Welding					
18.	Embedment Program					
19.	SSW. Cont. Shell, Block Wall, etc. attachment control					

PIPE SUPPORT REVIEW
FOR COMPLETENESS AND ADEQUACY

CHECKLIST #5
COORDINATION WITH OTHER GROUPS

Project: WNP-2 Review By: ____________

Date: ____________

Sht. No: ____________

Group	Item No.	Description	Adequacy		Remarks
			YES	NO	
Stress & Civil	1.	Pipe Support dwg. review and comment compliance			
Stress	2.	When hangers moved more than allowable			
	3.				
Stress	4.	Size of snubber changed			
Stress	5.	Lubrite Plate requirement			
Stress	6.	Integral part design of Nuclear Class I			
Stress	7.	Non-standard integral part design for critical pipe support			
Stress	8.	Anchor/reinforcement pad requirement			
Civil	9.	Embedment			
Civil	10.	Special Steel requirement			
	11.				
Civil	12.	Block Wall			

STRESS ANALYSIS REVIEW
FOR COMPLETENESS AND ADEQUACY

Project Name: WNP-2 Review By: ______________
Stress Calc No: ___________ Date: ______________

The purpose is to review six major areas as follows:

I. Design Specification and Codes in compliance with Project FSAR.

2. Design and Calculation Standards.

3. Computer Programs used.

4. Analytical Methodologies.

5. Calculation Documentation and Traceability.

6. Coordination, Review and Interface Procedure with other disciplines (Pipe Support, Civil/Structural, Mechanical and Construction).

Project Name: WNP-2

Stress Calc. No.:

Code/Class:

REFERENCE DATA

CHECKLIST

By:

Date:

INPUT DATA DESCRIPTION	STATUS INPUT DATA									REFERENCE DOCUMENTS COMMENTS
	NA-Not Applicable	Design Spec. Recd.	Approved Data Recd.	Unapproved Data Recd.	Data in Process of Change	Expect, But Not Received	Estimated/Verbal Data	Unconfirmed, No Reference	Incorrect Data Used	
	X	X	X	X	X	X	X	X	X	
a. Design Spec.										
b. Flow Diagram/P&ID										
c. Design Guide/Procedure										
d. System Isometric										
e. Thermal Modes (T&P)										
f. Response Spectra Curves										Tech Memo 1257, Rev. 0
1) Seismic OBE & SSE										
2) Hydrodynamic										
g. Forcing Functions										
h. Histograms										
i. Piping Index										215 Spec Section 15B
1) Piping Class Sheets										
2) Class Summary										
j. Valve Information										
1) Weight & Length										
2) Operator Wt. & C.G.										
3) f_n of Topworks										
4) Acceleration Allowable										
k. Restraint Information										
1) Location										
2) Orientation										
3) Flexibility										
4) Additional Weight										
l. Building Movement Data										
1) Seismic										
2) Hydrodynamic										
3) Process Piping										
m. Equipment Drawings										
n. Nozzle Allowables										
o. Computer Code and Rev.										
1) Verification Date										
p. Load Combinations										Tech Memo 1226, Rev. 2
q. Insulation Weights										
1) Pipe										
2) Valve, Flanges										

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: WNP-2 By: ____________

Calc. No.: ____________ Date: ____________

Code/Class: ____________

DESCRIPTION	CHECK	REMARKS
1.0 MODELING:		
1.1 Are there any special modeling techniques used (equipment flexibility, expansion joints, valves, etc.)		Ref FSAR 3.7.2.3.2
1.2 Are the proper stress intensification factors or stress indices used.		
1.3 Does the code employ a geometry/closure check.		
1.4 Is the correct pipe material, thickness, OD, modulus of elasticity and allowable stress used.		
1.5 Are branch connections identified and is there a criteria for including/excluding connected piping in the model.		Ref FSAR 3.9.3.1.19.5
1.6 Does the piping model terminate at full (six way) anchors. If not, is it acceptable.		Ref Tech Memo 1267, Rev. 0 Ref FSAR 3.7.2.8 & 3.7.3.13
2.0 THERMAL ANALYSIS		
2.1 Are the analyzed thermal modes in agreement with the flow diagram or mechanical group's mark-up.		
2.2 Are the correct thermal expansion coefficients used.		
2.3 Do anchor movements reflect vendor data and thermal modes.		
2.4 Is the system balanced; no upward load on gravity supports greater than deadweight.		

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: WNP-2 By: ______

Calc. No.: ______ Date: ______

Code/Class: ______

DESCRIPTION	CHECK	REMARKS
2.5 Have clearances at wall and floor penetrations, and pipe whip restraints been checked.		
2.6 Are post LOCA temperature and pressure effects considered.		
3.0 PRESSURE & DEADWEIGHT ANALYSIS		
3.1 Do operating, design and peak pressures agree with the design spec.		Ref 215 Spec Section 15B
3.2 Are pipe, valve, specialties, contents and insulation weights correct.		
3.3 Are pipe support clamps and welded attachment weights included.		
3.4 Are deadweight displacements excessive.		
4.0 STATIC SEISMIC ANALYSIS		
4.1 Do the static acceleration factors agree with FSAR requirements.		Ref FSAR 3.7.2.1.8.2 Ref FSAR 3.7.3.5
4.2 If based on the system natural frequency, does it occur at or beyond the peak of the applicable response spectrum curve.		
4.3 Are the calculated responses from the three components of acceleration combined correctly.		
5.0 SPECTRAL ANALYSIS		
5.1 The following load cases were analyzed using the response spectrum method:		

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: WNP-2 By: ______

Calc. No.: ______ Date: ______

Code/Class: ______

DESCRIPTION	CHECK	REMARKS
5.2 Are the latest revisions of the spectra curves used.		Ref Tech Memo 1257, Rev. 0
5.3 Are pipe restraint building attachment points properly identified.		
5.4 Have the spectra been properly enveloped.		
5.5 Are the correct damping ratios used per FSAR requirements.		Ref FSAR 3.7.1.3 Ref Tech Memo 1226, Rev. 2
5.6 Has the correct curve interpolation method been selected.		
5.7 Does the cutoff frequency cover the peak acceleration. Does the number of modes solved extend to the cutoff frequency. Are they acceptable.		
5.8 Is zero period acceleration considered.		
5.9 Does the mass point spacing reflect the cutoff frequency.		
5.10 Are at least two mass points located between two adjacent restraints acting along the same direction. At least one between two restraints of different directions.		
5.11 Are restraint flexibilities included.		
5.12 Are the extended yokes of motor, gear, air, or hydraulic operated valves modeled as flexible members having a natural frequency equal to that provided by the valve manufacturer.		

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: WNP-2 By: ____________

Calc. No.: ____________ Date: ____________

Code/Class: ____________

DESCRIPTION	CHECK	REMARKS
5.13 Are modal responses combined per FSAR requirements.		Ref FSAR 3.7.2.6 Ref FSAR 3.7.2.7
5.14 Have dynamic displacements been checked at springs, penetrations and pipe whip restraints.		
6.0 ANCHOR MOVEMENTS		
6.1 The following events were considered for anchor movement analysis:		Ref FSAR 3.7.2.1.7
6.2 Are support attachment points to the building correctly identified.		
6.3 Are the anchor movements correct at each attachment point.		
6.4 Are the phase relationships correctly identified.		
6.5 Are the inertial piping displacements considered in branch piping separately analyzed from the header.		
6.6 Are emergency or faulted anchor movements considered.		
6.7 Are differential building movements considered.		
7.0 SPECIAL ANALYSES		
7.1 Have special analyses been performed (i.e., fast valve transients, force or displacement time history, multiple response spectra, fatigue analysis, thermal transient analysis or wind loads). If yes, generate a separate check sheet.		

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: WNP-2 By: ____________

Calc. No.: ____________ Date: ____________

Code/Class: ____________

DESCRIPTION	CHECK	REMARKS
8.0 LOAD COMBINATIONS & EVALUATION		
8.1 Are all the operating conditions and postulated events for this system considered in this analysis.		Ref Tech Memo 1226, Rev. 2 Ref FSAR 3.9.3.1.1.7 Ref DAR 3.5.4.2
8.2 Are loads combined and evaluated per FSAR requirements and within code allowables.		
8.3 Are anchor movement moments properly included into Equation 9, 10, or 11.		
8.4 Has the thermal stress range and anchor movement stress, as necessary, been properly incorporated into Equation 10 or 11.		
8.5 Do inline anchors reflect the load from the other side of the system.		
8.6 Are positive and negative thermal loads tabulated on systems with more than one thermal operating mode.		
8.7 Are hydro loads tabulated for steam/air process lines requiring a hydrotest.		
8.8 Are transient loads (valve closure/opening, relief valve thrust) considered as required on certain systems.		
8.9 Are local stresses on the pipe due to welded support attachments considered.		
8.10 Are flange loads evaluated properly.		
8.11 Is pipe bearing stress on rigid supports considered.		

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: WNP-2   By: ______

Calc. No.: ______   Date: ______

Code/Class: ______

DESCRIPTION	CHECK	REMARKS
8.12 Are functional capability requirements considered.		Ref Tech Memo 1240, Rev. 1
8.13 Are valve accelerations within allowables.		
8.14 Are nozzle loads within allowables.		
8.15 Are postulated pipe break locations correctly identified.		
8.16 Are isolation valves properly evaluated against postulated pipe break loads.		
<u>9.0 COMPUTER CODES</u>		
9.1 List computer codes used for this calculation.		
9.2 Does the computer code satisfy the analytical requirements for seismic design.		Ref FSAR 3.7.2.1.8.2
9.3 Has the computer code been verified per FSAR requirements.		Ref FSAR 3.12
<u>10.0 DOCUMENTATION - CALCULATION ADEQUACY & COMPLETENESS</u>		
10.1 Do calculation design drawings reflect all outstanding documentation and/or later revisions.		
10.2 Does the documentation substantiate the assumptions and analysis performed in the calculation. List discrepancies (if any).		

PIPING STRESS ANALYSIS INPUT AND OUTPUT CHECKLIST

Project: ____________ By: ____________

Calc. No.: ____________ Date: ____________

Code/Class: ____________

DESCRIPTION	CHECK	REMARKS
11.0 CONCLUSIONS		

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

WNP-2 PROJECT INSTRUCTION

NO:	PMI 6-7
REV:	0
RESP. ORGN:	PE

APPROVED:
PROJECT MANAGER [signature]

TITLE: ASME CODE DESIGN ASSURANCE REVIEW

1.0 PURPOSE AND SCOPE

This procedure establishes the method used to evaluate the technical adequacy of specific ASME Code piping/hanger design work performed by external design organizations for the Supply System (Owner). The purpose of this evaluation is to provide assurance that the design work meets the technical intent of the applicable ASME Code.

The scope of this procedure describes the activities of the Owner or his agent from the identification of the intent to perform an ASME Code design assurance review, the performance of the review and the resolution of any findings.

This design review does not replace any of the existing contractually or Code imposed design reviews. This design review will be used by the Owner to establish a high level of confidence in the technical adequacy and completeness of the designs.

2.0 DEFINITIONS

2.1 ASME Code Piping/Hanger Design Assurance Review - A documented evaluation by a qualified review team in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that ASME code design is being or has been satisfactorily performed.

3.0 PROCEDURE

Responsibility		Action
Project Engineering (PE) Manager	.1	Identifies the need for an ASME Code piping/hanger design assurance review.
	.2	In cooperation with other management and organizations as appropriate, designates a review team leader and a review team. The members of the team shall meet the qualification requirements specified in Attachment 5.1.
Review Team	.3	Determines the scope of the specific review and establishes the schedule and the plans for performance of the review. Identifies additional review team members if required.

EFFECTIVE DATE:	SUPERSEDES ISSUE DATED:	QUALITY AFFECTING:	
	New	[X] YES [ ] NO	PAGE 1 OF 4

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3.0 PROCEDURE (Cont.)

Responsibility		Action
Review Team		NOTE: The plan shall be prepared in written form consisting of procedures, instructions, checklists or other documents as appropriate to the needs of the specific review.
Review Team Leader	.3	Drafts letter to the design organization to be reviewed advising of the schedule and scope of the review, documentation and personnel to be made available, and requesting any documentation or information needed prior to the review.
PE Manager	.5	Officially approves review plan and schedule. Transmits the review notification letter to the design organization to be reviewed.
Review Team	.6	Meets for prereview briefings, as necessary, to review available pertinent documentation, to prepare checklists and to make any other preparations necessary for the review.
Review Team Leader	.7	At the location of the design organization, conducts introductory interviews at first meeting; introduces review team members; chairs initial meeting and provides coordination of overall review.
Review Team	.8	Determines if the necessary personnel and documentation from the design organization are readily available to provide assistance and information for the review. Identifies additional personnel and documentation needed in areas of concern.
	.9	Conducts review.
	.10	Reconvenes, as necessary, to summarize and review findings. Prepares agenda for exit meeting.
Review Team Leader	.11	Chairs exit meeting with design organization.
		NOTE: Results, conclusions or findings discussed at the exit meeting should be presented as preliminary with the understanding that they are subject to change.

3.0 PROCEDURE (Cont.)

Responsibility		Action
Review Team Leader	.12	Requests comments and/or commitments from reviewed design organization as appropriate.
	.13	Holds a post review meeting at the Supply System to identify any problem areas and design discrepancies and to determine recommended corrective and follow-up action.
	.14	Prepares, signs and dates a review report, including a recommended schedule for accomplishing corrective action and follow-up items, if any.
PE Manager	.15	Reviews findings and recommended corrective actions.
	.16	Decides what corrective actions to take, if any.

4.0 REFERENCES

4.1 ASME Boiler & Pressure Vessel Code, Section III, Division 1, Subsections NA, NB, NC, ND and NF, Edition and Addenda as applicable to the component whose design is to be reviewed.

5.0 ATTACHMENTS

5.1 Qualification Requirements for ASME Code Piping/Hanger Design Assurance Review Team Members

QUALIFICATION REQUIREMENTS FOR ASME CODE PIPING/HANGER DESIGN ASSURANCE REVIEW TEAM MEMBERS

1.0 SCOPE

This attachment presents minimum requirements for the qualification of personnel selected to perform ASME Code piping/hanger design assurance reviews for the Supply System.

2.0 QUALIFICATIONS

One or more qualified team members shall be selected by the Review Team Leader to perform an ASME Code piping/hanger design assurance review. The qualifications of each team members shall be evaluated prior to their assignment to a team and shall be summarized in the final report.

2.1 A team members shall have not less than four years of active engineering experience.

2.2 A team member shall be experienced in the applicable field of design and analysis and in the application of the requirements of Section III. In particular, the member shall be knowledgeable of the applicable portions of Subsection NA, General Requirements, and shall have a working knowledge of Section III requirements for design, including pertinent materials requirements.

2.3 A team leader shall meet the minimum qualifications of a team member and shall also have demonstrated ability to organize and plan the work of technical teams and to effectively interface with organizations outside the Supply System. The team leader shall also have a working knowledge of the contractual requirements between the Supply System and the design organization as pertinent to Code design work.

2.4 Personnel not meeting the above requirements may be utilized on a team for training provided their work is reviewed by a qualified team member.

APPENDIX C

APPENDIX C

WNP-2 QUALITY ASSURANCE

The purpose of this Appendix is to describe the activities conducted by the Supply System Quality Assurance (QA) Program which confirm the quality of the safety-related aspects of WNP-2. The Supply System is ultimately responsible for quality in all phases of the design, procurement, construction, testing, and operations of WNP-2. The Supply System QA Program addresses the 18 criteria of Appendix B to 10CFR50, applicable ANSI QA standards, and other NRC, Federal, and State quality-related requirements. Accordingly, the QA programs of the suppliers and contractors involved with the ASME Code and safety components are required to adhere to the applicable Appendix B and ASME Code requirements. Further, Supply System QA reviews and approves such supplier and contractor QA Programs (including the Architect Engineer, Construction Manager, and NSSS supplier) prior to award. The Supply System Project QA Manager directs the QA activities related to the design, procurement, and construction of WNP-2. The Supply System QA organization is independent of the engineering, construction, and operations organizations; has the freedom to identify quality problems, and directly reports to senior management.

At WNP-2, the QA Program is implemented through four organizations. They are: 1) the Supply System, 2) Burns and Roe, 3) Bechtel, and 4) site contractors and subcontractors. (Refer to Figure 1.) The site contractors and subcontractors are responsible for implementing their approved QA programs. Each contractor has a QA and Quality Control (QC) function. First-line verification of construction quality is performed by these organizations. Bechtel, as Construction Manager, provides second level QA/QC surveillance and audits of contractor activities. Burns and Roe QA at the WNP-2 site performs surveillances on their engineering activities and audits on their engineering subcontractors. Supply System Project QA overviews Burns and Roe and Bechtel by surveillance. Additionally, Supply System QA performs surveillances of other contractor activities to determine the effectiveness of the Bechtel QA Program. The Supply System, Bechtel, and Burns and Roe Corporate QA organizations perform management audits on the site activities of their respective organizations.

A. Organization

1. Supply System Project Quality Assurance

a. Staff

1	Manager
2	Supervisors
1	Staff Assistant
10	Senior QA Engineer
1	QA Engineer I
1	Analyst
2	Secretaries
18	Members

b. Credentials/Experience

1. Nuclear Industry

<1	=	1(a)
1-5	=	5(a)
5-10	=	5
10-15	=	2
15-20	=	2
>20	=	1

(a)Years/personnel (typical)

2. Quality Assurance

<1	=	3
1-5	=	7
5-10	=	5
10-15	=	1
15-20	=	0
>20	=	0

3. College Degrees

13

4. Professional Engineer Registrations

4

5. AWS Certified

3

2. Burns and Roe Engineering Quality Assurance

a. Staff

1	Manager
5	QA Engineers
1	Secretary
7	Members

b. Experience - Nuclear/Quality Assurance

1-5	=	0
5-10	=	3
10-15	=	1
15-20	=	1
>20	=	1

3. Bechtel Power Corporation Quality Assurance

a. Staff

1. BQA

1	Manager
6	Auditors
3	Auditors in Training
4	Clerical
14	Members

2. BQC

1	Manager
26	Supervisors
141	Inspectors
22	Clerical
190	Members

b. Credentials/Experience

1. BQA Nuclear Industry

1-5	=	5
5-10	=	2
10-15	=	1
15-20	=	0
>20	=	2

2. BQA Nuclear Quality Assurance

1-5	=	5
5-10	=	2
10-15	=	1
15-20	=	0
>20	=	2

B. Responsibilities

The following paragraphs focus on the responsibilities and activities of the WNP-2 QA organization since the restart of Quality Class I work in June 1981. The entire WNP-2 QA Program was extensively reviewed and modified during the Restart Program (July 1980 to June 1981) as described in Appendix D to strengthen management control of the Project and improve implementation by the site contractors of the Project QA Program commitments. Appendix E summarizes the Quality Verification Program which has been implemented to assure that quality concerns for hardware installed prior to July 1980 are identified and corrected.

1. Supply System Project QA

The responsibilities of Supply System Project QA include:

- Verify implementation of the design and construction QA programs,
- Perform overview of the Architect Engineer, Construction Manager, contractors, and other project organizations (excluding Operations) by surveillance,
- Report significant, adverse quality conditions to the Supply System WNP-2 Program Director and Director of Quality Assurance,
- Issue Stop Work Orders as necessary,
- Interface with the NRC, Region V, to resolve identified items of noncompliance and/or concerns, and
- Review Construction Management and contractor records in support of System Turnover.

The responsibilities of the departments within Supply System Project QA include:

a. Quality Engineering

Personnel within this department perform surveillances of the Architect Engineer, Construction Manager, contractors, and other project (excluding Operations) organizations to verify compliance with the Supply System QA program requirements.

Personnel within this department also prepare, track, and evaluate Surveillance Quality Action Requests (SQARs), Quality Finding Reports (QFRs), and Corrective Action Requests (CARs).

SQARs identify a deficiency of minor significance. A CAR identifies a deficiency of major significance or breakdown in an organization's QA program. The Management CAR is a Supply System document used to notify an organization's Corporate management of a major, significant breakdown in a site organization's QA program. QFRs identify both minor and major deficiencies found during an audit.

When Project or Corporate QA identifies a deficiency within one of the site organizations, a SQAR, QFR, or CAR (or equivalent document if identified by Burns and Roe QA or Bechtel QA/QC) is issued to document the deficiency. Each deficiency document requires corrective action for the identified deficiency and gives a date for compliance. Upon completion of the corrective action, a re-audit or re-surveillance is performed to ensure the corrective action has been adequately completed.

Since June 1981, this department has performed:

- o Sixty six surveillances of Bechtel resulting in fifty SQARs and ten CARs,
- o Three audits of Bechtel resulting in twenty one findings (20 minor, 1 major),
- o Twelve surveillances of the Burns and Roe site and Richland offices resulting in four SQARs and one CAR,
- o One audit of the Burns and Roe site organization resulting in a single, minor audit finding,
- o Eight surveillances of WNP-2 Supply System organizations resulting in two SQARs and three CARs, and
- o Three audits of WNP-2 Supply System organizations resulting in twenty four minor audit findings.

In addition, since June 1981, the Supply System Corporate QA organization has performed one audit of the Burns and Roe New York office resulting in fourteen findings (7 major, 7 minor). Over the history of the WNP-2 Project, there have been a total of twenty three audits of the Burns and Roe organization by the Supply System.

Recently, Project QA has assessed the findings on Bechtel as Systems-Completion Contractor and as the Construction Management QA organization. The trends indicate a need to improve procedure implementation and to properly carry out the in-process QC surveillance and inspection activities. Recognizing the quality history of WNP-2, the late stage at which Bechtel entered the scene, and the trend indications, the Supply System has taken the following steps to enhance the effectiveness of the WNP-2 Project QA surveillance program.

- o Assigned Corporate QA the total responsibility for site audits. This change will permit the WNP-2 Project QA organization to focus on in-process surveillances.
- o WNP-2 Project QA has replaced four of the individuals in the group responsible for in-process surveillances with more experienced Senior QA engineers from WNP-1.

- o The program for surveillance of in-process construction has been revised to:

    Provide for the performance of in-depth, limited-scope and unscheduled surveillances. In-depth surveillances will be performed to provide a comprehensive analysis of the capability of a specific function to yield quality work. The plan requires the performance of about five in-depth surveillances per month. Limited-scope surveillances will be used to provide routine overview of ongoing work and unscheduled surveillances will be performed to cover specific problem areas as they arise.

    - Increase the number of surveillances from the average of about 9 per month since June 1981 to 12 or more per month.

    - Focus the surveillances on areas of complex or critical work and in areas where adverse trends are indicated based on the analysis of trend reports and current problem areas.

- o Added special surveillance programs in two areas. These surveillances are scheduled separately from the routine surveillances, and are used to assess critical or complex work.

    - RPV hydro preparation and performance. This included the contractor and Bechtel work in preparation for RPV hydro, the identification and review of documentation for components within the hydro boundary and the performance of the hydro.

    - Documentation review and turnover process. This includes the review of the documentation by the contractors prior to their document turnover to Bechtel plus the Bechtel document review and processing in support of system turnover and contract closeout activities.

b. Quality Compliance

Personnel within this department retrieve and review quality documentation for prepurchased and inactive site contracts, review quality documentation on a sample basis for Construction Management and active site contractors, support the Quality Verification Program by contract review, and support the System Turnover process.

These responsibilities are implemented as follows:

- o Prepurchased - Review quality documentation, obtain resolution of discrepancies, and supply information for contract close-out,

- o Turnover - Review quality documentation through a sampling of turnover packages and assist Construction Management to retrieve missing documentation and correct deficiencies,

- o Quality Verification Program - Review inactive site contracts to identify and resolve document deficiencies,

- o Systems - Review and approve Supply System specifications and purchase requisitions; prepare, review, and approve QA program procedures; prepare changes to and maintain the QA section of the FSAR; and coordinate supplier and bid evaluations, and

- o Project QA Library - Control specifications for construction contracts; collect and have available codes, standards, and procedures for use by site personnel; and ensure training has been performed for QA.

c. Supply System Project QA Staff

The Project QA staff tracks the resolution of 10CFR50.55(e) and 10CFR Part 21 items, trends deficiencies, and prepares reports for management on quality trends and deficiency backlogs. In addition, the staff working in conjunction with the other departments performs reviews of quality documents, procedures, Project Management Instructions (PMIs), etc.

d. Stop Work Activity

The Project QA, Construction, and Engineering Managers have exercised stop work authority as defined in PMI 4-13.2. When work is not in conformance with the quality requirements, a Quality Enforcement Action is initiated. Conditions which do not comply with technical and/or quality requirements, and for which one of the following apply, are considered severe deficiencies:

- o Fabrication, construction, or testing deficiencies, which represent a loss of safety function or integrity of a system or component, or

- o A breakdown in management or procedural controls evidenced by deficiencies in several areas of the QA program requirements and/or 10CFR50, Appendix B criteria.

When such a deficiency is identified, issuance of a MCAR, CAR, or Stop Work Order is required by the Project Management Instructions. When a valid reason exists for stopping work, a written directive is issued in the form of a Stop Work Order (SWO). The activities associated with the SWO are monitored to assure that conditions of the SWO are being met. Lifting of a SWO is initiated by a letter signed by Project Management after appropriate action has been taken and verified. This includes the elimination of the basic discrepancy and the steps taken to prevent recurrence. Limited resumption of work has in some instances been allowed (e.g., SWO No. 9) provided the conditions of release were documented and fulfilled prior to start of work. Since 1978, there have been fifteen (15) Stop Work Orders issued at WNP-2.. (Refer to Attachment 1.)

2. Burns and Roe Engineering Quality Assurance (EQA)

Their major responsibilities include:

- o Surveillance and audits of Burns and Roe engineering at the Richland and site offices to assure that the engineering is performed in accordance with project policies, programs, procedures, and instructions,

- o Preparation of reports of quality assurance activities at the Richland and site offices,

- o Performance of audits of engineering subcontractors,

- o Review safety-related equipment and construction specifications for quality requirements,

- o Prepare and/or review project instructions and procedures and their revisions to assure compliance with the QA program requirements, and

- o Investigate and report quality matters as requested by Burns and Roe Corporate Engineering or QA.

The Burns and Roe EQA organization was formed in July 1980, after a project reorganization which assigned the responsibility for construction surveillance to Bechtel. Since then, EQA has performed ninety two surveillances of the Richland and WNP-2 site offices. They have performed three audits of the Richland and WNP-2 site offices resulting in six minor findings.

From 1971 to February 1982, the Burns and Roe Corporate office has performed eighty audits, which included the New York, Richland and WNP-2 site offices. These audits resulted in a total of 235 findings.

3. Bechtel Power Corporation QA/QC

   a. Bechtel QA assumed responsibility for Construction Management QA activities June 1, 1981. Their major responsibilities include:

      o Perform audits of Bechtel and contractor/subcontractor site activities,

      o Stop work as required,

      o Track, status, and ensure timely resolution of NRC inspection findings,

      o Track, status, and trend nonconformance reports, and

      o Verify that Bechtel functions in support of system turnover are complete and satisfactory.

      From June 1, 1981, to March 31, 1982, BQA performed eleven audits of site contractor activities resulting in forty five minor findings, and eight audits of Bechtel internal activities, resulting in twenty four minor findings. Bechtel Corporate (San Fransico) QA performed four audits on their WNP-2 QA Program, which resulted in fifty two minor findings.

   b. Bechtel QC assumed responsibility for Construction Management Quality Control activities June 1, 1981. Their major responsibilities include:

      o Perform QC surveillance of site contractor and subcontractor activities,

      o Perform "first line" QC inspection of Bechtel activities as Systems-Completion Contractor,

      o Perform documentation reviews of active site contractor submittals, and

      o Review contractor, subcontractor, and Bechtel QC programs and procedures.

Since June 1, 1981, BQC has performed the following surveillances:

Contractor	No. Surveillances	No. Deviations
210A	285	61
213B	401	19
215	157	29
216	344	5
217	153	10
218	513	58
219	182	12
220	165	16
221A	225	37
234	198	6
215-103	10	0
215-103A	24	0
F003	36	0
2	4	0

4. Audit and Surveillance Schedules (1982)

In order to provide insight into the ongoing WNP-2 QA activities, the audit and surveillance schedules for 1982 are discussed below:

a. Audits

1. Supply System - The Project QA schedule is broken down into four quarters and gives the audited organization, audit team members, scope of the audit and schedule dates. (Refer to Attachment 2.)

   It should be noted that Corporate QA was assigned total responsibility for the performance of site audits effective June 1, 1982. This will permit Project QA to focus on in-process surveillances.

2. Burns and Roe - The EQA schedule has two areas, Burns and Roe subcontractors and technical audits. It lists the audited organization and the month the audit is to be performed. (Refer to Attachment 3.)

3. Bechtel Power Corporation - Bechtel QA has established an audit schedule for 1982 (refer to Attachment 4). The master audit plan has three sections: audit area/audit scope, master audit plan schedule (yearly), and the QA Quarterly Audit Schedule. The yearly schedule identifies the quarter the audit is to be performed and the quarterly schedule identifies the date for the audit.

b. Surveillances

1. Supply System - Project QA establishes a surveillance schedule based on a six month time frame (refer to Attachment 5). The published schedule only reflects scheduled audits to ensure coverage of the surveilled areas. Unscheduled surveillances are posted on the master schedule to show all surveillances performed for the six month period.

2. Burns and Roe - EQA establishes a monthly surveillance schedule (refer to Attachment 6) which includes the person responsible for performing the surveillance and the surveillance scope.

3. Bechtel Power Corporation - Bechtel QC inspectors perform daily surveillances which are not formally scheduled. At the end of each day, the QC inspectors file a surveillance report documenting their activities for that day and any deviations noted.

C. Management Support

The previous paragraphs described the structure and activities of the WNP-2 QA organization and provided evidence of the capability and effectiveness of this organization to identify problems and initiate action to resolve them. The key remaining factor is management support to ensure resolution of the problems identified by QA, and follow-up to ensure implementation and to preclude recurrence. Since the stop work in July 1980, a number of actions have been taken to strengthen the overall management control at WNP-2, including Project QA. Some of these actions were:

- Restart Program - The Restart Program provided a complete re-review of the contractors/subcontractors, Construction Management, and Supply System management control processes. Quality procedures were revised to strengthen acceptance criteria and to assure compliance with SAR requirements. New training programs were implemented to improve the overall quality of QA and QC personnel.

- Management Reporting - Routine reporting systems were instituted for site deficiencies, such as NCRs, CARs, audit findings, and open surveillances. These reports provide to Project Management, on a monthly basis, the total number of open deficiencies in each category, and aging data to permit management assessment of the timeliness of corrective actions.

- Management Quality Awareness - During the Restart and Quality Verification Programs, Supply System management became acutely aware of the lack of management attention to previously identified quality problems. The direct result of this enhanced awareness was increased management involvement in the resolution of quality concerns and a more rigorous reporting and assessment system for quality issues. Management involvement in these issues is the principal reason for the dramatic reduction in the overall deficiency backlog for WNP-2 to date.

- Reduction of Backlog (refer to Figure 2):

  - NRC Inspection Items - NRC inspection items numbered 55 in June 1980, reached a peak of 127 in April 1981 as a result of problems identified during the Restart Program, and have been reduced to 51 items of which 26 have been submitted to the NRC. This is a 60% reduction.

  - Corrective Action Requests - CARs numbered 22 in June 1980, reached a peak of 59 in March 1981, and have been reduced to eight as of March 1982. This is an 87% reduction.

  - Quality Finding Reports - QFRs numbered 102 in June 1980, reached a peak of 113 in February 1981, and have been reduced to 41 as of March 1982. This is a 63% reduction.

- 10CFR50.55(e) Items - 10CFR50.55(e) items numbered 28 in June 1980, reached a peak in August 1980, and have been reduced to 3 in March 1982. This is a 90% reduction.

- Project Reorganization - The WNP-2 project reorganization included bringing Bechtel Power Corporation in as the Construction Manager with responsibility for surveillance of the site contractor QA/QC programs.

- Action Tracking System - A computer program was implemented to track and ensure NRC commitments are completed in a timely manner.

- Quality Hotline - A telephone service was implemented to provide any site employee confidential access to Supply System management on issues related to qualify.

- Quality Awareness Program - A program was implemented to enhance feedback of quality problems from other Supply System projects.

Q.A. (OVERVIEW)

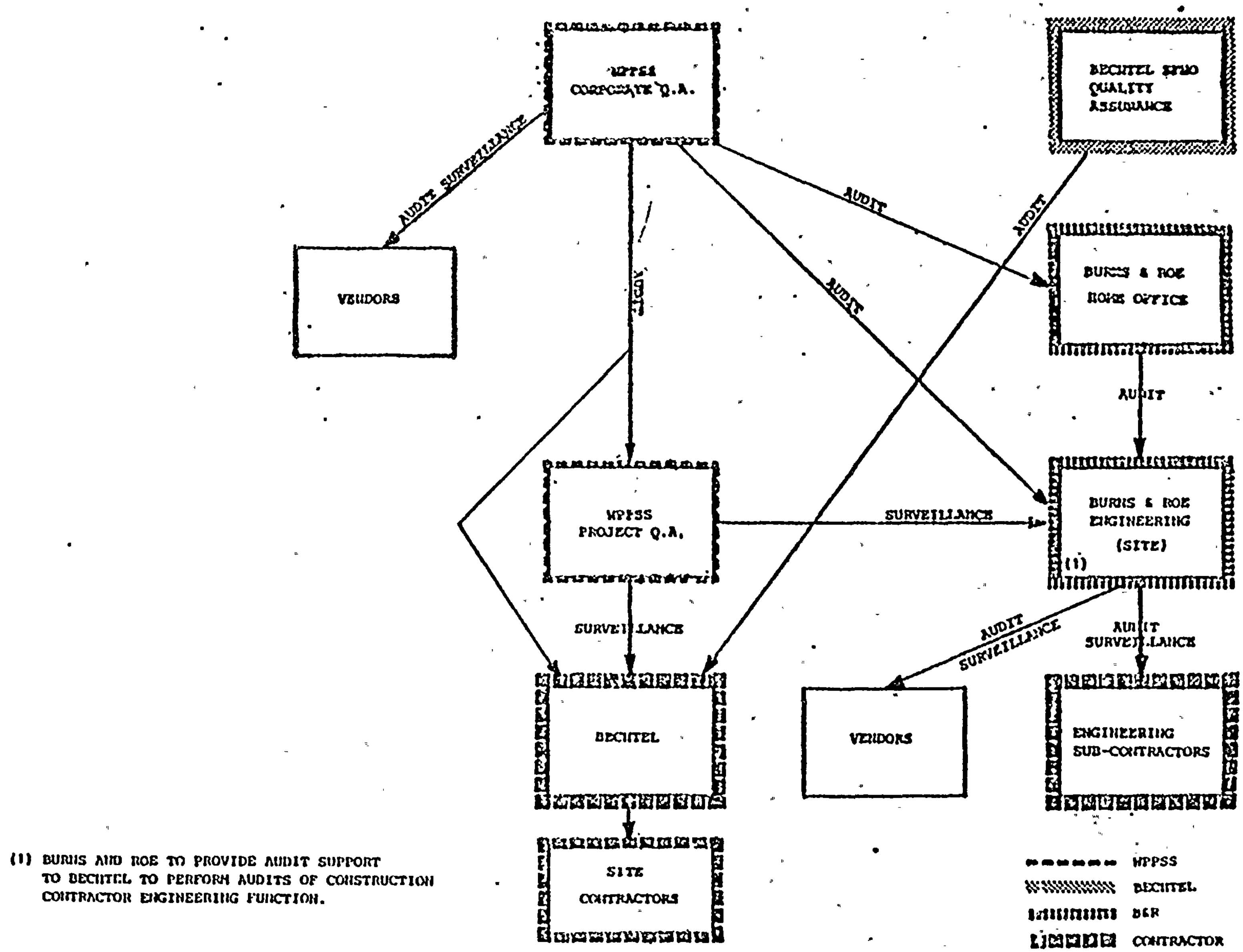


Figure 1

CORRECTIVE ACTION REQUESTS

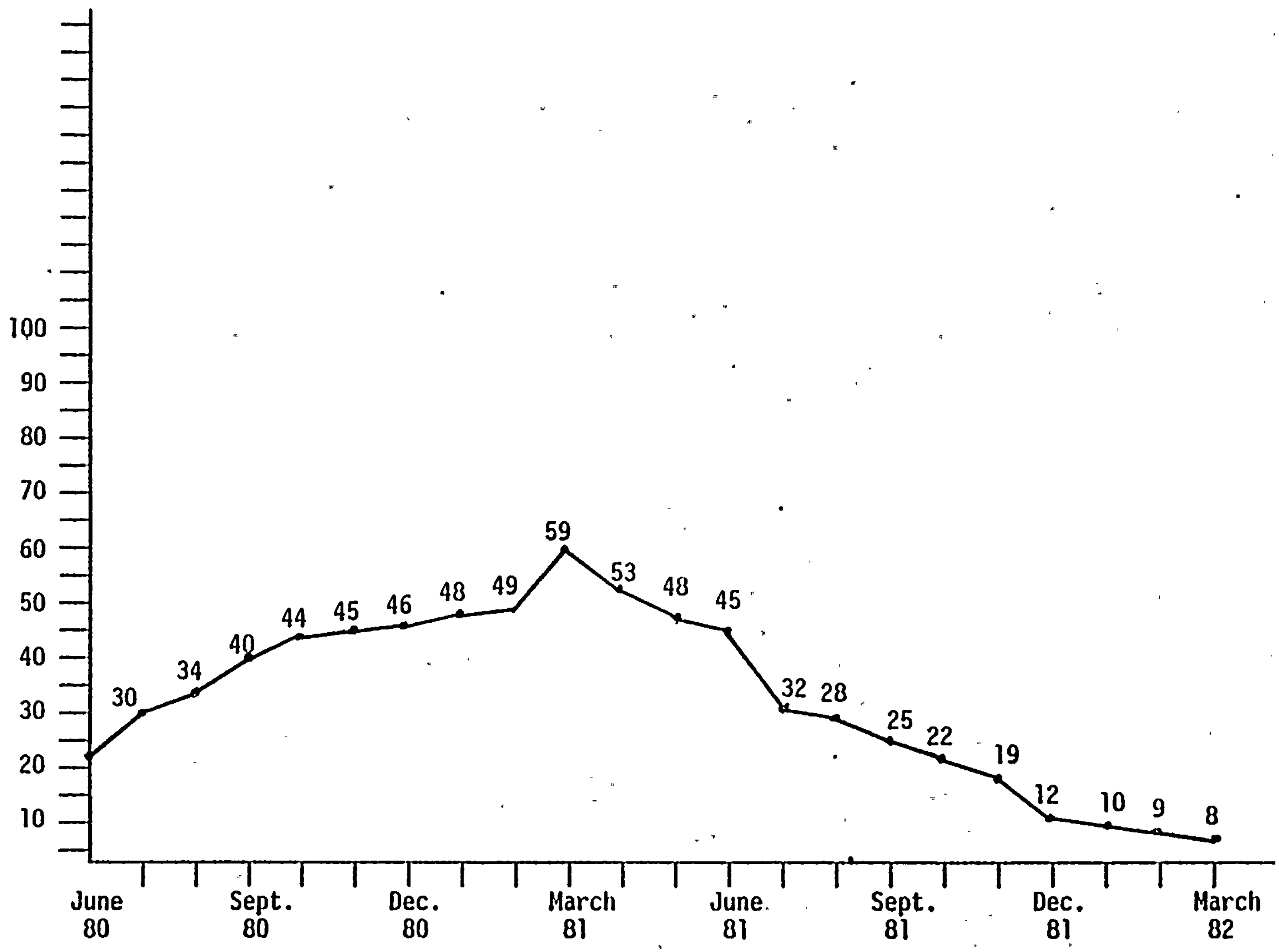
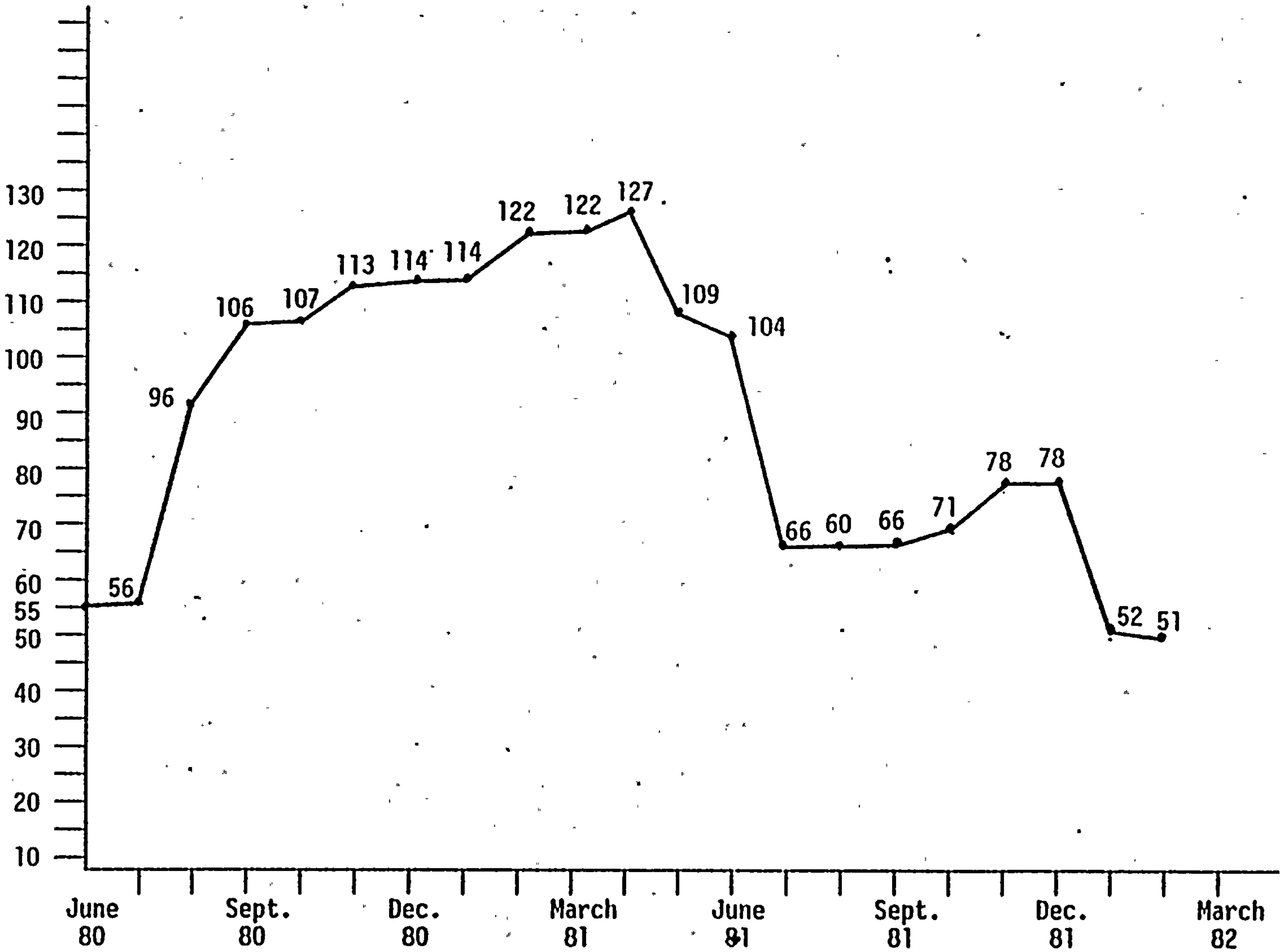


Figure 2

NRC INSPECTION SUMMARY



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QUALITY FINDING REPORTS

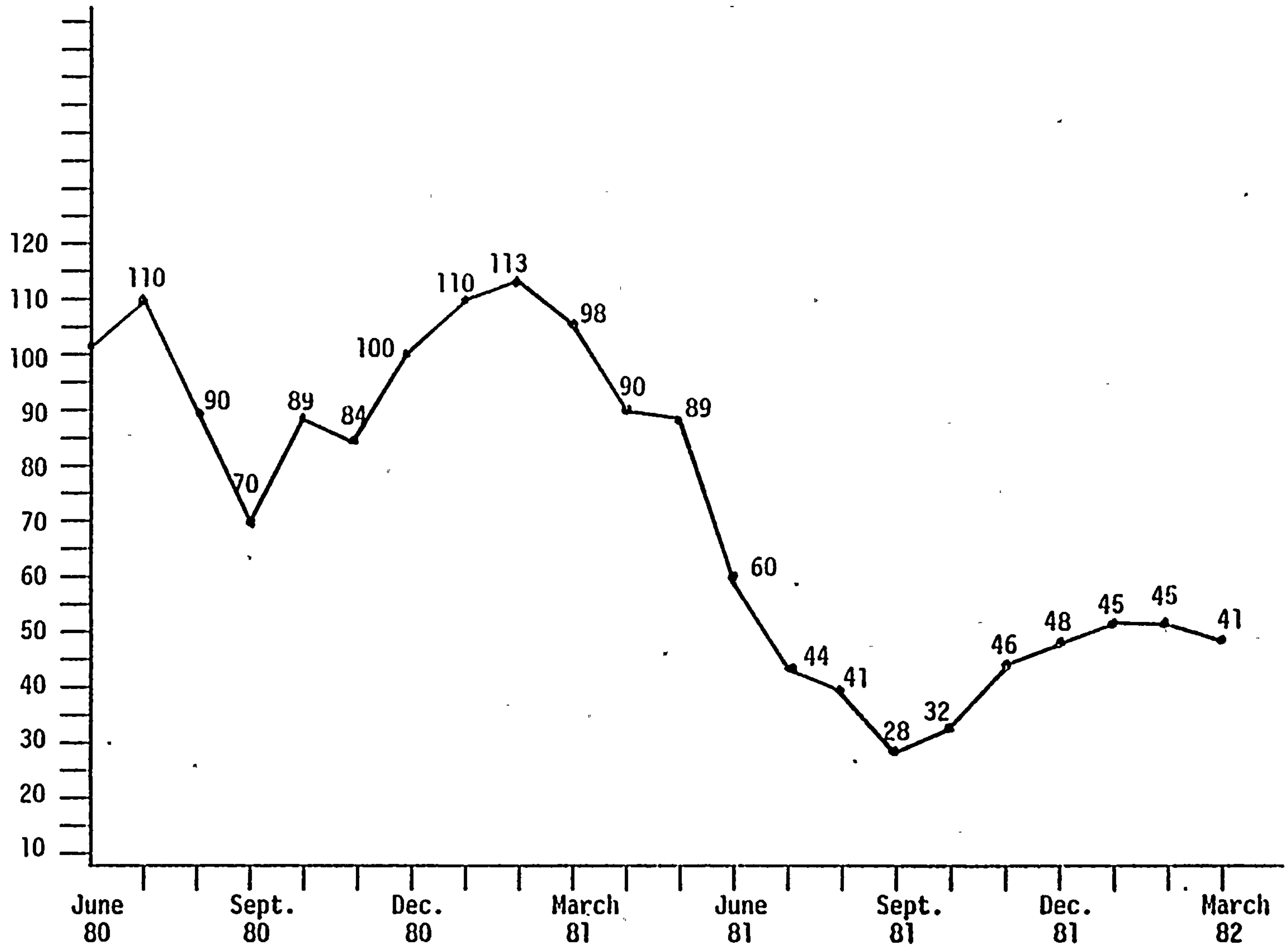
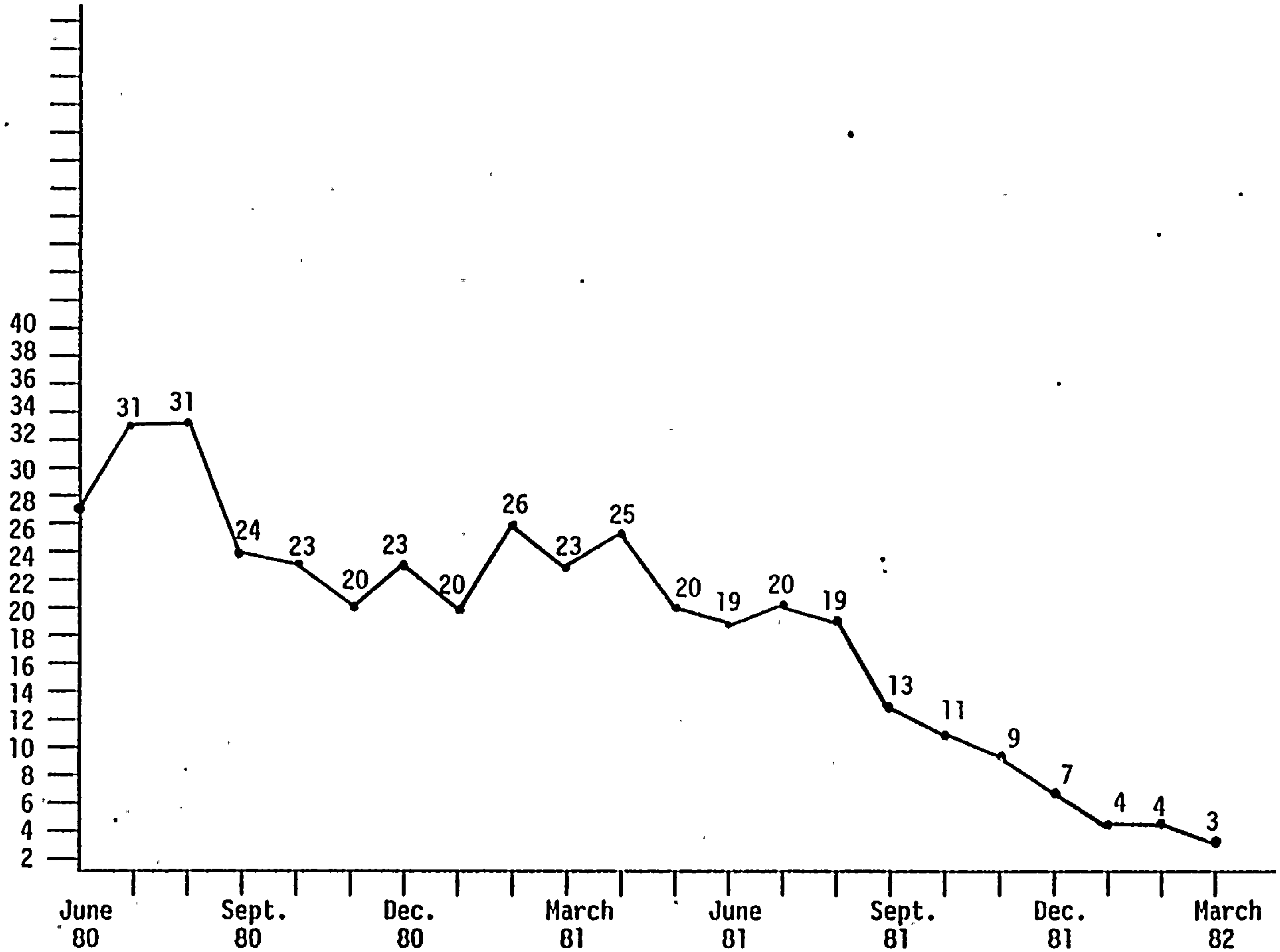


Figure 2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STOP WORK/CONTROL SUMMARY

STOP WORK ORDER #	SUBJECT	CONTRACT	DATE IMPOSED	CONDITIONS OF RELEASE	DATE LIFTED	COMMENTS
001 002 & 003	Improper assembly of the sacrificial shield wall; concrete void problems; visually rejectable welds and related repair problems.	218-F/L 215-WBG 220-JCI	11-21-79 11-21-79 11-21-79	a. Reinspections and quality records will be completed and all problems identified. b. A comprehensive corrective action plan (which includes design change and rationale for acceptance of non-reinspectiable work) will be developed and submitted to the NRC in an interm 50.55(e) report. The resumetion of work was contingent upon NRC review of the associated corrective action plan.	12-11-81 1-23-81 12-03-81	Actions Complete
004	Stop all work relating to concrete and grouting installation.	215-WBG	01-18-80	To assure control of Concrete and Grout placement, contractor was required to: a. Audit related activities to assure compliance to contract requirements. b. Accomplish work with trained personnel in accordance with approved procedures. (i.e.WP-7 R.5) c. Resolve CAR's 1427 & 1430 to satisfaction of the Owner.	01-31-80	Actions Complete
005	Stop work relating to field installation of QC-I materials due to field drawing discrepancies & drawing control problems.	220-JCI	03-28-80	Resumption was contingent upon Owner verification of: a. Drawings corrected of discrepancies. b. Drawing control system capable of maintaining up-to-date copies in the field.	04-09-80	Actions Verified & Complete

STOP WORK/CONTROL SUMMARY

STOP WORK ORDER #	SUBJECT	CONTRACT	DATE IMPOSED	CONDITIONS OF RELEASE	DATE LIFTED	COMMENTS
006	Stop design and installation activities associated with QC-I Small Bore Piping, due to lack of adequate design control.	215-WBG	04-18-80	A/E revise specification to change design responsibility for S.B.Pipe. The reason for this change in responsibility was to resolve several identified problems. Actions included: a. Establish an engineering organization responsible for the design of ASME piping systems. b. Implement a design control program which satisfies the quality requirements of ANSI N45.2. c. Perform a more rigorous design analysis in an effort to minimize construction changes to presently installed piping systems. d. Provide engineering certification that the design calculations comply with design criteria and reflect as-built drawing configuration in accordance with IE Bulletin 79-14.	06-03-81	Responsibility assigned to Gilbert/Commonwealth Inc. Actions Complete
007	Stop installation of cables associated with Power Generation Control Complex (PGCC) in Control Room.	218-F/L	05-23-80	Contractor to proceed with PGCC routing verification with approved Work Procedures and Project Engineering Directives (PED's) W-218-E-3064 & 2967.	02-12-81	Actions Complete
008	Stop work associated with Arc Stikes on Large and Small Bore Hangers. The inspection activities related to procedures pertinent to the acceptance of Arc Strikes on hanger or structural material, was stopped because procedures allowed arc strikes while the specification did not.	215-WBG	07-17-80	The Project prepared criteria on arc strikes and required the contractor to incorporate the information into its applicable procedures. Evidence was required of the contractor that it trained craftsmen and Q.C. inspectors to these procedures.	06-03-81	Actions Complete

STOP WORK/CONTROL SUMMARY

STOP WORK ORDER #	SUBJECT	CONTRACT	DATE IMPOSED	CONDITIONS OF RELEASE	DATE LIFTED	COMMENTS
009	Stop Work of all site QC-I work due to the inadequacy of work control and quality assurance systems at WNP-2.	All Const. Site Contrs. 213A-PDM 215-WBG 216-THC 217-SAS 218-F/L 219-OBC 220-JCI 221A-PTL 210-PKS 234-OBC	07-17-80	Restart activities included re-evaluation of the related work methods, controls, and standards of performance. Installation of safety significant items have been reviewed and systems to control future work are inplace. The following quality related programs/areas were upgraded: a. Qualification and Training b. Contractor Work Procedures c. Detailed Work Planning d. Responsibility and Accountability for work e. Documentation of completed work f. Feedback Systems within the Project and Contractor organizations.	See Below 04-01-81 06-03-81 04-13-81 05-15-81 04-02-81 04-14-81 02-11-81 05-12-81 05-21-81 04-20-81	Activities completed.
009-A	Stop all Quality Class I, II, & G work activities not previously stopped by Stop Work Order #009. Examples of work stopped included: preparing new work packages, issuing new Purchase Orders, subcontractor installations, issuing materials, document review.	215-WBG	08-22-80	Detailed instructions regarding specific activities to enable lifting the stop work were provided to the contractor. Some of these activities were: a. QA Program review of all deficiency documents. b. Audit/Evaluation of Procurement Pgm.	01-9-81	Activities completed.
010	Stop work involving installation and purchasing of Power Piping Sway Brace Brackets, due to discovery of defective welding.	213A-PDM & 215-WBG	08-13-80	The required actions taken by contracts 213A & 215 were: a. Identification of how many items were purchsed, installed and in stock. b. Field inspection of all hanger designs which utilized rigid sway struts. c. Significant findings reported. d. Repairs made as directed by A/E.	(see Page 4)	(see Page 4)

Attachment 1

STOP WORK/CONTROL SUMMARY

STOP WORK ORDER #	SUBJECT	CONTRACT	DATE IMPOSED	CONDITIONS OF RELEASE	DATE LIFTED	COMMENTS
010 continued:	Power Piping Sway Brace Brackets.	213A-PDM & 215-WBG	(see Page 3)	Corrective actions taken by the A/E: a. Results of a test program indicated that it was necessary to derate the design load allowable. b. Review of all existing installed designs which utilized size 15, 20, 25, & 40 rigid sway struts.	05-04-81 & 07-31-81	Activities Complete
011 & 012	Cease all installation of seam welded pipe and fittings associated with NRC-IE Bulletin 79-03A due to longitudinal weld defects in ASME SA-312, Type 304 Stainless Steel Pipe.	215-WBG & 213A-PDM	09-04-80	Actions to assure safety reuirements: a. Complete a review of contractor material lists for use of SA-312 or A-312, Type 300 series fusion welded pipe. b. Identify where material was used. c. Prepare instruction to etch(where applicable). d. Record status of etching & results.	01-12-82 & 06-18-82	Activities Complete
A	Owner-Furnished Pipe Whip Restraints for the Containment Dry Well (Leckenby C-90 PWR's).	215-WBG	11-21-79	Corrective Actions Included: a. Examination of quality records associated with the restraints. b. Submittal of corrective action plan to the NRC. c. Records suspected of being fraudulent were to be collected and retained in a secured area.	05-13-80	173 Pipe Whip Restraints were affected. Actions Complete
B	Stop work of activities performed by GEI&SE and Brand Hanford Co. These companies were subcontractors for WBG.	215-WBG	06-24-80	Actions taken to restart activities were: a. Both Subcontractors were retained under direct contract to the Owner. b. Both Subcontractors were required to comply with Owner & Bechtel QA Program.	09-24-81	This item was resolved during corrective action for SWO-009. Action Complete

STOP WORK/CONTROL SUMMARY

STOP WORK ORDER #	SUBJECT	CONTRACT	DATE IMPOSED	CONDITIONS OF RELEASE	DATE LIFTED	COMMENTS
C	Falsification of Documentation related to welding on pipe supports and piping.	215-WDG	03-02-78	The corrective action parameters required to have been implemented before resumption of work were: a. Recall all Class I pipe and pipe support document packages and place under WPPSS/B&R control. b. Constitute a joint WPPSS/B&R specially trained team to review these records for irregularities utilizing specific guidelines provided. c. Prepare for WPPSS/B&R approval, a procedure for the control of weld documentation packages, both pipe and pipe supports. d. Upgrade and implement the weld filler material control system. e. Provide training to all personnel involved in welding for the implementation of the upgraded weld filler material control system and the documentation package control procedure.	03-09-78	59 suspect packages were reviewed and dispositioned. Work completed March 19, 1978. Actions complete

1st Quarter 1982

PROJECT QUALITY ASSURANCE
AUDIT SCHEDULE
WNP-2

Rev. No. 1
Date April 2, 1982
By C.O. Wright
Approved R.T. Johnson
Page 1 of 3

ORGANIZATION	AUDIT TEAM	SCOPE	SCHEDULE (WEEK BEGINNING) NOTIFY	PERFORM	AUDIT NO.	ACTUAL DATE(S)	REMARKS
Supply System and	*D. Leslie J. Weers	Overall Control of Reverification Programs	1/1/82	1/11/82	WNP2-82-1	1/11-15/82	No Findings Issued.
Bechtel	D. Leslie (As Bechtel Team Member)	Participate in Bechtel Internal Audit of Procurement & Materials Management	2/9/82	2/19/82	WNP2-82-2	2/22-26/82	Joint Audit. Bechtel to lead. 6 Findings Issued. Bechtel to close.
Supply System Materials Management	*D. Leslie C. Park G. Baker	Supply System Material Control	2/26/82	3/8/82	WNP2-82-3	3/15-26/82	12 Findings. Report To Be Issued.

*Audit Team Leader

Attachment 2

2nd Quarter 1982

PROJECT QUALITY ASSURANCE
AUDIT SCHEDULE
WNP-2

Rev. No. 1
Date April 2, 1982
By C.O. Wright
Approved R.T. Johnson
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ORGANIZATION	AUDIT TEAM	SCOPE	SCHEDULE (WEEK BEGINNING) NOTIFY	PERFORM	AUDIT NO.	ACTUAL DATE(S)	REMARKS
Burns and Roe, Inc	*J. Reiten TBD	Document Control	4/2/82	4/19/82	WNP2-82-4		
Supply System Project Engineering	*D. Leslie TBD	Design and Specification Review	4/23/82	5/10/82	WNP2-82-5		
Burns and Roe, Inc.	*J. Reiten TBD	BRI QA Program	5/7/82	5/24/82	WNP2-82-6		
Bechtel	D. Leslie (As Bechtel Team Member)	Reverification Johnson Controls	6/4/82	6/21/82	WNP2-82-7		Joint Audit. Bechtel to lead.

*Audit Leader

Attachment 2

PROJECT QUALITY ASSURANCE
AUDIT SCHEDULE
WNP-2

3rd and 4th Quarters 1982

Rev. No. 1
Date April 2, 1982
By C.O. Wright
Approved R.T. Johnson
Page 3 of 3

ORGANIZATION	AUDIT TEAM	SCOPE	SCHEDULE (WEEK BEGINNING) NOTIFY	PERFORM	AUDIT NO.	ACTUAL DATE(S)	REMARKS
Bechtel	J. Reiten (As Bechtel RM)	Contractor Control	6/18/82	7/5/82	WNP2-82-8		Joint Audit. Bechtel to lead.
Burns and Roe, Inc	*J. Reiten TBD	Design Control	7/16/82	8/2/82	WNP2-82-9		
Bechtel	*D. Leslie TBD	Bechtel Receipt Inspection and Storage	9/3/82	9/20/82	WNP2-82-10		
Bechtel	J. Reiten (As Bechtel TM)	Bechtel Fire Protection	9/17/82	10/4/82	WNP2-82-11		Joint Audit. Bechtel to lead.
Supply System	*D. Leslie TBD	Records Management	10/15/82	11/1/82	WNP2-82-12		
Bechtel	*J. Reiten TBD	QA Program	11/19/82	12/6/82	WNP2-82-13		

*Audit Team Leader

Attachment 2

Attachment 3

1982
AUDIT SCHEDULE

Rev. 1
3/22/82

B&R Contractors	Audit Dates
Gilbert/Commonwealth	2/16-19/82 and 8/10-12/82
EDS Nuclear	3/16-18/82 and 9/14-16/82

Contract Numbers	Months		
210	May	and	November
213	March	and	September
215	May	and	November
216	June	and	December
217	June	and	December
218	April	and	October
220	April	and	October

NOTE:

Technical audits are to include the following disciplines as applicable - Civil, Electrical, HVAC, I & C; Mechanical, Nuclear and Stress.

QUALITY ASSURANCE
MASTER AUDIT PLAN

PROJECT NAME WNP-2
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REVISION NO 0
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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
1.0	Organization * (NQAM Section I No. 7)	Evaluate the project's compliance with the requirement for an organization chart showing key quality related positions.	
1.1	Organization *	Evaluate the project manager's compliance with the requirements for an organization chart showing key quality related positions.	NQAM Section I, No. 7
1.2	Construction Organization *	Evaluation of the project field construction managers compliance with the requirements for an organization chart showing key field and quality related positions.	WNP-2, BQAM Section I, 1.7.6.1
	* Not included in project audit program. This area to be covered by management audits, and monitored by projects.		

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Attachment 4

MAP-2

BECHTEL

PROJECT NAME WNP-2
JOB NUMBER 14631

QUALITY ASSURANCE MASTER AUDIT PLAN

REVISION NO 1

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
1.3	Q.C. Construction Quality Control Manual*	Evaluation of construction QC compliance to the requirements for preparation, approval and control of the CQCM.	CQCM, Section 1, 5.0-5.8
1.4	Project Construction Work Plan/Procedures*	Evaluation of construction compliance to the requirements for preparation approval and control of work plan/procedures.	WP/P-1, 1.5
1.5	Quality Program Documents*	Review of quality program procedures and manuals for maintenance of updated content of assigned copies issued by Bechtel departments.	NQAM, Section 0, No. 3 NQAM, SEction IV, No. 1

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
1.6	Managment Corrective Action Report Control*	Evaluation of project manager and manager of engineering compliance to the requirements for reviewing, evaluating and controlling MCARS.	NQAM, Section V, No. 4
1.8	Housekeeping*	Evaluation of construction compliance to the requirements for housekeeping.	WP/P-III

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QUALITY ASSURANCE MASTER AUDIT PLAN

REVISION NO 0

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
2.0	Indoctrination and training (NQAM Section V, No. 3)	Evaluation of construction compliance with the projects indoctrination and training program.	
2.1	Project construction indoctrination and training	Evaluation of construction and construction quality control compliance to the requirements for orientation, indoctrination, and training.	CQCM, Section II NQAM, Section V, No. 3 BQAM, Section II, 2.7.1.1 ~~ANSI N45.2.6, 1978 &~~ Reg. Guide 1.50 Rev. 1

QUALITY ASSURANCE
MASTER AUDIT PLAN

PROJECT NAME WNP-2
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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
3.0	Construction document control (NQAM, Section II, No. II)	Evaluation of project construction compliance with requirements for the control of project construction's design document control, and request for information.	
3.1	Design document distribution and control	Evaluation of project construction compliance with the requirements for: Field control and distribution of design documents. Preparation, processing, and control of request for information. (RFI)	NQAM, Section II, No. II BQAM, Section VI WP/P, Section VIII GWP/P-8

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BECHTEL

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QUALITY ASSURANCE MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
4.0	Q.A. Record retention (NQAM, Section V, No. 7)	Evaluation of requirements for collecting, evaluating, storing, and maintaining quality assurance records.	
4.1	Project quality control records	Evaluation of project construction Q.C. compliance to the requirements for establishing facilities and filing systems for retention of quality control records. (Record retrievability may be included in audits of other construction areas.)	NQAM, Section V, No. 7 CQAM, Section VII WP/P, Section II

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QUALITY ASSURANCE MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
5.0	Piping, control of installation in process inspection & testing. (NQAM Section IV, No. 3)	Evaluation of construction compliance to the requirements for in-process installation, testing, and inspection of piping, valves, and supports.	
5.1	Large bore piping and valve in-process control	Evaluation of construction compliance to the requirements for in-process installation, testing, and inspection of large bore piping and valves.	Applicable specifications, drawings, QCI's, QCIR's, and construction work/plan procedures. Spec. 215, CQCM-III, BQAM, Sec. 10
5.2	Small bore piping and valve in-process control	Evaluation of construction compliance to the requirements for in-process installation, testing, and inspection of small bore piping and valves.	Applicable specifications, drawings, QCI's, QCIR's, and construction work plan/procedures. Spec. 215, CQAM-III, BQAM Sec. 10
5.3	Pipe support in-process control	Evaluation of construction compliance to the requirements for in-process installation, testing, and inspection of pipe supports.	Applicable specifications, drawings, QCI's, QCIR's, and construction work plan/procedures. Spec. 215, QCI-P:210

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QUALITY ASSURANCE
MASTER AUDIT PLAN

REVISION NO 5

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
5.4	Bechtel Construction completion of MCC Powers Installation	Verify Bechtel Construction compliance to completed installation and "as-building."	Applicable contract specifications, PED's, Drawings, QCI's, QCIR's, Spec 215 CQCM III. BQAM Sect 10
5.5	Bechtel Construction CRD Installation	Verify Bechtel Construction Compliance to the Installation Requirements defined by G. E.	Applicable Contract Specifications, G.E. Documents CQCM III BQAM Sec 10.
5.6	Bechtel Construction Small-Bore and Large-Bore Hydrostatic Testing	To be covered by audit of GEI & SE Contract 240. Audit of GEI & SE's implementation of Control of Calibration equipment should be covered as part this audit. (specifically use of the Calibration Control Log) Reference: Closure of Supply System Audit # 215-80-1, QAFR # 8 of 10. ...nce to	Applicable specifications, drawings, QCI's, QCIR's, CQCM Sect III, BQAM Sect 10, SWP/P-G-3

PROJECT NAME WNP-2
JOB NUMBER 14631

QUALITY ASSURANCE MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
6.0	Nonconformance control (NQAM, Section IV, No. 4)	Evaluation of construction compliance to the requirements for identification, control, and disposition of nonconforming materials, parts, or components.	
6.1	Processing and disposition of nonconforming items.	Evaluation of construction compliance to the requirements for proper preparation of NCR forms; NCR logging, control of NCR tags, segregated storage practices, NCR disposition, reinspection and acceptance, corrective action to prevent recurring nonconformances; and control on installation of nonconforming items.	NQAM, Section IV, No. 4 CQCM, Section IV BQAM, Section 15

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QUALITY ASSURANCE
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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
7.0	Control of measuring and testing equipment. (NQAM-Section IV, No. 5)	Evaluation of construction compliance to the requirements for control of measuring and testing equipment.	
7.1	Control of measuring and testing equipment	Evaluation of quality control compliance to the requirements for the control of measuring and testing equipment used in construction activities, including evaluation and control of non-Bechtel calibration services to the purchase order and material requisition requirements.	NQAM, Section IV, No. 5 BQAM, Section 12 CQCM, VI, 6.0 CQCM, V

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
8.0	Material receiving, inspection, storage handling, and maintenance control. (NQAM Section IV, No. 2)	Evaluation of construction conformance to the requirements for material receiving inspection, storage handling and maintenance control.	
8.1	Material receiving inspection storage, and maintenance control.	Evaluation of construction conformance to the requirements for receiving and inspecting material, reviewing vendor documentation; material storage conditions; and maintenance operations and records.	BQAM, Section VII 7.6, Sec. 13 CQCM, Section III 4.0 GWP/P-4 QCI-R-1.00

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MAP-2

QUALITY ASSURANCE
MASTER AUDIT PLAN

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
9.0	Field procurement control (NQAM Section III, No. 2)	Evaluation of construction compliance to the requirements for field procurement.	
9.1	Field procurement control	Evaluation of construction compliance to the requirements for field procurement.	BQAM, Section IV CQCM, Section V WP/P, Section 12

QUALITY ASSURANCE
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PAGE 13 OF 23

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
10.0	Contractor control (NQAM IV, No. 7)	Evaluation of the contractor compliance to his quality assurance program and/or control document requirements.	
10.1	NDE contractor control	Evaluation of the NDE contractor compliance to his quality assurance program and/or control document requirements.	BQAM, 7 & 9 CQCM, Section 9 WP/P, No. 12
10.2	Elec. contractor control	Evaluation of the elec. contractor compliance to his quality assurance program and/or control document requirements.	Spec. 218 BQAM, 7 & 9 CQCM, Section 9 WP/P, No. 12
10.3	Coating and painting contractor control	Evaluation of the coating and painting contractor compliance to his quality assurance program and/or document requirements.	Spec. 219, 234 BQAM, 7 & 9 CQCM, Section 9 WP/P, No. 12
10.4	Instrumentation contractor control	Evaluation of the instrumentation contractor compliance to his quality assurance program and/or control document requirements.	Spec. 220 BQAM, 7 & 9 CQCM, Section 9 WP/P, No. 12

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QUALITY ASSURANCE
MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
10.5	HVAC & plumbing contractor control	Evaluation of the HVAC and plumbing contractor compliance to his quality assurance program and/or control document requirements.	Spec. 216 BQAM, 7 CQCM, Section 9 WP/P, No. 12
10.6	Concrete & grouting contractor control	Evaluation of the concrete & grouting contractor, compliance to his quality assurance program and/or control document requirement.	Spec. 215 BQAM, 7 CQCM, Section 9 WP/P, No. 12
10.7	Mechanical contractor control	Evaluation of the mechanical contractor, compliance to his quality assurance program and/or control document requirement.	Spec. 215 BQAM, 7 CQCM, Sec. 9 WP/P, No. 12

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
10.8	Architect Construction Contractor Control	Evaluation of the architect contractor compliance to his quality assurance program and/or control document requirements.	Spec. 210 BQAM,7 CQCM, Sect 9; WP/P, No. 12
10.9	Primary Containment Vessel Retrofit, Construction Contractor Control	Evaluation of the primary containment vessel and retrofit contractor compliance to his quality assurance program and/or control document requirements.	Spec. 213, 213(LCA) BQAM, 7 CQCM, Section 9 ~~WP/P, No. 12~~
10.10	Fire Protection Contractor Control	Evaluation of the Fire Protection Contractor compliance to his quality assurance program and/or control document requirements.	Spec 217 BQAM 7 CQCM, Section 9 ~~WP/P, No. 12~~
10.11	Testing Laboratory Contractor Control	Evaluation of the testing laboratories contractor compliance to his quality assurance program and/or control document requirements.	Spec 221, 221(A) BQAM 7 CQCM, Section 9 ~~WP/P, No. 12~~

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MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
11.0	Control special process (NQAM IV, 8)	Evaluation of construction compliance to the requirements for special process control.	
11.1	Welding and nondestructive examination control. Post weld heat treatment and filler metal control.	Evaluation of construction compliance with the requirements of quality control and documentation for welding, post weld heat treatment, filler metal control, and nondestructive examination for ASME Code, Section III application.	BQAM, 9 CQCM III, 7.1.2 SWP/P, W1
11.2	ASME Code stamping * control	Evaluation of project compliance with the requirements of code authorization, inspection and code symbol stamping.	BQAM, 19 BQAM, 7

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
12.0	Inspection plans and records (NQAM, Section IV, No. 3 & 7)	Evaluation of construction conformance to the requirements for inspection, and inspection records.	
12.1	Inspection plan & records	Evaluation of construction conformance to the requirements for preparing, processing, revising, and controlling field inspection records.	BQAM, Section X CQCM, Section III, Page 8

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QUALITY ASSURANCE MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
13.0	Systems completion and verification	Evaluation of conformance to procedures for reverification of completed safety-related work.	QVI-01 Rev. 0
13.1	Bechtel systems completion and verification	Evaluation of construction and quality control conformance to procedures for systems completion and verification of past work.	
13.2	Electrical contractor verification activities	Evaluation of contractor conformance to procedures for verification of past work.	
13.3	Instrumentation contractor verification activities	Evaluation of contractor conformance to procedures for verification of past work.	
13.4	HVAC and plumbing contractor verification activities	Evaluation of contractor conformance to procedures for verification of past work.	

QUALITY ASSURANCE
MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
13.5	Coating and painting contractor verification activities	Evaluation of coating & painting contractor conformance to procedures for verification of past work.	QVI-01 Rev.0
13.6	Architect Construction Contractor verification Activities	Evaluation of the architect contruction contractor for conformance to procedures for verification to past work.	QVI-01 Specification 210 SWP/P-G14,15 BQAM Sec. 7 CQCM Sec. IX
13.7	Primary Containment Vessel contractor verification activities	Evaluation of the primary containment vessel contractor for conformance to procedures for verification to past work.	QVI-01 Specification 213 SWP/P-G14, 15 BQAM Sec. 7 CQCM Sec. IX
13.8	Fire Protection contractor verification activities	Evaluation of the Fire Protection Contractor for conformance to Procedures for verification to past work.	QVI-01 Specification 217 SWP/P-G14, 15 BQAM Sec. 7 CQCM Sec. IX
13.9	Mechanical Contractor verification activities	Evaluation of the Mechanical Contractor for conformance to procedures for verification to past work	QVI-01 Specification 215 SWP/P-G 14, 15 BQAM Sec. 7 CQCM Sec. IX

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
14.0	Fire protection system (NQAM, Section 0, No. 5)	Evaluation of conformance to procedures for completion of fire protection system.	
14.1	Bechtel fire protection system completion	Evaluation of construction and quality control conformance to procedures for system completion of fire protection system.	PQAM, C-3, C-4, C-12 CQCM, Sec. III, Sec. IX SWP/P-G-3

BECHTEL

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
15.0	Seismic II/I quality assurance program (NQAM, Sec. 6, No. 6)	Evaluation of conformance to procedures for completion of seismic II/I.	
15.1	Bechtel II/I system completion	Evaluation of construction and quality control conformance to procedures for system completion relative to seismic II/I items.	PQAM, C-3, C-4, C-12, C-5 CQCM, Sec. III, SEc. IX

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NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
16.0	Sacrificial shield wall void repair. (NQAM Section IV No. 8)	Evaluation of conformance to procedures for control of special processes.	
16.1	NS-1 Material-Sacrificial shield wall void application contractor.	Evaluation of the sacrificial shield wall application contractor (subcontractor to the 215 contract) for compliance to his quality assurance program & documented process control requirements.	Specification 215 BQAM 7 WP/P, No. 12 CQCM Section 9
17.0	Fire protection subcontractor electrical subcontractor to fire protection contractor. (NQAM, Section O, No. 5)	Evaluation of the fire protection contractor for compliance to his quality assurance program and/or control document requirements.	
17.1	Electrical installation of fire protection system.	Evaluation of the fire protection electrical installation contractor (subcontractor to the 217 contract) for compliance to his quality assurance program and/or control document requirements.	Spec. 217 BQAM 7 CQCM Section 9
18.0	Piping, control of insulation contractor. (NQAM Section IV No. 7)	Evaluation of the pipe insulation contractor for compliance to his quality assurance program and/or control document requirements.	
18.1	Inprocess and final inspection control of the piping insulation contractor.	Evaluation of the piping insulation contractor (subcontractor to the 215 contract) for compliance to his quality assurance program and/or control document requirements.	Spec. 215 BQAM 7 CQCM Sec. 9 ; WP/P No. 12

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QUALITY ASSURANCE MASTER AUDIT PLAN

NO.	AUDIT AREA	AUDIT SCOPE	CONTROL DOCUMENTS
19.0	Electrical Contractor control of subcontractor. (NQAM IV No. 7)	Evaluation of the contractor compliance to his quality assurance program and/or control document requirements.	
19.1	Control of the subcontractor for the balance of plant power generation control complex.	Evaluation of the BOP, PGCC contractor for compliance to his quality assurance program & document requirements.	Spec. 218 BQAM 7 ; WP/P No. 12 CQCM Section 9
20.1	Bechtel Construction PGCC Completion	Verify Bechtel Construction compliance to Bechtel Procedures and to requirements provided by GE-NEBO	Applicable Contract Specifications, GE documents CQCM III QCI's, QCIR's BQAM Sec. 10

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LEGEND

AUDIT SCHEDULED

AUDIT PERFORMED

AUDIT CLOSED

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QUALITY ASSURANCE MASTER AUDIT PLAN SCHEDULE

REVISION NO 1

NO.	19 81				19 82				19 83				19__				19__				19__				19__				19__				19__			
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Attachment 4

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MAP-3

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AUDIT SCHEDULED ⧄

AUDIT PERFORMED ⊠

AUDIT CLOSED ■

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QUALITY ASSURANCE MASTER AUDIT PLAN SCHEDULE

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NO.	19 81				19 82				19 83				19__				19__				19__				19__				19__				19__			
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Attachment 4

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AUDIT SCHEDULED ▨ /

AUDIT PERFORMED ☒

AUDIT CLOSED ■

QUALITY ASSURANCE MASTER AUDIT PLAN SCHEDULE

BECHTEL

PROJECT NAME WNP-2

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Attachment 4

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MAP-3

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QUALITY ASSURANCE MASTER AUDIT PLAN SCHEDULE

BECHTEL

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Attachment 4

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* New

LEGEND

AUDIT SCHEDULED ▨

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NO.	1981				1982				1983				19__				19__				19__				19__				19__				19__			
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16.1				■																																
** * 18.1					/																															
* 19.1							/																													
* 20.1							/																													
5.6						/																														

SF[illegible]

* [illegible]

** See Page 2 for [illegible]

REVERIFICATION AUDITS

QUALITY ASSURANCE
QUARTERLY AUDIT SCHEDULE

PROJECT NAME WNP-2
JOB NO 14631

PAGE 1 OF 4
FOR [illegible] DATE 1/22/82

13 WEEK PERIOD FROM 1 Jan. 1982 THROUGH 26 March 1982

AUDIT NO.	(AUDIT TITLE) (CONTROL DOCUMENTS) (AUDITOR)	1-1	1-8	1-15	1-22	1-30	2-5	2-12	2-19	2-26	3-5	3-12	3-19	3-26
13.7	Primary Containment Vessel Contractor Verification Activities Spec. 213					X								
13.4	HVAC and Plumbing Contractor Verification Activities Spec. 216							X						
13.8	Fire Protection Contractor Verification Activities Spec. 217									X				
13.6	Architect Construction Contracto Verification Activities Spec. 210										/			

Attachment 4

EXTERNAL AUDITS

NP-2

I

QUALITY ASSURANCE
QUARTERLY AUDIT SCHEDULE

PAGE 1 OF 4

PQAE M. J. Jucbon DATE 1/22/82

ITLE)

L DOCUMENTS)

13 WEEK PERIOD FROM 1 Jan 1982 THROUGH 26 March 1982

11.1.1

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		WEEK ENDING												
		1-1	1-8	1-15	1-22	1-30	2-5	2-12	2-19	2-26	3-5	3-12	3-19	3-26
10.12	Fire Protection Contractor Control of Electrical Subcontractor Spec. 217				X									
10.9	Primary Containment Vessel Cont Spec. 213, 213 (LCA), BQAM 7 CQCM Sec. 9, WP/P No. 12					\								
18.1	Piping Control of Insulation Contractor 215-103								/					
10.3	Coating & Painting Contractor Spec. 219, 235, BQAM-7 & 9 CQCM-Sec. 9 WP/P No. 12													/

Attachment 4

BECHTEL

PROJECT NAME WNP-2
JOB NO. 14631

QUALITY ASSURANCE QUARTERLY AUDIT SCHEDULE

PAGE 1 OF 4
FQAE [illegible] DATE 1/22/82

13 WEEK PERIOD FROM 1 Jan. 1982 THROUGH 26 March 1982

AUDIT NO.	(AUDIT TITLE) (CONTROL DOCUMENTS) (AUDITOR)	1-1	1-8	1-15	1-22	1-30	2-5	2-12	2-19	2-26	3-5	3-12	3-19	3-26
		WEEK ENDING												
5.1	Large Bore Piping & Valve Control Spec. 215, CQCM-III BQAM-Sec. 10							X						
9.1	Field Procurement Control BQAM Sec. IV, CQCM Sec. V WP/P-Sec. 12								X					
6.1	Nonconformance Control NQAM-Sec. IV, No. 4, CQCM-Sec. IV, BQAM-Sec. 15										/			
11.1	Welding & Nondestructive Exam BQAM-9, CQCM III-7.1.2, SWP/P-W1													/
12.1	Inspection Plans & Records BQAM-Sec. X, CQCM - Sec. III, Page 8												/	

Attachment 4

INTERNAL AUDITS

QUALITY ASSURANCE
QUARTERLY AUDIT SCHEDULE

PROJECT NAME WNP-2
JOB NO 14631

PAGE 2 OF 4
PQAE M. Gredeis DATE 4/5/82

13 WEEK PERIOD FROM 2 April 1982 THROUGH 25 June 1982

AUDIT NO.	(AUDIT TITLE) (CONTROL DOCUMENTS) (AUDITOR)	4-2	4-9	4-16	4-23	4-30	5-7	5-14	5-21	5-28	6-4	6-11	6-18	6-25
4.1	QA Record Retention NQAM-Sec. V No. 7, CQCM-Sec. VII, WP/P=Sec. II						/							
15.1	Seismic II/I PQAM-C-3, C-4, C-12, C-5, CQCM Sec. III, Spec. IX									/				
5.4	Verify Bechtel const. Compliance to Installation & Asbuilding Requirements. (MCC Powers)												/	
7.1	Control of Measuring & Testing Eqpmnt. NQAM-Sec. IV, No. 5, BQAM-Sec. 12, CQCM-V, CQCM-VI 6.0		/											
5.6	Small Bore & Large Bore Hydrostatic Testing. QCI's, QCIR's, CQCM Sec III, BQAM Sec 10, SWP/P-G-3													* /

* This audit could occur earlier in the quarter depending on actual hydrostatic test dates.

SFP-20874

Attachment 4

QUALITY ASSURANCE
QUARTERLY AUDIT SCHEDULE

PROJECT NAME WNP-2
JOB NO 14631

PAGE 2 OF 4
FOAE M. Jacobs DATE 4/5/82

13 WEEK PERIOD FROM 2 April 1982 THROUGH 25 June 1982

AUDIT NO.	(AUDIT TITLE) (CONTROL DOCUMENTS) (AUDITOR)	4-2	4-9	4-16	4-23	4-30	5-7	5-14	5-21	5-28	6-4	6-11	6-18	6-25
13.3	Instrumentation contractor Verification													/
13.1	Systems Completion & Verification		/											

Attachment 4

EXTERNAL AUDITS

QUALITY ASSURANCE QUARTERLY AUDIT SCHEDULE

BECHTEL

PROJECT NAME WNP2

JOB NO. 14631

PAGE 2 OF 4

PQAE [signature] DATE 4/5/82

13 WEEK PERIOD FROM 2 April 1982 THROUGH 25 June 1982

AUDIT NO.	(AUDIT TITLE) (CONTROL DOCUMENTS) (AUDITOR)	4-2	4-9	4-16	4-23	4-30	5-7	5-14	5-21	5-28	6-4	6-11	6-18	6-25
		WEEK ENDING												
10.6	Concrete & Grouting Contractor Spec. 215, BQAM-7, CQCM-Sec. 9 WP/P-No. 12			/										
10.8	Architect Contractor Spec. 210, BQAM 7, CQCM Sec. 9, WP/P, No. 12								/					
10.7	Mechanical contractor Spec. 215, BQAM-7, CQCM-9, WP/P No. 12						/							

Attachment 4

Attachment 5

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 SITE SURVEILLANCE PLAN

	1982	JAN 4	JAN 11	JAN 18	JAN 25	FEB 1	FEB 8	FEB 15	FEB 22	MAR 1	MAR 8	MAR 15	MAR 22	MAR 29	APR 5	APR 12	APR 19	APR 26	MAY 3	MAY 10	MAY 17	MAY 24	MAY 31	JUN 7	JUN 14	JUN 21	JUN 28
(1) QA PROGRAM A INDOC. & TRAINING B QUALIFICATION & CERT. C MISC.	BCM BSC B&R SS																										
(2) DESIGN CONTROL A DRAWINGS/REV. B SPEC./REV. C RFI'S D AS-BUILT E MISC.	BSC B&R																										
(3) DOCUMENT CONTROL A DRAWINGS/REV. B SPEC./REV. C PROC./MANUAL D MISC.	BCM BSC B&R SS																										
(4) PROCUREMENT A P.O. REVIEW/CONTROL B REC. INSP. C CONTRACTOR/S/C CONTROL D VENDOR/SUPPLIER	BCM BSC B&R SS BCM																										
(5) I.D. AND CONTROL OF MATERIAL, PARTS, AND COMPONENTS A TAGGING/I.D. OF MATERIAL B PREVENTIVE MAINT. C MISC.	BCM BSC SS																										
(6) CONTROL OF SPECIAL PROCESSES A WELDER QUAL. B PROCED. QUAL. C FILLER MATERIAL CONTROL D PREHEAT/PWHT. E COATINGS F N.D.E. G MISC.	BCM BSC B&R BCM																										
(7) INSPECTION A IN PROCESS B FINAL ASSEMBLY C MISC.	BCM BSC BSC																										
(8) [T] CONTROL [A] TEST STATUS B IN PROCESS TESTING C MISC.	BCM BSC B&R																										
(9) CONTROL, MEASURING & TESTING EQUIP. A IMPLEMENTATION B CALIBRATION RECORD C MISC.	BCM BSC																										
(10) HANDLING, STORAGE & SHIPPING A HANDLING B STORAGE/CLEANLINESS C SHIPPING D. MISC.	BCM BSC SS																										
(11) NONCONFORMING PARTS, MATERIALS & COMPONENTS/CORRECTIVE ACTION A N.C.R. CONTROL B PART 21 POSTING C C.A.R. CONTROL D MISC.	BCM BSC B&R																										
(12) RECORDS A STORAGE/RETENSION/RETRIEVABILITY B RECORDS/TURNOVER SYS. C DOCUMENT REVIEW/PRES. D MISC.	BCM BSC B&R SS																										
(13) INSTRUCTIONS/PROCED. A PROC. REVIEW/APPROVALS B MISC.	BCM BSC B&R SS																										
(14) HOUSEKEEPING A PLANT B WAREHOUSES C MISC.	BCM BSC SS																										

LEGEND

- TO BE SCHEDULED
- COMPLETED SATISFACTORILY
- COMPLETED UNSATISFACTORILY
- SCHEDULED
- UNSCHEDULED
- SURVEILLANCE NUMBER
- BCM - BECHTEL CONSTRUCTION MANAGEMENT
- BSC - BECHTEL SYSTEMS COMPLETION
- B&R - B&R ENGINEERING
- SS - SUPPLY SYSTEM

1/4/82

Attachment 6

SURVEILLANCE SCHEDULE

April

B. Gonthier	1. Training effectiveness PMI 2-3 2. Duplication of PEDs WNP-2-017 3. ENDs WNP-2-049	
G. Hudak	1. SCL/DCL - Richland per WNP-2-018 2. (Equipment) Updating List WNP-2-044.1,.2,.3,.4	
G. Montenegro	1. Procedure Conflicts - Richland 2. ISO Update - Drawings SEI 3-4 3. Hanger DCL SEI 3-6	
R. Sabol	1. Calculations WNP-2-ED-010 Prep. of Cont. Transmittal to Proj. File * 2. Eng. Holds ◇ WNP-2-ED-004 3. G/C Audit Follow-up	
J. Verbeck	1. Indoc. & Train EDS Pers. PMI 2-3 2. Res. of Maj. & Min. Hanger Problems SEI 3-1 3. Dist. & Cont. Site Eng. Inst. SEI 1-2	

* F-82-1514 & F-82-1465
◇ Ref. PEDs 215-H-8917
215-H-8832
215-M-C076
C0208-M-0244 & Letter GCBR-F-82-059

APPENDIX D

APPENDIX D

RESTART PROGRAM

The purpose of the Restart Program was to assure that risk of additional construction quality problems was minimal prior to releasing a contractor to resume construction on Quality Class I (QC-I) or Seismic Category I (SC-I) work. The program was applied to all site contractors performing QC-I or SC-I work. The scope of the program summarized below is described in detail in Attachment 1 to this Appendix. The program included the following tasks.

A. Reduction of Non-Contractor Backlog

This task focused on the methods used by project and corporate organizations to resolve problems and to respond to requests for information and direction from contractors and external agencies. The purpose was to reduce the backlog of outstanding problems and improve response time. The specific areas addressed were:

- Nonconformance Reports,
- Physical implementation of engineering direction,
- Quality assurance audits,
- Corrective Action Requests,
- Quality assurance surveillances,
- NRC Inspection Items,
- 10CFR50.55(e) reports,
- Startup Problem Reports,
- Documentation receipt by the Supply System,
- Request for Information (RFI) processing,
- IE Bulletins, Circulars, and Information Notices,
- Major engineering problems,
- Corporate audit findings, and
- Master Work List.

This task resulted in a number of specific actions which have succeeded in reducing the backlog of PEDs, RFIs, NCRs, and SPRs from about 3,100 to 1,000 (refer to Figures 1 and 2) and contributed to the reduction of other backlogs as discussed later.

B. Specification Reconciliation

This task included a review of the construction specifications to assure that they complied with the FSAR commitments, development and issuance of an updated "list of effective pages" for each contract specification, and a review by the contractor to assure that his issue of the specification was current and complete. The specification/FSAR review resulted in four changes to the FSAR and approximately 20 changes to various sections of the specifications. The procedures used to control the specification/FSAR review and a typical transmittal showing the feedback to the procedure review process (Section D of this Appendix) is included as Attachment 2.

C. Deficiency Review

This review covered the full range of deficiency documents (e.g., Nonconformance Reports, Corrective Action Requests, Quality Audit Findings, NRC Inspection Items, 10CFR50.55(e), and 10CFR Part 21 items). All open deficiencies were identified (listed) and reviewed for trends that were indicative of programmatic problems. Programmatic problems detected in these reviews were fed back through the QA program to assure that corrective action was implemented to preclude recurrence and to evaluate the impact on prior work. In addition, for NRC Inspection Items, 10CFR50.55(e), and 10CFR Part 21 items, a matrix showing the action taken to close each item was prepared and an evaluation was performed to assure that subsequent procedure revisions had not invalidated the previous corrective action. Finally, all open deficiencies were resolved by closure, carrying the resolution to the point where craft work was required for closure; or evaluation, which determined that the existing status did not impact restart of QC-I/SC-I construction. In the latter case, this usually involved having an approved corrective action plan in-place so that the assessment of the impact on restart of construction could be performed.

The primary benefits were a substantial reduction of the backlog of open deficiency documents (refer to Figure 2 of Appendix C), feedback of programmatic problems to strengthen the QA programs, management systems and work procedures, and the development of a more effective system to monitor and manage the size of the backlog of open deficiencies.

D. Procedure Review

The primary focus of this task was to assure that the construction contractors' QA, QC, and work procedures complied with the specifications, codes and standards, were internally consistent, and incorporated adequate controls to preclude recurrence of past problems. The review process worked in both directions, and in a number of cases, changes were made to clarify or correct project instructions or the specifications. The completion of the specification/FSAR and deficiency reviews provided a baseline from which the procedure reviews were performed. The procedure reviews were conducted in several stages with formal transmittal and response to review comments.

In those cases where revisions had been made in response to the deficiency reviews or other inputs, the procedure was first reviewed and approved within the contractor's organization. It was then reviewed for approval by Burns and Roe and the Supply System Restart Task Team assigned to that contract. The Task Team exercised the Owner's QA approval authority for procedures and was responsible for tracking the resolution of outstanding comments.

E. Training and Personnel Qualification Reviews

This review included the procedures that control personnel qualification and training requirements, and audits of the implementation of these requirements. The scope covered QA/QC personnel, NDE personnel, welders, and engineering/supervisory personnel. In general, few problems were encountered in those areas where job descriptions and qualification requirements are well standardized (e.g., NDE personnel and welders). The primary benefits from this review were clarification and strengthening of the qualification requirements in the QA/QC and engineering areas, increased emphasis on the qualifications and training of key personnel, and an independent verification that the personnel involved in the work to be restarted were qualified and had been trained to the revised program.

F. Management Systems Review

Work process flow diagrams were developed by the four major contractors (mechanical, electrical, HVAC, and I&C) to assist in the identification of problem areas and the development of corrective action. The scope of these reviews concerned all phases of the contractor's program, from work planning, processing of engineering direction, and material acquisition, through construction, inspection, problem resolution, and documentation review. The main benefit was the broad overview of the program structure which highlighted interface problems and adverse procedural interactions.

G. Corrective Action

The corrective action process which took place during the Restart Program involved two major thrusts. One activity was directed at the identification and resolution of generic problems that were impacting work in major hardware areas or the dispositioning of multiple defects. Examples of these problems are the dispositioning of weld defects in sway brace brackets procurred from several vendors, and the development of more effective criteria for the inspection and resolution of arc strikes. Since many of these items were contained in the backlog of deficiency documents and the engineering backlog, the performance of this task was one of the key factors in the reduction of the backlogs.

The other activity of the corrective action process is less visible, but was equally effective. This was the feedback between the reviews described above. This feedback process is depicted in the flowchart in Attachment 1. The principal result of this feedback was iterative review and revision of the QA, QC, and work procedures. The primary driving forces for these iterations were the output from the deficiency reviews, the resolution of the generic problems, and the management system reviews.

H. Evaluation

The evaluation encompassed the collection, review, assessment, and documentation of the results of the various Restart Program tasks. The evaluation was done by Supply System task teams using formal procedures and checklists to assure that the main elements of each task were complete and satisfied the program requirements. The task teams conducting the evaluation were independent of the organizations responsible for performing the work. They had the authority to reject the work submitted and exercised this authority frequently. Additionally, a review was performed by WNP-2 Project QA of the Restart Program documentation assembled by the Task Team. The review by Project QA was not limited to the documentation, but included checks of contractor records and interviews of contractor personnel to verify the validity of the conclusions developed by the task teams. These reviews did generate additional findings which required resolution. The results of the Project QA reviews and the resolution of their findings are part of the Restart Program record.

I. Independent Review

The last step prior to the release of a contractor was a review of the Restart Program results for that contractor by a team composed of senior Corporate QA and Engineering personnel who were not involved in the Restart Program and who were organizationally independent of the WNP-2 Project. A copy of the results of the Restart Program reviews was also provided to the NRC Resident Inspector concurrent with the Supply System's independent review process. The findings of the independent review team and their resolution were also provided to the NRC Resident Inspector.

ENGINEERING DOCUM BACKLOG - 1981
ACTUAL BACKLOG EACH WEEK BY DOCUMENT TYPE

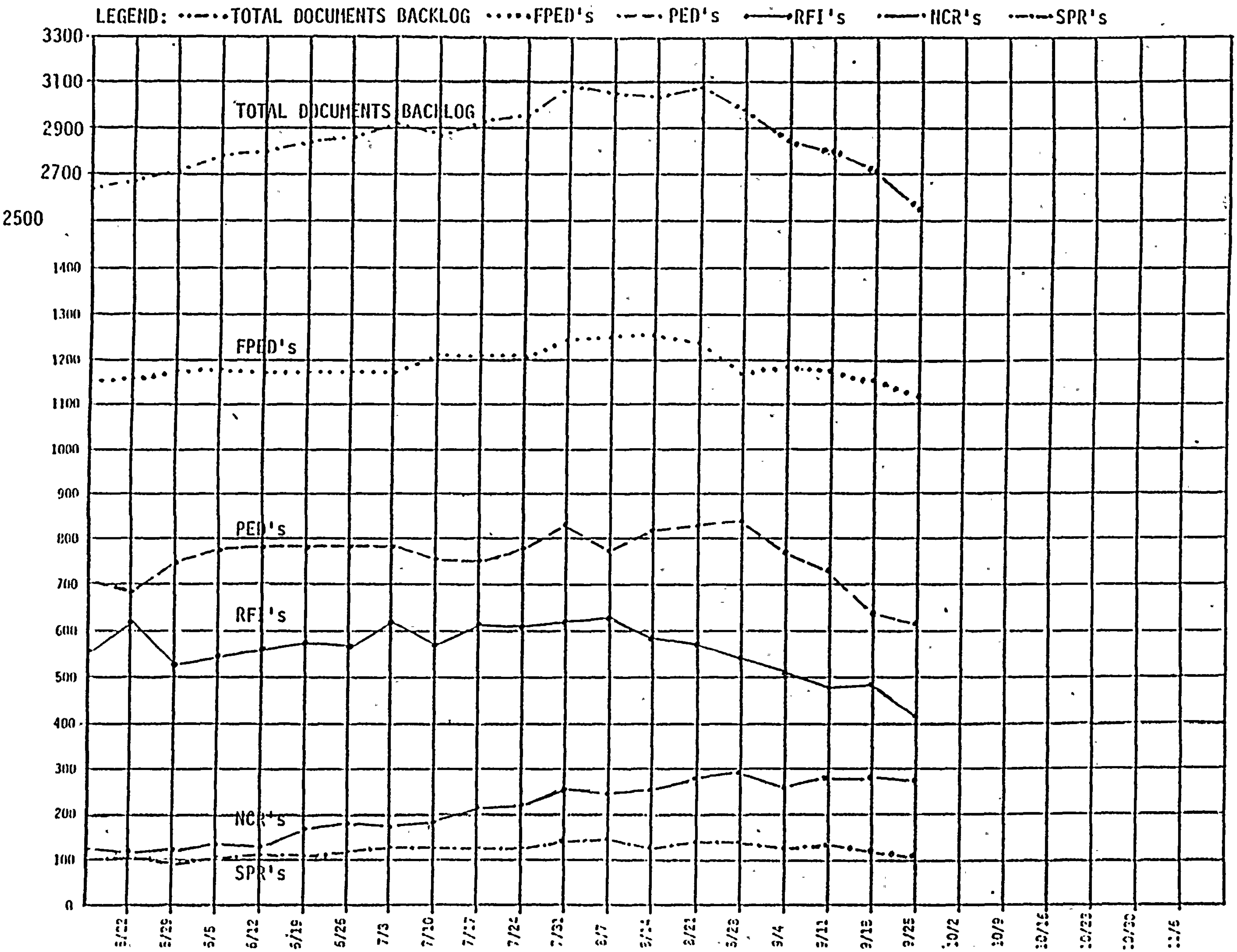


FIGURE 1

ENGINEERING DO[illegible] ITS BACKLOG - 1981 & 1982
ACTUAL BACKLOG EA[illegible] [illegible]EEK BY DOCUMENT TYPE

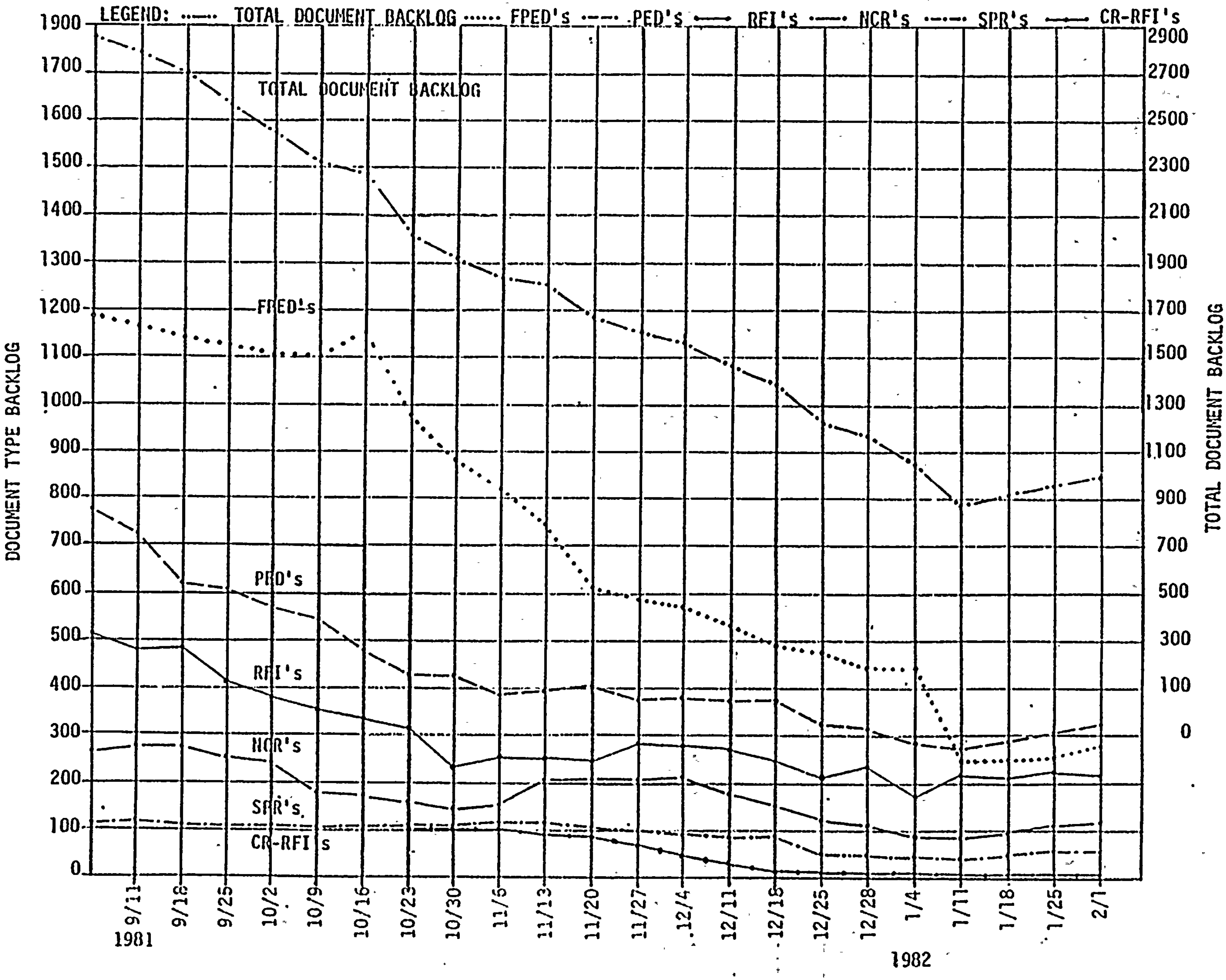


FIGURE 2

Attachment 1

WPPSS	WASHINGTON PUBLIC POWER SUPPLY SYSTEM REVERIFICATION INSTRUCTION	NO. PJT-01 REV. NO. 1 EFFECTIVE DATE 12/29/80 QUALITY AFFECTING [X] YES [ ] NO
TITLE RESTART ACTIVITIES SCOPE		

1.0 PURPOSE

The purpose of this instruction is to delineate the total scope of all activities required prior to authorizing the restart of a specific commodity of Quality Class I/Quality Class II Seismic Category I work. This instruction also assigns the responsibility by Project organization for performance.

2.0 DEFINITIONS

None

3.0 DISCUSSION

The activities required to restart work on commodities (priorities established on reference 4.3) are derived from commitments of Reference 4.1 and further described in Reference 4.2. Additionally, there are several activities which must be performed to fulfill the intent of the commitments made in Reference 4.1 but are not specifically identified. The activities of Attachment 5.1 are a compilation of all known items which will be required to satisfy Owner commitments. These activities will be performed in accordance with the cited instruction and by those assigned responsibility in order to standardize methods, coordinate the total project effort and minimize duplications.

4.0 REFERENCES

4.1 WPPSS letter, GO-2-80-153, dated July 17, 1980 - response to NRC 10CFR50.54(f).

4.2 Plan, WNP-2 Restart of Safety Related Work, dated December 17, 1980 (Rev. 1)

4.3 Restart Level 3 Commodity Priority Schedule.

5.0 ATTACHMENTS

5.1 Restart Activities

5.2 Standard Restart Flow Diagram, Dated December 10, 1980 (Rev. 2)

5.3 Plan, WNP-2 Restart of Safety Related Work, dated December 17, 1980 (Rev. 1)

APPROVED	SUPERSEDES ISSUE: PJT-01, Revision 0	PAGE 1 OF 12

REVERIFICATION PROGRAM ACTIVITES (PHASE I - RESTART))
REFERENCE "STANDARD RESTART FLOW DIAGRAM"
(ATTACHMENT 5.2)

ACTIVITY	INSTRUCTION	RESPONSIBILITY
1. Current Baseline Specification.		
a. Provide Baseline Specification.		B&R Engr., Cont.
b. Ensure Baseline Specification Compliance w/FSAR.	PJT-06	Project Engr.
c. Modify Baseline Specification/FSAR as Required.		B&R Eng., Proj. Engr.
2. Deficiency Review.	PJT-07	
a. Provide Listing of 50.55(e)s, Part 21s, Open NRC Findings and Closed (since 1977) NRC Findings.		P.Q.A.
b. Analyze List (para. 2.a.) in Conjunction with All Open CARs, QAFRs, NCRs, IRs and RFIs for Program/System Failures and Provide Recommended Corrective Action(s).		Contractor
c. Review & Approve Analysis and Recommended Corrective Action(s).		R.P.
d. Verify that Corrective Action(s) have been Incorporated in Applicable Specification(s), Procedure(s) and/or Management System.		R.P.
3. Corrective Action.	PJT-08	
a. Provide Construction Sequence/Priorities/ Detailed Schedules to Identify that Specific Work to Commence upon Authorization to Restart.		C.H.

ACTIVITY		INSTRUCTION	RESPONSIBILITY
b.	Identify and List Non-Contractor Deficiency Backlog that Constrains Restart of Work and Provide for Disposition in Accordance with the Restart Schedule.	PJT-09	Engr., P.Q.A.
c.	Review Deficiency List (par. 2.a., 2.b.) in conjunction with Construction Sequence (par. 3.a.) and Establish a Priority for Disposition of All Open Deficiencies.		Contractor
d.	Disposition Deficiencies in Accordance with the Established Priorities (par. 3.b.) (Minimum Acceptable Criteria is the Deficiency Backlog Reduction to Support One Month's Work and Scheduled Disposition of the Balance to Sustain Project Remobilization).		Contractor, B&R Engr., Project Engr., Project Mgmt., P.Q.A., C.M.
e.	Review Deficiency Disposition (par 3.c.) and Identify any Requirements for Specification Modification, Procedure Revision and/or Management System Revision.		R.P.
f.	Review and Document the Effects of Deficiency Disposition on Restart (Including Material Availability and Long Lead Items) and Adjust Construction Sequence (par 3.a.) as Required.		C.M., Contractor
g.	Verify that Identified Changes/Revisions (par 3.d.) have been Incorporated in Applicable Specification(s), Procedure(s) and/or Management System.		R.P
4.	Procedure Review.	PJT-05	
a.	List and Submit all Procedure(s) by Commodity.		Contractor
b.	Review Procedures to Current Specification (Par. 1.) Deficiency Review (Par. 2.) and Corrective Action (Par. 3.) and Submit Resolved Comments to Contractor.		R.P., B&R Engr.
c.	Revise Procedure(s) as Required.		Contractor
d.	Approve Procedures.		R.P., B&R Engr.

ACTIVITY	INSTRUCTION	RESPONSIBILITY
5. Personnel Qualification.		
a. Submit Names and Resumes of QA, QC, Engineering and Supervisory Personnel to be Trained as Required by Approved Training Program/Procedures.		Contractor
b. Review and Approve.		R.P.
c. Authorize Training.		C.M.
6. Management Systems (Applicable Only to Contracts 215, 216, 218 & 220).		
a. Submit Management System to Include those Requirements Identified in the Deficiency Review (par. 2.) and Corrective Action (par. 3.).		Contractor
b. Review and Approve.		P.M.
7. Evaluation.		
a. Document an Evaluation of the Adequacy of R.P. Performance of Reviews and Actions Accomplished. (pars. 1., 2., 4., and 5.)		P.Q.A.
b. Document the Effect of Restart on Reinspection (Reverification Program - Phase II).		Contractor, C.M.
c. Provide a Declarative Statement Attesting that Restart of Work will have a Minimal Risk of Quality Problems.		Contractor, R.P.
8. Final Review and Approval.		
a. Prepare a Final Document Package that Demonstrates Satisfactory Completion of All Restart Requirements. (par. 1. thru 6.)		R.P.

ACTIVITY	INSTRUCTION	RESPONSIBILITY
b. Conduct an Independent Review of Restart Activities to Provide an Objective Evaluation that the Requirements of the "PLAN WNP-2 Restart of Safety Related Work" have been Adequately Accomplished.		Supply System Mgmt. Committee
9. Restart and Work Surveillance Program.		
a. Prepare Work Surveillance Plan and Identify Applicable Work Hold Points.		P.Q.A.
b. Issue to the Contractor a Conditional Authorization to Restart Subject to the P.Q.A. Surveillance Plan and Hold Points.		P.M.
c. Commence Work.		Contractor
d. Perform Surveillance in Accordance with Plan.		P.Q.A.
e. Identify Additional Revisions to Specifications, Procedures and/or Managements Systems as Applicable and Assess the Adequacy of Training Programs.		P.Q.A.
f. Initiate, Implement and/or Incorporate those Findings Identified (par. 9.e.) to Include Retraining as Necessary.		Contractor
g. Issue to the Contractor an Unconditional Release to Restart.		P.M.

PLAN

WNP-2 - RESTART OF SAFETY RELATED WORK

NAME	APPROVAL
G.I. Wells	[signature]
R.M. Foley	[signature]
A.M. Sastry	[signature]
R.T. Johnson	[signature]
W.C. Bibb	[signature]

TASK II/PHASE I SUMMARY

In order to resume any work stopped by Stop Work Order No. 009, a review will be conducted to assure that contractor quality controls are effective and that any resumption of work would have minimal risk of quality problems and would not preclude reinspection of past work. This requirement applies to all contractors responsible for Quality Class I or Quality Class II Seismic Category I work.

The list of actions which must be taken before release for any work activity for any contractor is included as Attachment I. Attachment II identifies the additional requirements which must be applied to Contract 215 individual work activities prior to resumption of work.

The attached restart plan is to be considered as Phase I of the overall review effort, which was committed to in the 10CFR50.54(f) response to NRC (letter GO2-80-153). The plan attached herein addresses only those activities necessary to restart work. It involves the appointment of a Restart Coordinator for each contract, in Attachment I. This individual will be the central point of communication with the contractor as it relates to the restart program. Work which will be reviewed and assessed are summarized as follows:

- Procedure status and adequacy of procedure requirements to specification and SARs.
- Adequacy of personnel qualification and training programs.
- Analysis of deficiencies (IRs, RFIs, NCR, QAFR, CAR's 50.55(e)s, Part 21 and NRC findings.)
- Deficiency backlog reduction in accordance with priorities of construction completion plan.

Results of the review will be assessed and if controls are deemed adequate, work may restart. Corrective action measures will be stipulated, as appropriate.

Upon verification that the corrective action measures have been implemented, the contractor will be authorized to commence work subject to a Conditional Release for Restart. During the period of Conditional Release for Restart, work activities will be subjected to a surveillance program established and administered by the Project QA Department. An Unconditional Release for Restart will be issued contingent upon the Contractor's demonstration of the adequacy of all controls/procedures affecting the work.

Upon completion of the review associated with Phase I the designated team will then initiate Phase II of the review plan which will verify the adequacy of completed work. An action plan, schedule, team leaders, and team members are presently being identified.

TASK II/PHASE I

		Responsibility
I.	List the following types of safety significant work which was stopped as a result of SWO #9. A. Safety function - Quality Class I/Seismic Class I and Quality Class II/Seismic Class I.	Construction
II.	The initial prioritized list of contractor work activities to be reviewed will be provided. Subsequent lists will be added as needed.	Construction
III.	Identify and obtain resolution of contractors' concerns which could affect restart of safety significant work (e.g., NCR dispositions, approved drawings, procedure comment and resolution/approval). Meetings with the contractor, conducting-interviews and requesting written responses from the contractor by the Project organization will be utilized to identify contractors' concerns.	Construction
IV.	Evaluate contractors' current work and inspection controls to assure that quality controls are effective and adequate for the specific work activity being considered.	
	A. Procedures associated with the control of work being evaluated shall be listed and will be associated with the following applicable areas. . Material control, material receiving and traceability. . Work procedures . Inspection procedures . Document control . Design Change control . Special processes . NCRs, RFIs, CARs . Qualification/traing procedures	Contractor RP (Task Force II)
	B. Procedures will be reviewed for: . Proper approval authority status . Incorporation of applicable SAR, specification, code and standards requirement . Qualification of welding and special processes . A program to provide positive control of the work	RP (Task Force II)
	C. Review of personnel qualification and training programs shall include: . Qualifications for QA/QC, Engineering & supervisory personnel	RP (Task Force II)

		Responsibility
IV.	C. (continued)	
	• Qualifications of NDE personnel • Training programs for craft personnel • Qualification requirement of welders	RP (Task Force II)
	D. Documentation (Delete) (Documentation review will be accomplished under the scope of Task Force II, Phase II).	
	E. Deficiencies (IRs, RFIs, NCRs, QAFRs, CARs, 50.55(e)s, Part 21s and NRC findings) shall be analyzed to determine (if applicable): • Programatic failure of management controls • Recommended corrective actions • Resolutions required to support construction priorities	Contractor, Construction, RP (Task Force II)
	F. Sample Reinspection (Delete) (Reinspection of completed work will be accomplished under the scope of Task Force II, Phase II).	
V.	Evaluation of Restart Activities to Provide:	
	A. Identify area(s) where restart of work would preclude reinspection of previously installed work. If restart of work would not preclude reinspection of previously installed work, this condition shall be so documented.	Contractor, Construction
	B. Declarative statement attesting that Restart of work will have a minimal risk of quality problems.	Contractor, RP (Task Force II)
	C. Documented evaluation of the performance of the activities described in IV.	QA
VI.	The following information shall be compiled and provided to the independent review team, identified in VII below to assist in determining if work should be restarted: A. Results of the activities performed in IV. B. Results of the activities performed in V.	RP (Task Force II)

	Responsibility
VII. For the work activities identified from II above, an independent review shall be conducted to provide an objective evaluation of all safety significant work activities to be restarted. This review will continue until terminated by approval of the WNP-2 Project Manager and WNP-2 Program Director. The Independent Review Team will be comprised of senior management personnel not presently assigned to the WNP-2 Project. Prior to restart of work, the results of the independent review will be forwarded to the WNP-2 Program Director for his disposition. This review shall:	Independent Review Team
A. Determine that the assessment, "restart of work will have minimal risk of quality problems", has been adequately performed.	Independent Review Team
B. Determine that the assessment, "restart of work will not preclude reinspection of previously installed work which falls under the requirements of the reverification program (Phase II)", has been adequately performed.	
C. Determine that the evaluation performed in IV above did not identify any areas which were not in full compliance with the identified requirements. Where deficiencies were identified, appropriate restrictions will be imposed on the work activity.	
D. Determine that identified conditions which represent a generic problem with the overall management control system are corrected and verified as being adequate.	
VIII. Upon Conditional Release for Restart, QA surveillance will be conducted on the commodity activity. Project Quality Assurance will establish a Surveillance Plan and identify work hold points. The surveillance results will be documented on prepared check lists. These results will be analyzed to determine any necessary corrective actions to management controls, procedures or training. Unconditional Release for Restart will be contingent upon a demonstrated adequacy of the work controls and where identified, the implementation and verification of any corrective actions.	QA

ATTACHMENT II

215 ADDITIONAL ACTIONS

(1) Review selected work processes and simplify work procedures (Ref. 50.54(f) letter - Attachment 5)

- Hangers
- Small Bore

(2) Review and upgrade work planning:

- Ensure availability of approved procedures
- Ensure adequate training of all personnel
- Ensure availability of material in compliance with specifications
- Establish performance accountability
- Establish performance indicators and monitoring system
- Establish productivity measurement system

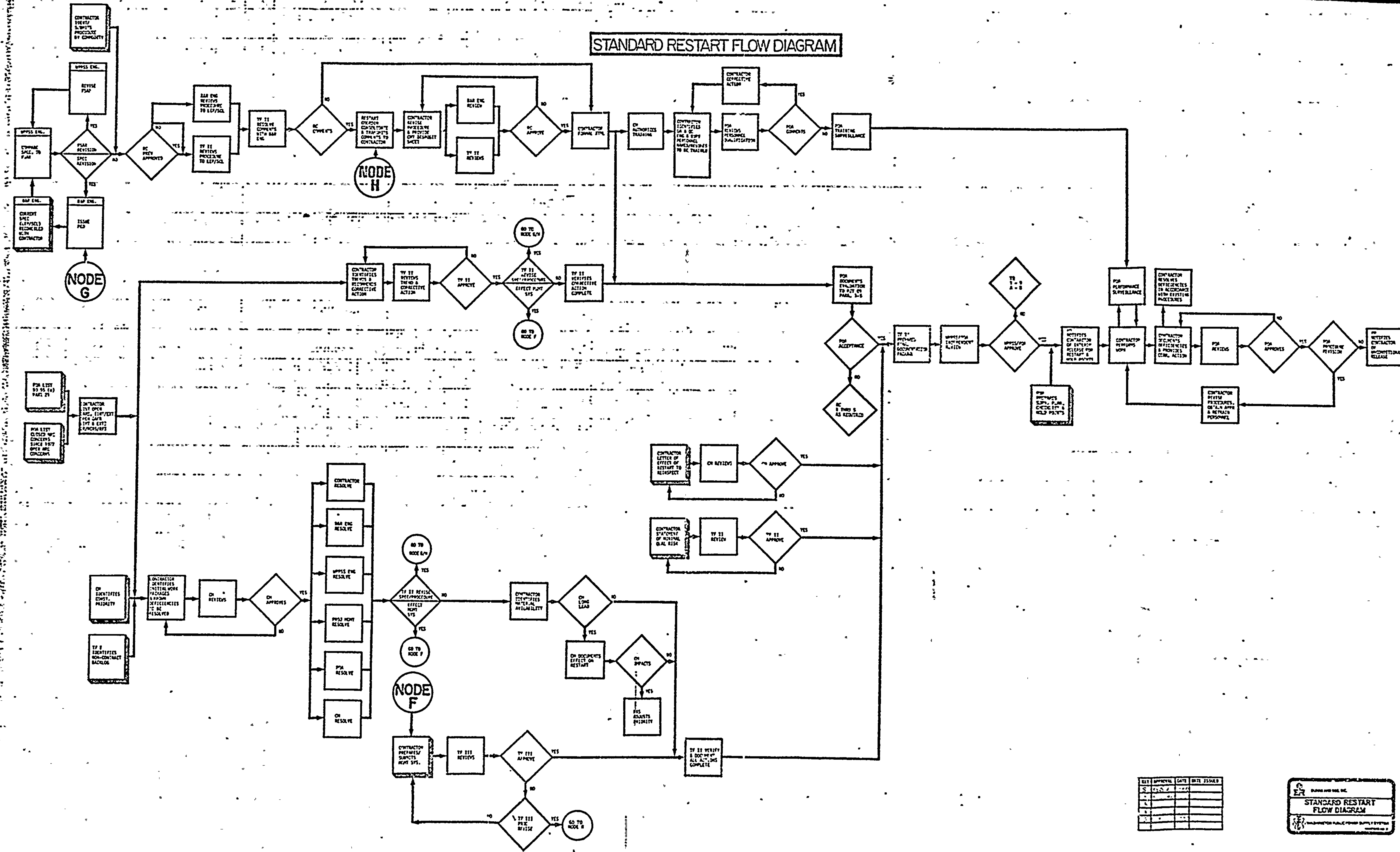
(3) Reduce backlogs and establish controls to provide timely resolution of the following:

- RFI's
- IR/NCR's
- CAR's
- Audit Findings
- Transmittals

(4) Review and upgrade the training program. Train personnel to new training program requirements before resumption of affected work.

(5) Secure release of Stop Work Directive from WNP-2 Program Director and NRC Region V.

STANDARD RESTART FLOW DIAGRAM



WPPSS	WASHINGTON PUBLIC POWER SUPPLY SYSTEM REVERIFICATION INSTRUCTION	NO. PJT-06 REV. NO. 2 EFFECTIVE DATE 1-16-81 QUALITY AFFECTING [X] YES [ ] NO

TITLE

REVIEW OF SAR REQUIREMENTS

1.0 PURPOSE

The purpose of this instruction is to delineate those responsibilities necessary to assure adequate review of SAR requirements to be included in contractors specifications.

2.0 DEFINITIONS

None

3.0 INSTRUCTION

Responsibility	Action
Reverification Program	1. Submits priority list of construction activities to Engineering.
Engineering	2. Receives list and if required adds additional activities that they have specific knowledge of.
	3. For each construction activity, reviews the latest amendment of the FSAR and the SCN LOG for approved commitments and fills out an "Activity/Commitment Checklist" (Attachment 5.2) and verifies the amendment number used on attachment 5.4. The commitment column must identify the requirements such that specification compliance can be evaluated. In general, the identification of a specific code/standard/guide with revision will be sufficient. Where a commitment is not to a code/standard/guide, the detailed commitment must be entered.

The "NOTE" refers to not confirming information within the SAR. The specifications were reviewed against the SAR design requirements.

NOTE: Commitments relative to design and/or test program are not a part of this review.

APPROVED	SUPERSEDES ISSUE: PJT-06 Rev. 1	PAGE 1 OF 7

WP-100

ATTACHMENT 2

4. Reviews each commitment against the latest specification as defined by the current List of Effective Pages (LEP) and Specification Control Log (SCL) identifies the dates of the LEP and SCL on attachment 5.4 . Determines compliance/ non-compliance. Prepares RFI/SCN in accordance with references 4.1 and 4.2 as appropriate for non-complying items. Fills out "Commitment Specification Checklist" (Attachment 5.3) and verifies the LEP and SCL used on attachment 5.4.

5. Submits completed forms attachments 5.2, 5.3 and 5.4 and copies of RFI's and SCN's to Engineering Review Coordinator.

Engineering Review Coordinator

6. After approval submits 1 (one) copy of all items in 5 above and any pertinent correspondence to Reverification Program Phase I Supervisor.

Reverification Program Supervisor/Team Leader

7. Reviews Comment Specification Checklist and other information submitted in 3.6 above evaluates effect on Procedure Review and Restart.

4.0 <u>REFERENCES</u>

4.1 B and R PI# WNP-2-012 Request for Information (RFI)

4.2 EDP-8.3 Review and Approval of SAR Amendments

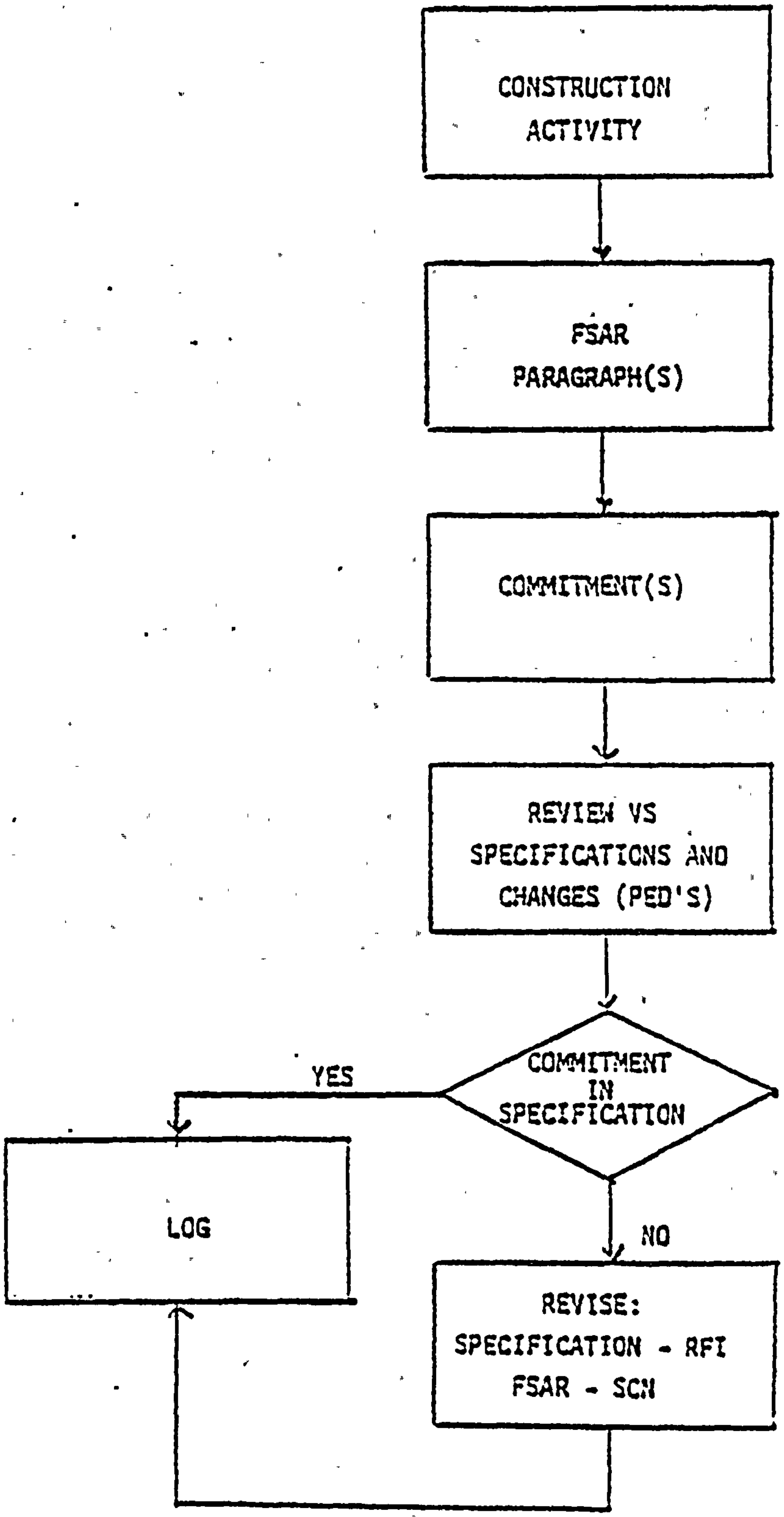
5.0 <u>ATTACHMENTS</u>

5.1 FSAR Review Flow Chart

5.2 Activity/Commitment Checklist

5.3 Commitment/Specification Checklist

5.4 FSAR/SPEC Review, Verification of Amendments and Revisions Used.


CONSTRUCTION ACTIVITY
FSAR PARAGRAPH(S)
COMMITMENT(S)
REVIEW VS SPECIFICATIONS AND CHANGES (PED'S)
COMMITMENT IN SPECIFICATION
YES
LOG
NO
REVISE: SPECIFICATION - RFI FSAR - SCN

ACTIVITY/COMMITMENT CHECKLIST

ACTIVITY	FSAR SECTION (S)	COMMITMENT (S)

REVIEWER ________

DATE ________

COMMITMENT/SPECIFICATION CHECKLIST

CONTRACT ______ PAGE ______

COMMITMENT	SPECIFICATION PARAGRAPH	COMPLIANCE YES	COMPLIANCE NO	RFI #/SCN #

REVIEWER ______

DATE ______

RESTART PROGRAM

FSAR/SPECIFICATION REVIEW

VERIFICATION OF AMENDMENTS AND REVISIONS USED

Amendment No. 11 of the WNP-2 FSAR was used for the Activity/ Commitment review.

The Commitment/Specification Review for Contract _____ included a check against the List of Effective Pages (LEP) dated __________ and a review of PED's listed in the Specification Control Log (SCL) dated ______________.

REVIEWER:__________________

DATED:_____________________

E-81-237

INTEROFFICE MEMORANDUM

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

Distribution:
- ☐ EDC WNP-1/4
- ☒ EDC WNP-2
- ☐ EDC WNP-3/5
- ☐ Admin File

WG Conn w/o
A Cygelman-904A
F. Damerval
OK Earle
RM Foley
AN Kugler
GT Harper-904A
RT Johnson-917B
AM Sastry-901A
MF Wiitala
sf(2) pf(1)
MFW/lb

Date: January 13, 1981

To: R. Grant, Reverification Program Phase 1 Supervisor

M Wiitala

From: M. F. Wiitala, Engineering Review Coordinator, WNP-2

Subject: RESTART OF SAFETY-RELATED WORK
FSAR/SPECIFICATION REVIEW
COMMODITY NO. 15, RHL PIPE (213A)

Reference:

In accordance with PJT-06, Rev. 1, attached are:

1. Activity/Commitment checklists, and
2. Commitment/Specification checklists
3. RFI's WP-614
4. SCN's 80-327, 328 & 340

for the subject commodity. The Activity/Commitment checklists are provided so that the commitments can be correlated to the Commitment/Specification checklists.

Where a checklist indicates that the specification is in compliance with the FSAR commitment, no further action is required. If the specification is not in compliance, then the RFI referenced shall be incorporated and procedures shall be reviewed to ensure compliance with the FSAR commitment. In those cases where the commitment is changed by the SCN referenced, the change shall be reviewed to determine its effect on the procedures. Any procedure affected shall not be released for construction until the SCN has been approved.

MFW:cd

APPENDIX E

APPENDIX E

NORMAL PLANT VERIFICATION ACTIVITIES

The purpose of this Appendix is to discuss the normal verification activities used to confirm the adequacy of:

- o Construction,
- o Functional performance of components, systems, and structures, and
- o Governing documents used to implement the plant operating enevelope.

The in-process design controls and design verification used to ensure an adequate design are discussed in Appendix A and further confirmed by the technical reviews addressed in Appendix B.

Due to the construction quality problems experienced earlier in the history of WNP-2, the Quality Verification Program (QVP) was implemented. This program, although not a normal construction activity, is discussed here because through the implementation of the QVP, the Quality Class (QC) I and/or Seismic Category (SC) I construction prior to July 1980 will be upgraded or confirmed to be acceptable. The ongoing quality controls are then used to maintain an adequate level of construction quality.

The discussions on Performance and Operating Envelope Verification are used to tie in the standard testing program and procedural controls and operating limits that bring the plant from the construction phase to commercial operation.

A. Construction Verification

1. Quality Verification Program

As the Restart Program activities were drawing to a close and prior to the time contractors were released to resume construction of safety-related work, BPC was engaged as the Construction Manager/ Systems-Completion Contractor. In planning for the evaluation of the adequacy of prior work accomplished by active site contractors, the Supply System integrated its reinspection activities with Bechtel's Systems-Completion Plan. Provisions were included in the normal verification process for reverification of work already completed and accepted.

The Quality Verification Program is designed to verify the adequacy of safety-related work completed prior to the July 1980 stop work. This program, which is described in detail in Attachment 1 of this Appendix, has three major elements:

- Systems Completion - which covers work performed by active site contractors,
- Prepurchase and Inactive Contracts - which covers long-lead hardware purchased by the Supply System, and work performed by site contracts that are already closed, and
- Special Tasks - which include:
  - Review of deficiency documents for proper disposition,
  - Analysis of personnel qualifications gathered from other reviews and reinspections, and
  - Receiving reinspections to determine the adequacy of past receiving programs.

The Quality Verification Program provides for a random, sample (minimum 10%) reinspection of hardware that has already been completed, inspected and accepted, and review of supporting quality documentation. Deficiencies identified in these reviews and reinspections are reported and corrected in accordance with approved project procedures. The completion of the review and reinspection activities of the QVP are coupled with the Systems-Completion Plan. As such, this program will function in parallel to construction completion on a system-by-system basis (system turnover). Attachment 2 identifies the individual system turnover dates projected at this time, and therefore includes the schedule for performance and completion of the Quality Verification Program.

Another consideration in establishing confidence in the quality of the work in-place is recognition of special investigation and rework programs. The existence of such programs is a positive indication that the hardware or work items have received adequate attention to design, function, quality, and performance. The Quality Verification Program takes credit, as appropriate, for these other reinspection activities and rework programs already performed or under way. A list of examples is provided below, with a brief statement describing the scope of each activity:

- Backfill Testing

  The failure of contractor documentation to fully support the in-place densities of soil backfill placement led to a special testing program developed by Burns and Roe. The results indicate that QC-I backfill is acceptable and no rework is necessary.

- Sacrifical Shield Wall Investigation and Repair

  Deficiencies identified in the welding, shielding, and material traceability of this structure, installed by the mechanical contractor, were extensively investigated by the Supply System and Burns and Roe. Inspections and tests were performed by independent personnel, and repair work was performed by the on-site contractor and Bechtel. Results are recorded in a complete engineering report.

- Rework of Pipe Whip Restraints

  A review of contractor records by Project QA revealed a number of deficiencies, which ultimately resulted in 100% NDE of the pipe whip restraints provided by a contractor. Corrective action to resolve the fabrication problems continues at this time; all PWRs are being remanufactured or repaired. Results of the investigation and evaluation are recorded in an engineering report.

- Control Room Cabling

  As a result of concerns, questions arose relative to cable separation in the control room. A sample inspection program to verify routing and separation of cables has been initiated by the electrical contractor. Bechtel QC and the Quality Verification Program are monitoring this work.

- Weld Radiograph Review

  In late 1981, a sample review of weld radiographs was conducted as a part of the reverification effort on the Project. The results indicated a need to re-examine all radiographs of ASME field welds completed by the mechanical contractor (approximately 2,500), which is in progress at this time and is regularly reported as part of the Quality Verification Program.

- o Work Smart

  This program was initiated in 1979 to resolve construction interference problems with large-bore pipe supports in the mechanical contract. The work was typically performed by a team composed of a contractor field engineer, a Burns and Roe pipe support stress analyst and draftsmen, and craftsmen. While originally designed as a time-saving action, this program resulted in less conflicts in the construction, less rework, and a higher quality installation.

- o Grout Testing

  All grouting under QC-I and SC-I equipment and hanger base plates is currently under review. A sampling program of micro-coring and testing has been developed by Burns and Roe to determine the quality of grout used throughout the Project. Another program for the orderly replacement of deficient grout is being developed at this time.

2. Ongoing Construction

The Restart Program should be viewed as providing a "fresh start" in the context of the basic program, procedures, etc., and the reduction of the backlog of unresolved problems. However, a number of additional actions were taken to assure effective follow-through on the implementation of the new program and prompt corrective action in response to new problems as they occur. In addition, a number of organizational and contract realignment changes were made to strengthen management control of the Project. The benefits from the Restart Program, in conjunction with the follow-up and ongoing activities discussed below, and the WNP-2 Quality Assurance Program (refer to Appendix C) ensure that the in-process construction will be acceptable.

a. Strengthen Project Management

Within the Supply System, the management of the construction projects was decentralized to provide stronger direction in the field. Each project now has a Program Director responsible for all design and construction activities at the site.

Bechtel Power Corporation (BPC), with extensive experience in the nuclear power industry, has been engaged as the Construction Manager and the Systems-Completion Contractor. Prior to this change, the Supply System and Burns and Roe shared the construction management responsibilities. As Construction Manager, BPC is responsible for the day-to-day management of the on-site contractors. In their role as Systems-Completion Contractor, BPC is responsible for construction completion of assigned areas or systems, and for turnover of all systems to the Supply System. BPC is also responsible for audit and surveillance of all site contractor QA programs and QA/QC activities

for their work as Systems-Completion Contractor. The WNP-2 Project QA organization is responsible for audit and surveillance of the BPC QA/QC Program, including monitoring the effectiveness of the BPC program of contractor audits and surveillances. In the fall of 1981, BPC was assigned the responsibility for construction completion of all the mechanical systems at WNP-2.

The role of Burns and Roe at the WNP-2 Project has been changed to provide undivided responsibility for engineering. The design activities, formerly conducted at the home office in New York, for the most part have been transferred to the Burns and Roe Richland office or to the site organizations. Technical authority for the mechanical, nuclear, electrical, and I&C disciplines resides in the Richland office. Further, the Richland office staff includes former Supply System engineers who are familiar with the technical issues, the requirements of the Project, and Supply System operations.

b. Control of the Engineering and Quality Program Backlog

A major emphasis of the Restart Program was the reduction of the backlog of unresolved engineering and quality problems. The Restart Program was highly successful in producing resolution of many of the outstanding problems, but in most cases the actual correction of the defects could not be performed until after restart of construction since they required craft work. To assure effective management of this process, tracking systems and processing goals were established which have proven very effective in maintaining control of backlog since the Restart Program. In addition, the resolution of reportable conditions (10CFR50.55(e) and 10CFR Part 21) is now scheduled and tracked on a priority basis throughout the Project.

c. Maintenance of Specifications and Procedures in Compliance with Licensing Requirements

Burns and Roe instructions include as a specific checklist item the review of each Project Engineering Directive (engineering directive to contractors) for conformance to the FSAR commitments. Changes to contractor procedures are reviewed by Bechtel and/or Burns and Roe to assure compliance with the specification. In addition, when completion of the mechanical work scope was assigned to Bechtel, an extensive review was performed to assure that earlier commitments made in response to NRC Inspection Items had been carried through into the Bechtel program. This review identified a number of actions which required follow-up by Bechtel and/or the Supply System to satisfy these commitments.

d. Improving the Timeliness and Control of Engineering Direction to the Field

Many of the activities initiated under the Restart Program associated with reduction of the non-contractor backlog have been continued and expanded to further improve the timeliness and control of engineering direction to the field. Examples are:

- A Burns and Roe Field Engineering group was established to provide quick engineering response to minor problems, interferences, etc. which occur during construction activities. These engineering resolutions are documented via the Field Resolution Project Engineering Directive (FRPED). The FRPED is checked by the appropriate discipline engineers (not in the field group) to assure the validity of the solution and potential impacts in other interfacing areas. This system has significantly reduced the response time for engineering answers to construction questions while preserving the integrity of the design control.

- In an effort to reduce the administrative processing time required to revise specification pages, the active construction specifications have been put in a word processor system. In addition, Burns and Roe has established a tracking system to expedite specification release packages through the site engineering groups to accelerate the issuance of the revised specification pages.

- The mechanical specification is being revised to consolidate QA requirements and clarify the technical requirements. This effort will ensure that technical requirements are more simply stated for the Systems Completion Contractor.

- Burns and Roe engineering, design, and drafting groups are completing an effort to significantly reduce the volume of drawing changes remaining to be incorporated. The volume of outstanding, authorized drawing changes (PEDs) has already been reduced by over 60%. The object of this activity is to reduce the volume to less than four weeks backlog of drawing changes. This will result in improved drawings for use in the field and will help minimize document control system errors.

- Burns and Roe has established internal methods and procedures for updating drawings which had been supplied by contractors and vendors whose contracts are now closed. These drawings will therefore be maintained current and assist in the control of design and construction.

- The Drawing Control Log (DCL) lists the Burns and Roe drawings which are issued for construction and authorized changes to those drawings which have not been incorporated. The use of the DCL is becoming more efficient because of the current program to incorporate FED changes into the drawings and thereby reduce the volume of "open" FEDs.

- To assure that documents requiring a Burns and Roe response (e.g., Request For Information, Startup Problem Report, transmittals, etc.) are answered in a more timely fashion, Burns and Roe Site Engineering has in operation a program which lists response required items by date. The Document Aging Report is also used by the engineering groups to keep an active track of items which require extensive research, and therefore time, or are awaiting information from an organization outside of Burns and Roe.

e. The Bechtel Systems-Completion Plan

The Systems-Completion Plan is a method used by Bechtel for completion of QC-I and QC-II/SC-I systems. Concurrent with the performance of new work to effect systems completion, the plan integrates provisions for resolution and correction of discrepancies in both hardware and documentation, as well as verification of a sample of previously completed and accepted safety-related work and accompanying documentation, which is discussed in the Quality Verification Program discussion. It is utilized by BPC and other site contractors working under Bechtel Construction Management (CM) in completing safety-related systems.

Bechtel verifies, using their total QA/QC Program and this plan, those portions of the systems to be completed by Bechtel directly. Portions of systems that are completed by other contractors working under Bechtel CM are verified by those contractors using their Supply System approved QA/QC programs and this plan. The site contractors are under surveillance inspection by Bechtel QC and auditing by Bechtel QA. These efforts are conducted under the Supply System's overall administration and direction. Figure 1 of this Appendix illustrates a flow diagram for the verification process.

It should be noted that BPC has successfully used similar plans in the completion stages of other nuclear power plant projects.

B. Performance Verification

1. Purpose

Performance Verification is the industry established and carefully structured process by which WNP-2 will be taken from completion of the construction phase to commercial operation. This verification of proper functional performance includes not only the plant systems, components, and structures, but also the plant operational procedures and personnel. The end result of the Performance Verification is the demonstration that the plant, staff and procedures meet governing regulatory requirements and are integrated to achieve safe and reliable operation.

Performance Verification is accomplished by testing in a time proven, logical sequence (refer to Figure 2 of this Appendix) which extends over a wide range of normal operating and transient events. Systems, structures, and components will be tested to ensure that functional design requirements are met.

2. Scope

The specific scope of Performance Verification includes testing to:

- o Ensure that the plant systems and components are designed and constructed to allow preoperational and power ascension testing,
- o Demonstrate the functional capability of structures, components, and systems to meet performance requirements,
- o Effect fuel loading in a safe manner,
- o Demonstrate that the plant adequately performs under normal operation and a wide range of abnormal/transient conditions,
- o Evaluate and demonstrate, to the extent possible, plant operating procedures to provide assurance that the operating plant staff is knowledgeable about the plant and procedures and is fully prepared to operate the facility in a safe manner, and
- o Bring the plant to rated capacity and sustained power operation.

3. Requirements

Performance Verification is modeled after and meets the same regulatory requirements as numerous, previous General Electric Boiling Water Reactor Test Programs. The plant will be tested and operated under the requirements of 10CFR50 and the WNP-2 Plant Technical Specifications. Following fuel load, WNP-2 will be operated in accordance with Chapter 13 of the FSAR "Conduct of Operations". Quality Assurance for Performance Verification activities will be in accordance with Appendix B of 10CFR50, ANS 3.2 "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear

Power Plants", and Chapter 17 of the FSAR "Quality Assurance". The personnel conducting Performance Verification will be qualified according to ANS 3.1 "Standard for Selection, Qualification and Training of Personnel for Nuclear Power Plants" and Regulatory Guide 1.8 "Personnel Selection and Training".

The test programs will be in accordance with the requirements of Regulatory Guide 1.68 "Preoperational and Initial Startup Test Programs for Water Cooled Power Reactors" and the General Electric BWR "Startup Test Specification". The individual tests are discussed in detail in Chapter 14 of the FSAR.

4. Method of Compliance

The management organization from the Corporate Managing Director down to the Plant Manager and the Test and Startup Manager is illustrated in Figures 3, 4, 5, and 6. A complete description of the organization, responsibilities, and personnel training program for the operating plant is provided in Chapter 13 of the FSAR.

The test programs are procedurally controlled by the Corporate level Test and Startup Program Manual for the system lineup and preoperational tests. The power ascension phase is implemented by the Plant Procedures Manual which contains 1400 to 1500 specific procedures.

It should be noted that Burns and Roe and General Electric, for their design responsibilities, review and concur with the acceptance criteria and test results from the system lineup and preoperational test programs. In addition, General Electric is intimately involved in all aspects of the power ascension test phase, through the use of the GE Startup Test Specifications and by review and concurrence with the test procedures, including acceptance criteria, and the test results. Further, prior to fuel load for the purposes of the NSSS scope, General Electric will perform their Operational Readiness Review.

a. System Lineup Tests

System lineup tests are the first group of tests after provisional acceptance of a system from the construction organization. These tests determine if the components which comprise a system function properly and, if not, identifies specific deficiencies for corrective action. In addition to generic tests to be used on all systems, there are also special tests to demonstrate specific functions.

Typical system lineup tests generally include, but are not limited to, the following:

o Chemical cleaning and flushing of systems, tanks, and vessels,

- Electrical equipment tests including energizing, checking grounds, relay checks, checking circuit breaker operation and controls, continuity checks, megger tests, phasing check, high potential measurements, and energizing of buses,

- Initial adjustment and bumping of motors,

- Checking control and interlock functions of instruments, relays, and control devices,

- Calibrating instruments and checking or setting initial trip setpoints,

- Pneumatic testing of instruments and service air systems and cleanout of lines,

- Checking and adjusting of relief and safety valves,

- Complete tests of safety-related, motor-operated valves including adjusting torque switches and limit switches, checking all interlocks and controls, measuring motor current and operating speed, and checking leak tightness of stem packing and valve seats during hydrotests,

- Complete tests of NSSS control systems including checking all interlocks and controls, adjusting limit switches, measuring operating speed, checking leak tightness of pnuematic operators, and checking for proper operation of controllers, pilot solenoids, etc., and

- Other tests and verifications such as component leak integrity and vibration.

Refer to Table 1 of this Appendix for a list of system lineup tests.

b. Preoperational Tests

Preoperational testing is the testing of entire systems after formal system turnover from construction has occurred. The system must have either no deficiencies or only minor deficiencies evaluated not to impact testing before turnover is completed. Preoperational testing ensures that the system operates properly and meets performance requirements in all respects, with the exception that heat transport systems cannot be tested for heat transfer capability.

Preoperational testing also demonstrates that the operating procedures are adequate to the extent they are reflected within the scope of these testing activities and gives operating personnel training time on operating systems.

The general objectives of preoperational tests are as follows:

- o Ensure that test acceptance criteria for system performance are met,
- o Provide documentation of the performance of safety-related equipment and systems,
- o Provide baseline test and operating data for future reference,
- o Run-in new equipment for a sufficient period so that design, manufacturing, or installation defects are found, and
- o To the extent possible, ensure proper integrated operation of plant systems.

Refer to Table 2 for a list of preoperational tests.

c. Power Ascension Tests

Power ascension testing begins after the preoperational test phase has been completed. The power ascension phase begins with fuel loading and extends to commercial operation. The tests (approximately 43) conducted during this phase consist of major plant transients, stability tests, and tests which demonstrate correct performance of the nuclear boiler and numerous plant systems while at power.

The power ascension tests are performed in a structured sequence starting with basic plant operating checks and building into more complex integrated plant performance testing as reactor power, and thereby temperatures, pressures, and flow rates are increased. During this testing phase, plant operating personnel will perform the testing, and plant operating procedures will be used for actions not covered directly by normal or special test procedures. The plant will be operated in accordance with the Technical Specifications during this test phase.

Table 3 lists the power ascension tests.

d. Technical Specifications

Upon receipt of the plant operating license, just prior to fuel load, the NRC issues the Technical Specifications which govern plant operation following that time.

Technical Specifications are Appendix "A" to each production facility operating license issued by the NRC. Basically, Technical Specifications are the NRC's requirements covering plant operating limits and surveillance testing to ensure that the plant is operated safely and within limits. Refer to Subsection C of this Appendix for additional details.

5. Conclusion

The Performance Verification activities comply with regulatory requirements, logical and time-proven industry startup experience, and Supply System Corporate policy. These activities will be completed by qualified personnel in accordance with Chapters 13, 14, and 17 of the FSAR, Corporate level and plant level procedure manuals, and the Technical Specifications.

Performance Verification, through the various testing phases, will ensure that WNP-2 will perform in accordance with the design and plant performance requirements during normal and abnormal operating conditions.

C. Operating Envelope Verification

1. Purpose

The purpose of the Operating Envelope Verification is to ensure that the operating envelope, as defined in the Technical Specifications and implemented by the Plant Procedures Manual, properly reflects the design, plant performance requirements, regulatory requirements, and industry experience.

2. Scope

Operating Envelope Verification in the context of this report includes:

- o The process used to establish the NRC approved Technical Specifications, which govern plant activities after fuel load, and
- o The process used to establish the plant procedures which implement the operational controls (Plant Procedures Manual).

It is to be noted here that the Technical Specifications and the Plant Procedures Manual also govern the power ascension testing phase of Performance Verification.

In addition, the implementation of the Operating Envelope activities requires the establishment of an operating organization with qualified personnel capable of supporting the operation of WNP-2. Though this issue is briefly discussed herein, this document is not intended to be used to address organizational readiness for operation.

3. Requirements

The basic requirements associated with the operating envelope are provided in 10CFR50.36 "Technical Specifications", NUREG-0123, and through licensing commitments documented in the FSAR. Requirements relative to the operating personnel and organizational structure are provided in regulatory guides, NUREGs, and ANSI/ANS standards.

The plant specific operating requirements are specified by the NRC in the operating license and the Technical Specifications for WNP-2.

4. Method of Compliance

a. Technical Specifications

A violation of a Technical Specification condition or limit is a reportable occurence to the NRC; thus, considerable attention is focused on the preparation, review, and approval of this document to assure it correctly reflects the plant design and performance requirements, the regulatory requirements, and our commitment to operate the plant in a safe and reliable manner.

The NRC uses a generic approach to establish Technical Specifications. This generic approach resulted in a standard document that is revised yearly (i.e., the Standard Technical Specifications (STS) for BWRs). Implementation of the STS on a given plant is described in Attachment 3 to this Appendix. The STS document for BWRs is NUREG-0123 and has been revised five times since first incorporated in the license of Brunwick No. 1 in September 1976. The STS has been refined considerably since 1976, but there still remain about 24 issues presently being discussed with the NRC by the BWR-5 Owner's Group (refer to examples in Attachment 4). WNP-2 personnel are actively involved in this group effort.

The WNP-2 plant specific Technical Specifications (marked up STS-Rev. 5) have been prepared in first draft and have been submitted to the NRC as described in Phase I in Attachment 3. General Electric and Burns and Roe are presently reviewing this first draft. Responsibility for preparation and processing of Technical Specifications rests with the plant Technical Staff, and the majority of the information in the first draft was assembled by plant technical personnel who are experienced in startup and surveillance testing of BWRs. In addition, association with other BWR-5s resulted in inclusion in the WNP-2 STS markup of information derived from their testing programs. The actual parameter values (instrument setpoints, flow rates, etc.) were taken from Burns and Roe and General Electric design documents and from the FSAR.

Review and approval of the STS markup within the Supply System is performed by WNP-2 Project Engineering, the WNP-2 Plant Technical Manager, and by the Safety Engineering Group Manager (refer to Attachment 5).

Phase II of the STS process should begin in about six months. At that time, comments form General Electric, Burns and Roe, NRC, the Supply System, other BWR-5s, etc., will be incorporated into the next draft (Draft No. 2). This draft will then undergo review and approval by the Plant Technical Manager, the Safety Engineering Group Manager, and the Systems Design Engineering group. This engineering group also performs the Requirements and Design Reverification. Subsequently, the NRC/Supply System resolution meetings will commence. Refer to Attachment 6.

Technical Specification examples (ECCS and Administrative Controls) and a copy of 10CFR50.36 are provided as Attachment 7.

There will be an overview of the Technical Specification preparation/review process by the Corporate Nuclear Safety Review Board.

b. Plant Procedures Manual

The Plant Procedures Manual contains the implementing procedures required by the Technical Specifications. The plant procedures are being developed and refined based on a number of inputs:

- o Procedures from operating BWRs,
- o Technical Specifications,
- o BWR Owners' Group on Emergency Response Guidelines,
- o System lineup tests,
- o Preoperational tests,
- o Power ascension tests,
- o FSAR,
- o Washington State Site Certification Agreement and Permit,
- o Design specifications,
- o Operating experience reports, and
- o Corporate policy, programs, and procedures.

The plant operating procedures are prepared and reviewed by experienced plant staff members. They are also reviewed by the Plant Operations Committee (POC) which consists of the following personnel:

- o Plant Manager,
- o Assistant Plant Manager,
- o Operations Manager,
- o Technical Manager,
- o Maintenance Manager,
- o Administrative Manager,
- o Plant QA Manager, and
- o Health Physics and Chemistry Manager.

Upon resolution of all review comments, a plant procedure is approved by the Plant Manager.

In addition, the functioning of POC is overviewed by the Corporate Nuclear Safety Review Board.

The Plant Procedures Manual consists of 14 volumes including the emergency and security plan implementing procedures as listed in Figure 7. These procedures are specific to the WNP-2 facility and are the required and approved methods for operating, monitoring, testing, maintaining, and modifying WNP-2 equipment, systems, and facilities in accordance with the Technical Specifications and other regulatory requirements. The emergency plan implementing procedures integrate operational aspects to the Site Emergency Plan.

c. Corporate Support Programs and Procedures

Programs and procedures generated by support organizations which are qualified for use at WNP-2 include welding procedures, ISI, operations Quality Assurance, procurement, security, environmental monitoring, and the Emergency Response Program. All safety affecting Corporate procedures used with the WNP-2 facility are approved by the WNP-2 Plant Operating Committee.

d. Organizational Structure and Operating Personnel

The organizational structure of the Supply System and the lines of responsibility for operation of WNP-2 are established in accordance with NRC requirements and guidelines and industry experience. In establishing the organizational structure the following were considered:

- o Regulatory Guide 1.8, "Personnel Selection and Training",
- o Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)",
- o NUREG-0731 (Draft), "Guidelines for Utility Management Structure and Technical Procedures",
- o NUREG/CR-1280, "Power Plant Staffing",
- o NUREG/CR-1656, "Utility Management and Technical Resources",
- o ANSI/ANS-3.1, "Standard for Qualification and Training of Personnel for Nuclear Power Plants",
- o ANSI/ANS-3.2, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants", and
- o INRO guidelines on organizational structure and responsibilities.

In addition, the qualifications, training, and experience for plant operations and support personnel comply with regulatory requirements, ANSI standards, INPO recommendations, and TMI lessons learned criteria. The plant training program and the qualification of key staff members and operations personnel are discussed in Chapter 13 of the FSAR. Specific responses to regulatory issues on qualifications and training are addressed in Appendix B of the FSAR.

Nuclear experience of the current WNP-2 plant technical and management staff exceeds 1100 man-years (refer to Figure 5). At full staffing, this number is expected to increase markedly (refer to Figure 8). In addition, plant craft personnel have in excess of 517 man-years of nuclear experience.

The manner in which the plant organization is structured will ensure that sufficient personnel depth, diversity, and capability exists to support the operation of WNP-2. The qualifications and experience of the operating staff, combined with the review process for the Plant Procesures Manual, will ensure that the plant operating procedures are adequate and will properly implement the Technical Specifications.

e. Independent Reviews

The Quality Assurance and Nuclear Safety Assurance organizations will perform a spectrum of review functions relative to the operating plant. The Nuclear Safety Assurance organization under the Safety and Security Directorate, provides for independent review of safety issues, plant procedures, test plans, safety performance, and plant changes, and coordinates/performs industry and WNP-2 operating experience evaluations. The industry experience review process is illustrated in Figure 9. The Nuclear Safety Assurance organization is discussed in FSAR Appendix B, item I.B.1.2 ("Independent Safety Engineering Group"), and Chapter 13 of the FSAR.

The Operational Quality Assurance organization, under the Quality Assurance Directorate, provides QA/QC services such as review of documents which affect plant safety, surveillance of plant activities, overview of the Inservice Inspection Program, and perform QC inspections. The Operational Quality Assurance organization and their responsibilities are described in the Supply System Operational Quality Assurance Program Topical Report.

A Plant Operating Review Committee and Corporate Nuclear Safety Review Board further serve as line management and Corporate surveillance of nuclear safety, respectively.

5. Conclusions

WNP-2 operations will comply with:

- o NRC, Federal, and State requirements,
- o Industry experience, and
- o Corporate policy.

The operation of WNP-2 will be performed and governed by:

- o NRC approved Technical Specifications,
- o FSAR requirements,
- o Approved plant procedures, and
- o Qualified, trained, and experienced personnel.

Plant procedures and operating staff are used in performing the power ascension testing programs. Thus, each is "verified" in conjunction with plant operations to assure that all are integrated, qualified, and provide for safe, reliable operation in accordance with the governing Technical Specifications.

SYSTEM LINEUP TESTING PROGRAM

Generic Tests on All Systems

ITG	Instrument and Control Test Guide
I1	Instrument Calibration
I2	Loop Checks
I3	Instrument Removal & Installation
VTG	Vibration Test Guide
V1	Vibration Data
V2	Machinery Vibration Signature
FPI1	Flushing Program Requirements
FPI2	Cleaning Procedure Preparation
FPI3	Cleaning Procedure Implementation

ETG	Electrical Test Guide
E1	Circuit Test Record (non-rotating equipment)
E2	Motor and Control Test Record
E3	Motor Operated Valves
E4	Crane Motor and Control Test
EDS-1 thru EDS-31	(Electrical Data Sheets)
M1	Pump Test Record
M2	Fan Test Record
M3	Compressor Test Record
M4	Air-Operated Valves
M5	Safety and Relief Valve Operational Readiness Test
M6	Loose Locking Nut on Limitorque Valve Operators

Special Tests

- Total approximately 60 tests
- Examples:

a. S13.0-1 CRD Scram Discharge Volume Verification
b. S58.0-2 Special Performance Test of WNP-2 Ultimate Heat Sink (UHS)
c. S1.0-1 RPV Code Hydro Test Pressurization Procedure

TABLE 1

PREOPERATIONAL TEST PROGRAM

1. NUCLEAR BOILER
2. REACTOR RECIRCULATION
3. REACTOR WATER CLEANUP
4. REMOTE SHUTDOWN
5. REACTOR CORE ISOLATION COOLING
6. HIGH PRESSURE CORE SPRAY-MECHANICAL
7. HIGH PRESSURE CORE SPRAY-STANDBY ELECTRICAL
8. HPCS 125 DIVISION 3 BATTERY
9. LOW PRESSURE CORE SPRAY
10. RESIDUAL HEAT REMOVAL
11. STANDBY LIQUID CONTROL
12. CLOSED COOLING WATER
13. CONTROL ROD DRIVE-HYDRAULIC
14. CONTROL ROD DRIVE-MANUAL CONTROL
15. PROCESS COMPUTER
16. REACTOR PROTECTION
17. NEUTRON MONITORING
18. TRAVERSING IN-CORE PROBE
19. ROD WORTH MINIMIZER
20. ROD SEQUENCE CONTROL
21. LEAK DETECTION
22. FUEL HANDLING & VESSEL SERVICING EQUIPMENT
23. CRD INSTALLATION EQUIPMENT (CRD-IE)
24. PRIMARY CONTAINMENT ATMOSPHERIC CONTROL
25. PRIMARY CONTAINMENT COOLING
26. PRIMARY CONTAINMENT INSTRUMENT AIR
27. PRIMARY CONTAINMENT ATMOSPHERIC MONITORING
28. LIQUID WASTE PROCESSING
29. CHEMICAL WASTE PROCESSING
30. SOLID WASTE PROCESSING
31. RADIOACTIVE DRAINS & SUMPS
32. PROCESS RADIATION MONITORING
33. AREA RADIATION MONITORING
34. ENVIRONS MONITORING
35. FUEL POOL COOLING & CLEANUP
36. STANDBY GAS TREATMENT
37. OFF-GAS
38. 500/25KV DISTRIBUTION
39. LOW VOLTAGE DISTRIBUTION
40. INSTRUMENT POWER
41. EMERGENCY LIGHTING
42. STANDBY AC POWER SYSTEM
43. STANDBY AC POWER SYSTEMS DIVISION 2
44. MAIN TURBINE SYSTEMS
45. 250V DC DISTRIBUTION
46. 125V DC DISTRIBUTION
47. 125V DC DISTRIBUTION
48. 125V DC DISTRIBUTION
49. 24V DC DISTRIBUTION
50. EXCITATION & VOLTAGE REGULATION
51. GENERATOR HYDROGEN COOLING

TABLE 2

52. GENERATOR HYDROGEN SEAL OIL
53. GENERATOR HYDROGEN STORAGE & SUPPLY
54. GENERATOR STATOR COOLING
55. ISOLATED PHASE BUS DUCT COOLING
56. TOWER MAKEUP
57. CIRCULATING WATER
58. PLANT SERVICE WATER
59. STANDBY SERVICE WATER
60. MAKEUP WATER TREATMENT
61. DEMINERALIZED WATER STORAGE & TRANSFER
62. POTABLE HOT & COLD WATER
63. FIRE PROTECTION
64. MAIN STEAM LINE ISOLATION VALVE LEAKAGE CONTROL
65. MAIN STEAM
66. SEALING STEAM
67. CONDENSER AIR REMOVAL
68. AUXILIARY STEAM
69. CONDENSATE
70. CONDENSATE STORAGE & TRANSFER
71. CONDENSATE FILTER DEMINERALIZER
72. REACTOR FEEDWATER
73. REACTOR FEEDWATER CONTROLS
74. HEATER VENTS & DRAINS
75. TURBINE OIL PURIFICATION & TRANSFER
76. NON-RADIOACTIVE DRAINS & SUMPS
77. CONTROL & SERVICE AIR
78. PLANT COMMUNICATION
79. REACTOR BUILDING HVAC
80. REACTOR BUILDING EMERGENCY EQUIPMENT COOLING
81. TURBINE BUILDING H&V
82. CONTROL, CABLE & CRITICAL SWITCHGEAR ROOMS HVAC
83. RADWASTE BUILDING H&V
84. STANDBY SERVICE WATER PUMPHOUSE H&V
85. DIESEL GENERATOR BUILDING H&V
86. SERVICE BUILDING H&V
87. OFF-GAS VAULT HVAC
88. SEISMIC MONITORING
89. CIRCULATING WATER PUMPHOUSE H&V
90. MAKEUP WATER PUMPHOUSE H&V
91. COOLING TOWER ELECTRICAL BUILDING H&V
92. METEROLOGICAL SYSTEM
93. TDAS
94. SECURITY SYSTEM POWER DISTRIBUTION
95. SECURITY SYSTEM
96. CATHODIC PROTECTION
97. PROCESS SAMPLING
98. CRANES & HOISTS
99. REACTOR BUILDING CRANES
100. PRIMARY CONTAINMENT INTEGRATED LEAK RATE TEST
101. SECONDARY CONTAINMENT INTEGRATED LEAK RATE TEST
102. LOSS OF POWER & SAFETY TESTING
103. RADIOACTIVE WASTE PROCESSING CONTROLLER

SPECIAL TESTS: BASELINE DATA FOR THE FOLLOWING:

1) INSERVICE INSPECTION OF REACTOR VESSEL
2) INSERVICE INSPECTION OF PUMPS AND VALVES (IWP & IWV)

TABLE 2 (cont.)

POWER ASCENSION TEST PROGRAM

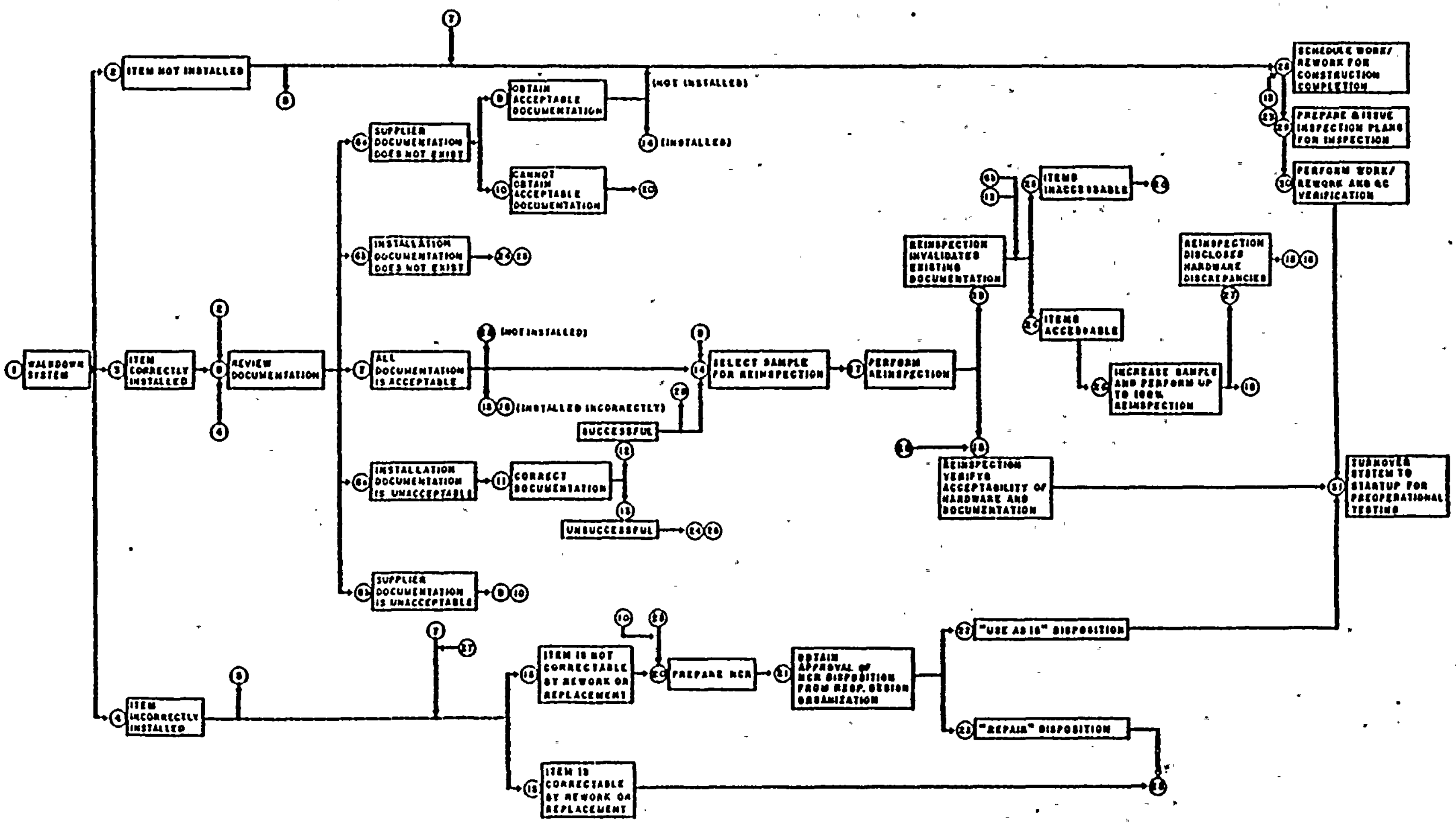
STI No.	Test Name
1	Chemical & Radiochemical
2	Radiation Measurements
3	Fuel Loading
4	Full Core Shutdown Margin
5	CRD
6	SRM Perf. & Control Rod Sequence
8	Rod Sequence Exchange
9	Water Level Measurements
10	IRM Performance
11	LPRM Calibration
12	APRM Calibration
13	Process Computer
14	RCIC
16	Selected Process Temperatures
17	System Expansion
18	Core Power Distribution
19	Core Performance
20	Electrical Output and Heat Rate
21	Core Power-Void Mode Response
22	Pressure Regulator: Setpoint Change Backup Regulator
23	FW System: FW Pump Trip Water Level Setpoint Change Heat Loss
24	Turbine Valve Surveillance
25	MSIVs: Each Valve One Valve Full Isolation
26	Relief Valves: Flow Demonstration
27	Turbine Stop Valve Trip & Generator Load Reflection
28	Shutdown from Outside Control Room
29	Recirculation Flow Control System
30	Recirculation System: Trip One Pump Trip Two Pumps System Performance Non-Cavit. Verification
31	Loss of T-G Offsite Power
33	Drywell Piping Vibration
34	RPV Internals Vibration
35	Recirc. System Flow Calibration
36	Isolated Reactor Stability
70	Reactor Water Cleanup System
71	Residual Heat Removal System
72	Drywell Atmosphere Cooling
73	Cooling Water System
74	Off Gas System

SPECIAL TESTS

- Moderator Temperature Coefficient Measurement
- In-Plant Safety-Relief Valve Load Test
- Ultimate Heat Sink Test
- Sacrificial Shield Verification Tests
- Loose Parts Monitoring Baseline

TABLE 3

VERIFICATION PROCESS



NOTE
DISCREPANCIES IDENTIFIED AS A RESULT OF THE FOLLOWING ACTIVITIES WILL BE ENTERED ON THE MASTER WORK LIST:
6, 7, 8, 17, 26 & 35

Figure 1

TEST AND STARTUP PROC GENERAL OUTLINE

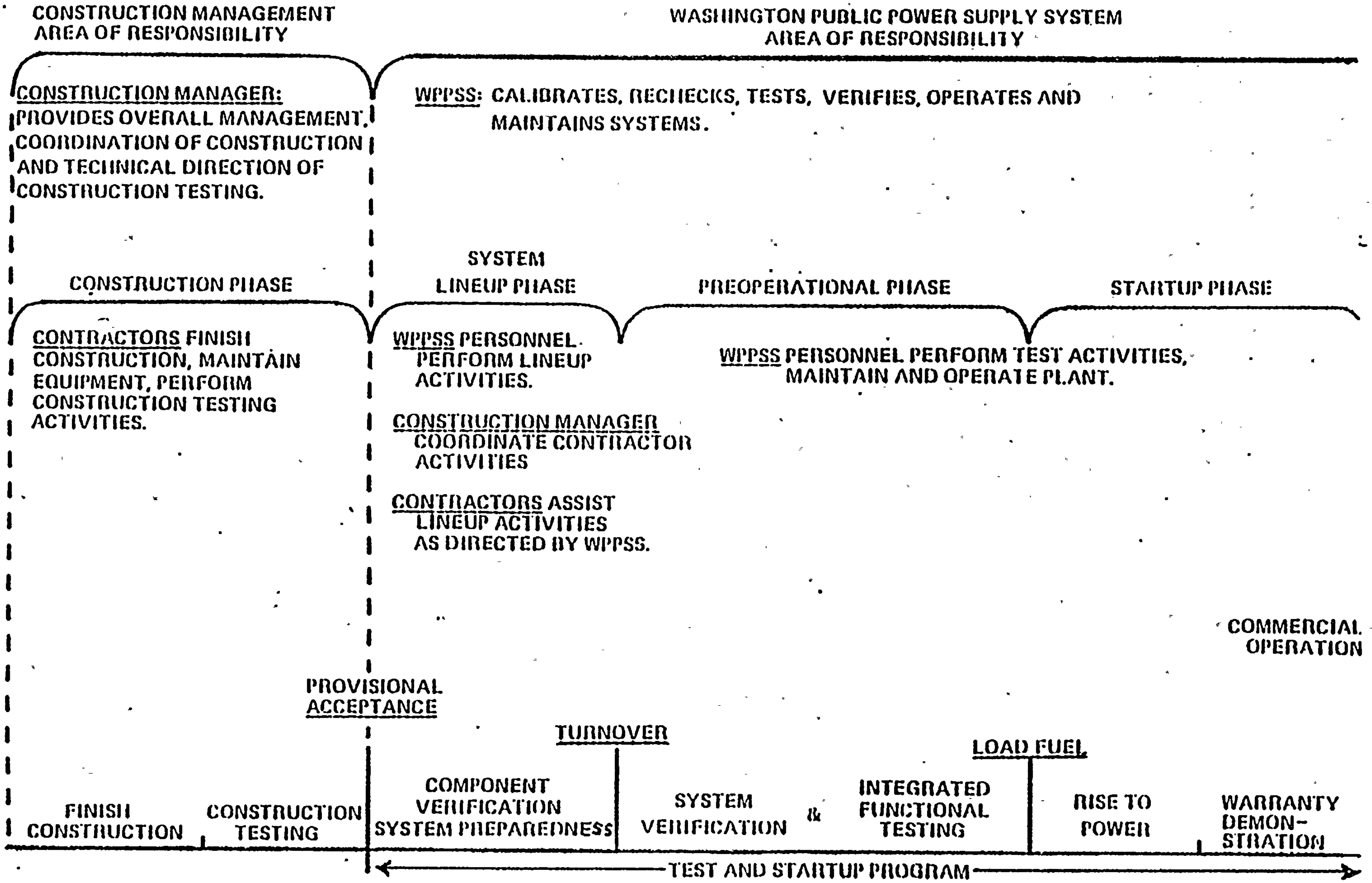


Figure 2

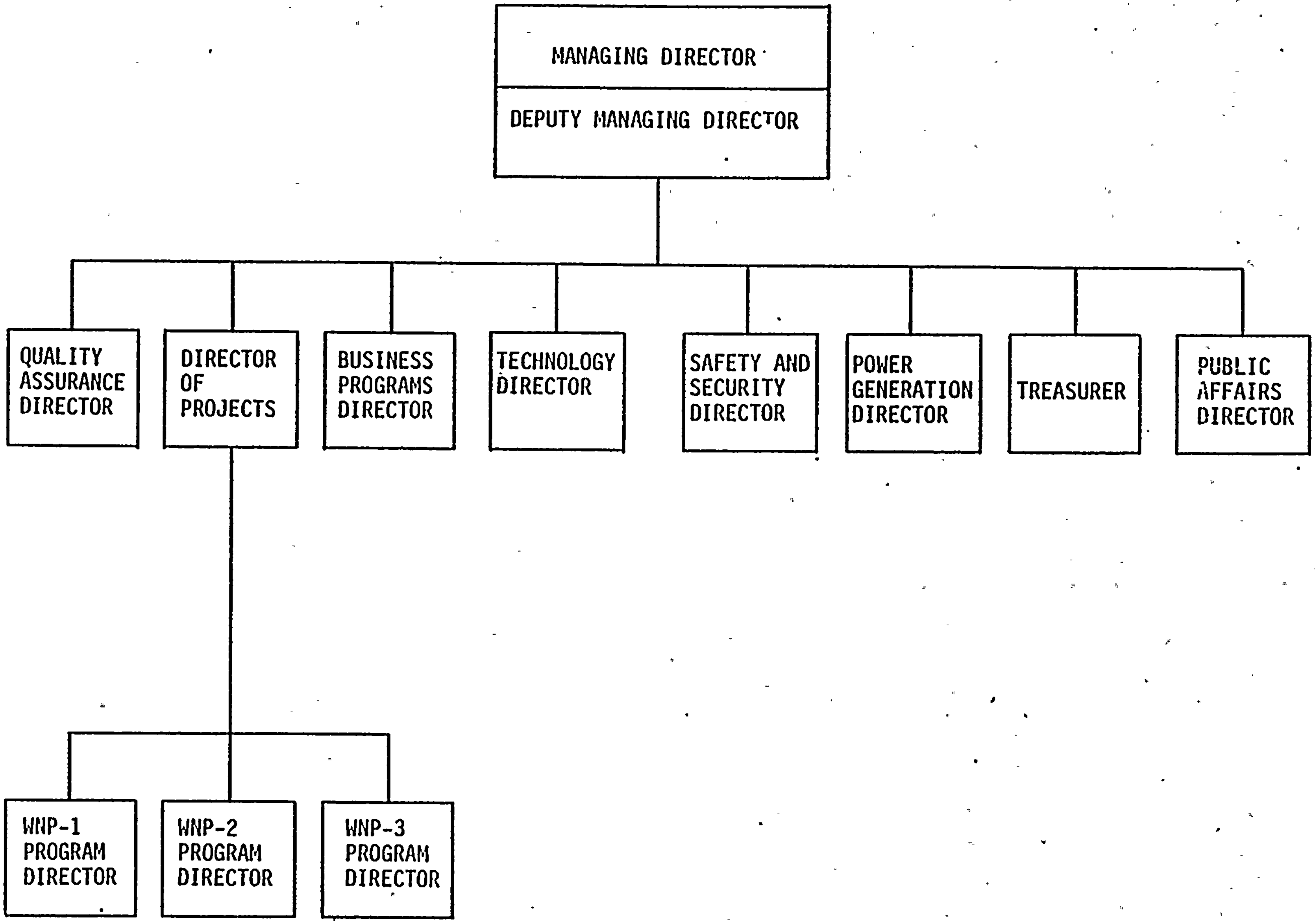
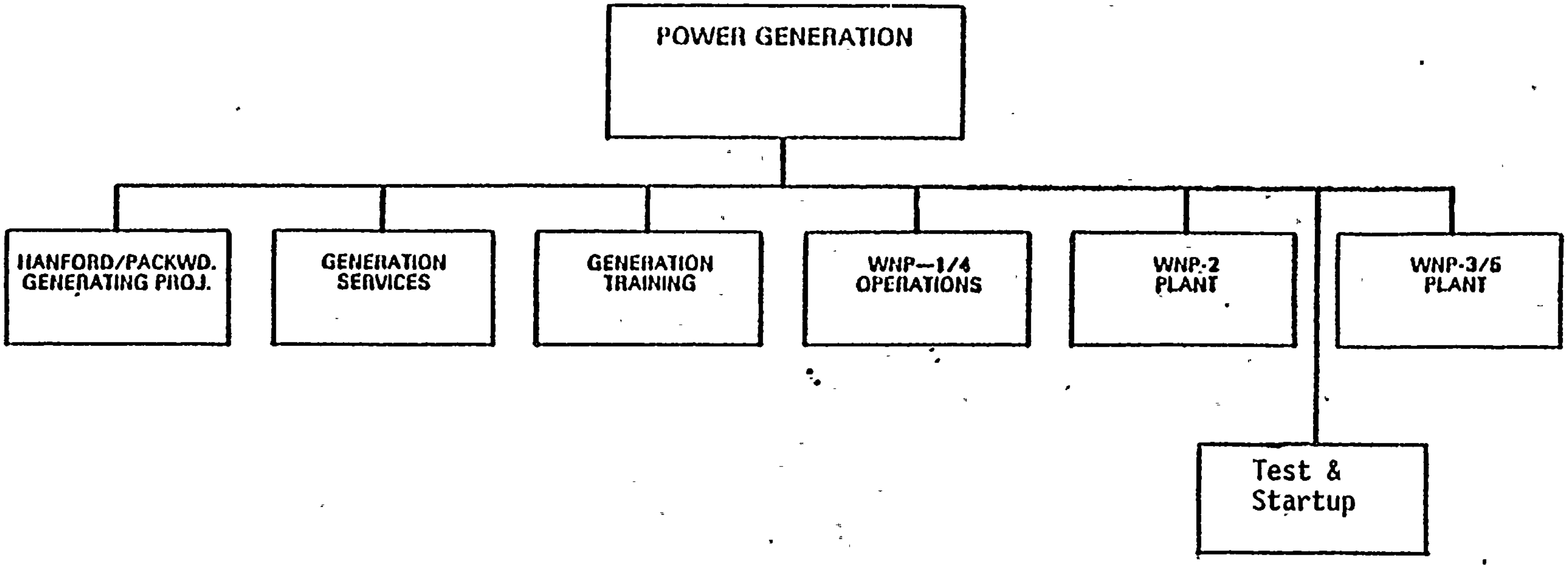

MANAGING DIRECTOR
DEPUTY MANAGING DIRECTOR
QUALITY ASSURANCE DIRECTOR
DIRECTOR OF PROJECTS
BUSINESS PROGRAMS DIRECTOR
TECHNOLOGY DIRECTOR
SAFETY AND SECURITY DIRECTOR
POWER GENERATION DIRECTOR
TREASURER
PUBLIC AFFAIRS DIRECTOR
WNP-1 PROGRAM DIRECTOR
WNP-2 PROGRAM DIRECTOR
WNP-3 PROGRAM DIRECTOR

Figure 3

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



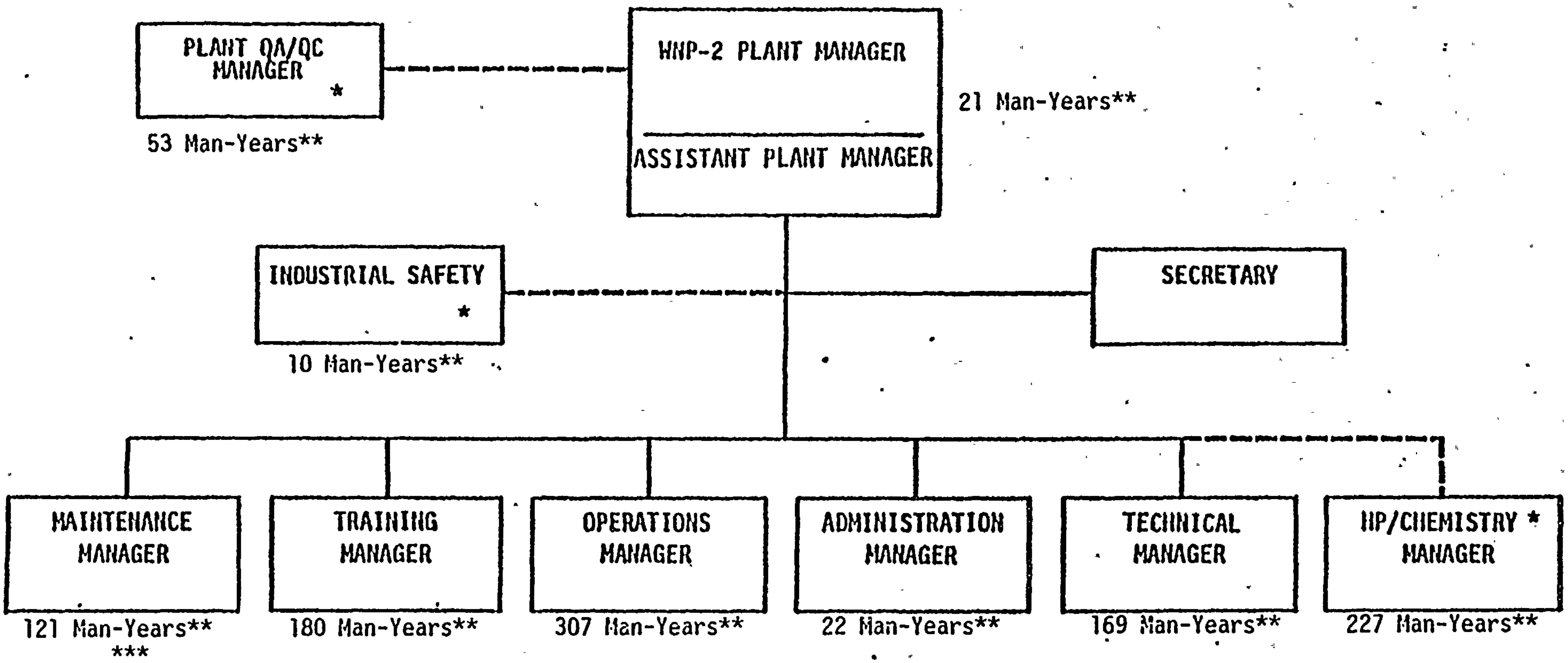
APPROVAL ____________ 10-13-81
ACTING DIRECTOR, POWER GENERATION — DATE

APPROVAL ____________ 10.14.81
DEPUTY MANAGING DIRECTOR — DATE

CONCURRENCE ____________ 10-14-81
COMPENSATION/ORG PLANNING — DATE

Figure 4

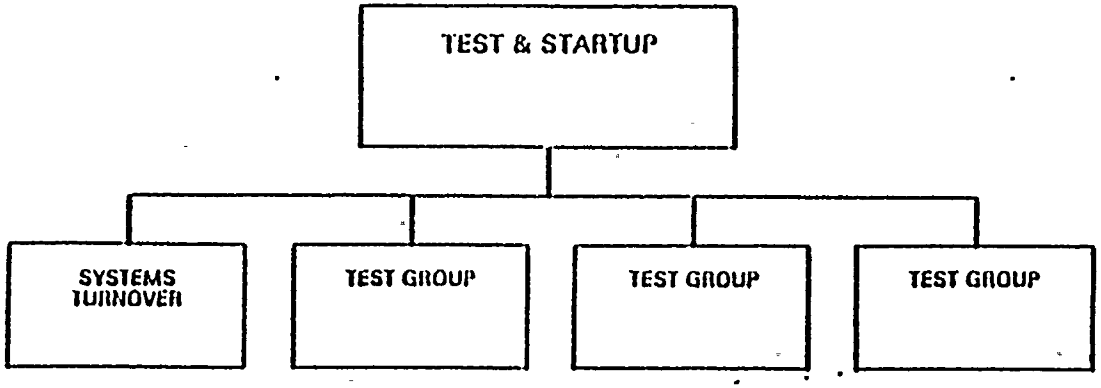
WNP-[illegible] PLANT



*** MATRIXED**
** Nuclear Experience (1110 Total)
*** Craft Experience of 517 Man-Years

FIGURE 5

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



APPROVAL ______________ 11-10-81
MANAGER, TEST & STARTUP — DATE

APPROVAL ______________ 11/10/81
DEPUTY PROGM DIR, STARTUP & OPRS — DATE

CONCURRENCE ______________ 11-10-81
COMPENSATION ORG PLANNING — DATE

FIGURE 6

PLANT PROCEDURES MANUAL

VOLUME	TITLE	CURRENTLY REQUIRED
1	ADMINISTRATIVE PROCEDURES	65
2	SYSTEM OPERATING PROCEDURES	70
3	GENERAL OPERATING PROCEDURES	9
4	ABNORMAL CONDITION PROCEDURES	192
5	EMERGENCY OPERATING PROCEDURES	14
6	FUEL HANDLING AND REFUELING	19
7	SURVEILLANCE PROCEDURES	135
8	OPERATING AND ENGINEERING TESTS	48
9	NUCLEAR PERFORMANCE EVALUATION	27
10	MAINTENANCE PROCEDURES	251
11	HEALTH PHYSICS PROCEDURES	115
12	CHEMISTRY PROCEDURES	337
13	EMERGENCY PLAN IMPLEMENTING PROCEDURES	96
14	SECURITY PLAN IMPLEMENTING PROCEDURES	35
	TOTAL APPROXIMATELY	~1400

FIGURE 7.

WNP-2 PLANT OPERATIONS STAFFING

		Manning at WNP-2 Fuel Load
Plant Management		3
Operations		71
Includes:	Supervision	3
	Shift Managers	6
	CR Supervisors	6
	Shift Support Supervisors	6
	Reactor Operators	12
	Equipment Operators	38
Maintenance		65
Includes:	Supervision	5
	Electricians	10
	I&C Technicians	20
	Mechanics	30
Technical		28
Includes:	Supervision	3
	Plant Engineering	12
	Reactor Engineering	13
HP/Chemistry		30
Includes:	Supervision	4
	Technicians	26
Administration		22
Training		11
		230

FIGURE 8

INDUSTRIAL EXPERIENCE REVIEW

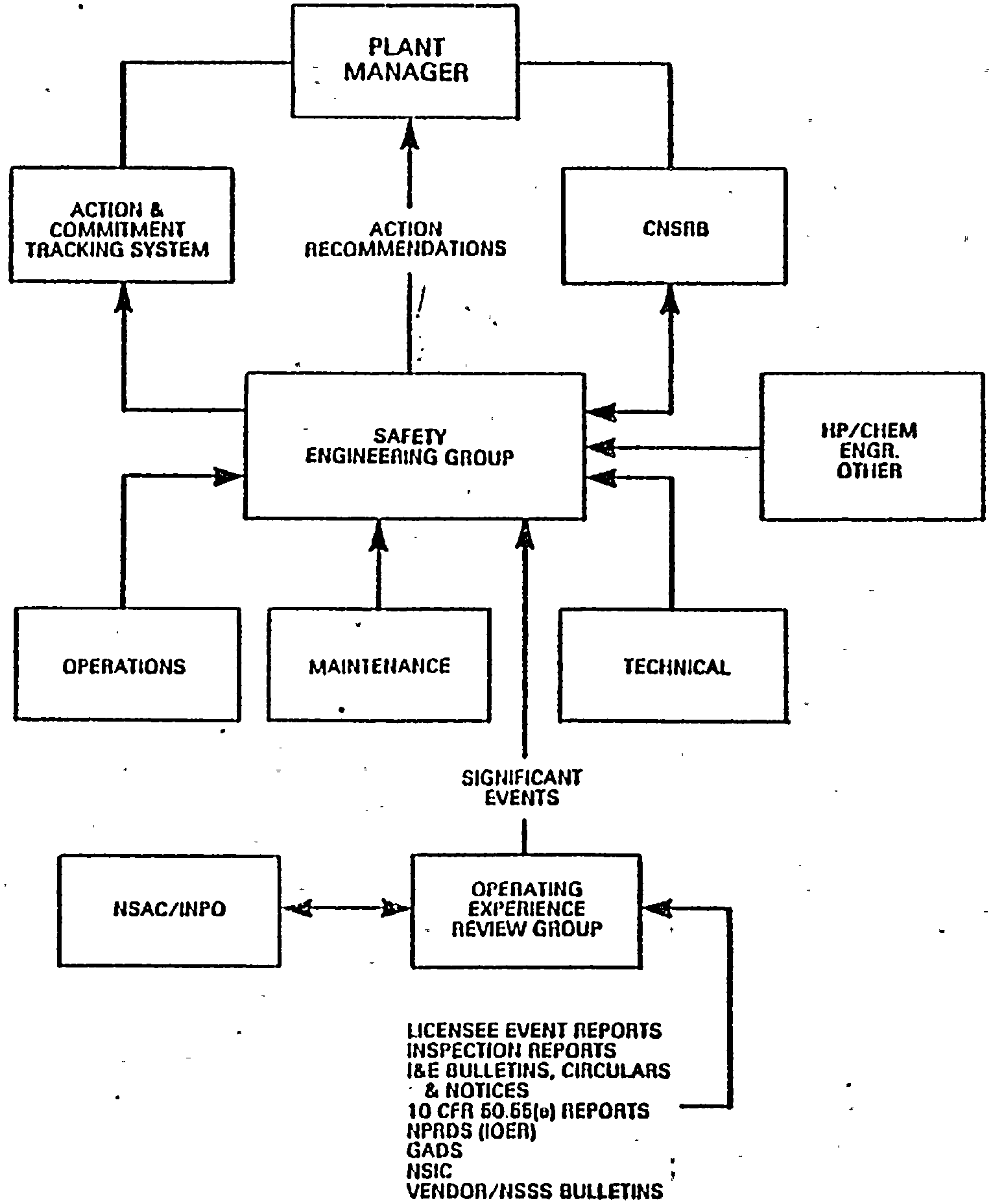


FIGURE 9

ATTACHMENT 1

WNP-2 PROJECT

QUALITY

VERIFICATION

PROGRAM

JUNE, 1981

REV. 1, DECEMBER 1981

WASHINGTON PUBLIC POWER
SUPPLY SYSTEM

MANAGEMENT STATEMENT

QUALITY VERIFICATION PROGRAM

The Special Projects Department (formerly Systems Turnover Group) has consolidated the activities resulting from Supply System commitments in letter G02-80-153, dated July 17, 1980. Most of these activities have been accomplished prior to restart of the construction contractors, with the exception of verification of documentation and hardware completed before July 1980. The plans for this work, the Quality Verification Program, are now ready and the activities are scheduled to begin.

The guidelines in the RCSW manual, Volumes I and II, governed the work of the Restart Program and other activities. Volume III has been created to provide instructions for implementing the Quality Verification Program, and is being issued at this time. Volume I, containing internal administrative information for the Special Projects Department, is being revised to accommodate the program.

The Manager Construction Department, is hereby delegated the authority to develop, approve, and publish instructions to meet his goals and objectives in this program. Concurrence must be obtained from all affected project organizations, including Project QA on quality related instructions, prior to publication. All project personnel are directed to implement this program by ensuring that Quality Verification Program objectives and activities are integrated with the remaining work of the WNP-2 Project. Individual responsiveness and personal commitments are necessary for the successful completion of this program and this plant.

Revision 1, December 4 , 1981

The first two paragraphs of this statement are historically correct. The third paragraph is revised to reflect the organizational changes accomplished since the original document was published.

R. G. Matlock
Program Director, WNP-2

WNP-2 PROJECT - QUALITY VERIFICATION PROGRAM

TABLE OF CONTENTS

TABLE OF CONTENTS

(continued)

LIST OF FIGURES

ATTACHMENTS

WNP-2 PROJECT

QUALITY VERIFICATION PROGRAM

June, 1981

1.0 INTRODUCTION

The Supply System has re-examined its original response to the NRC's 50.54(f) letter of June 17, 1980, to determine the effect of recent changes at the WNP-2 Project, such as, the transition from bulk construction to systems-completion construction and the engagement of Bechtel Power Corporation to be the system-completion contractor and construction manager. Also, as the Restart Program nears completion and results of reviews and actions arising from information acquired in that program become available, a reassessment of plans for verifying the quality of past work has been accomplished. While the original objectives and policies stated in the Supply System's response remain unchanged, the planning of verification activities has evolved. This program description outlines the resulting plan for verifying that the quality of work already in place at the WNP-2 Plant is acceptable.

To accomplish the work of this Program, procedures or instructions will be prepared and implemented by the WNP-2 Project. In the execution of the work, other inspections and evaluations will be appropriately considered for guidance to areas requiring attention, or for satisfying the program objectives. The scope of this program does not include the work of contractors and suppliers whose quality assurance programs have been reviewed by the NRC.

The Supply System has identified three major activities to be covered in its Quality Verification Program:

1.1 Systems Completion

The WNP-2 Plant has been scoped into approximately 100 startup systems/facilities for the purpose of conducting an orderly turnover of systems to the Test and Startup Department. These systems have been prioritized for turnover to Startup to support the Project schedule [1].

The primary goal of the systems completion effort is to complete construction by startup system. Verification review of documentation and reinspection of safety-related hardware within these systems have been integrated with the Systems Completion Program. Since these investigations and the resolution of any discrepancies found are a part of the construction completion, this work, including verification, has been assigned to Bechtel in its role as systems-completion contractor and construction manager. However, the Supply System retains the ultimate review, approval, and disposition responsibility.

1) As of July 1, 1981, three Startup Systems have been turned over to Test and Startup and the Supply System will be responsible for verification of these systems. All other systems and facilities will be turned over to the Supply System by Bechtel in accordance with the System Completion Program.

1.2 Prepurchase and Inactive Site Contracts

Documentation for safety-related hardware will be reviewed and an evaluation made of the need to perform sample hardware reinspection on a contract by contract basis. Verification on these contracts does not lend itself to systems-orientation, but will be coordinated to make information available in support of the systems completion schedule. This work will be performed by the Supply System, with some reinspection activities assigned to Bechtel. The Supply System will review and report the results.

1.3 Special Tasks

Three special areas have been identified for verification which do not lend themselves to systems-orientation and do not involve activities in Section 1.2. These include:

- Evaluation of personnel qualifications, which will be accomplished by the Supply System, but will include reviews by Bechtel.
- Deficiency document review, which will be performed by the Supply System.
- Receiving inspection, which will be performed by Bechtel, and reviewed and approved by the Supply System.

These tasks will be coordinated with the systems completion effort.

2.0 ORGANIZATION

2.1 Functions

The activities to be accomplished in this program are more fully described in Sections 3 through 5 below. The activities are outlined in Figures 2-1, and a Quality Verification Program Flow Diagram is shown in Figure 2-2.

2.2 Functional Responsibility

An organization chart is shown in Figure 2-3. The chart delineates overall functional responsibility for basic activities in the Quality Verification Program. An example of specially-assigned tasks for Bechtel's area of performance may include such documentation reviews and/or hardware reinspections that would normally be accomplished in an inactive contract or pre-purchase contract review, but are required at a specific time to support systems completion.

3.0 SYSTEMS COMPLETION REVIEWS

Safety-related items within a startup system are identified on equipment lists prepared for systems completion. Scoping drawings are used to establish the boundaries of each system, and after transfer of a system, a walkdown is performed. This process is described in the

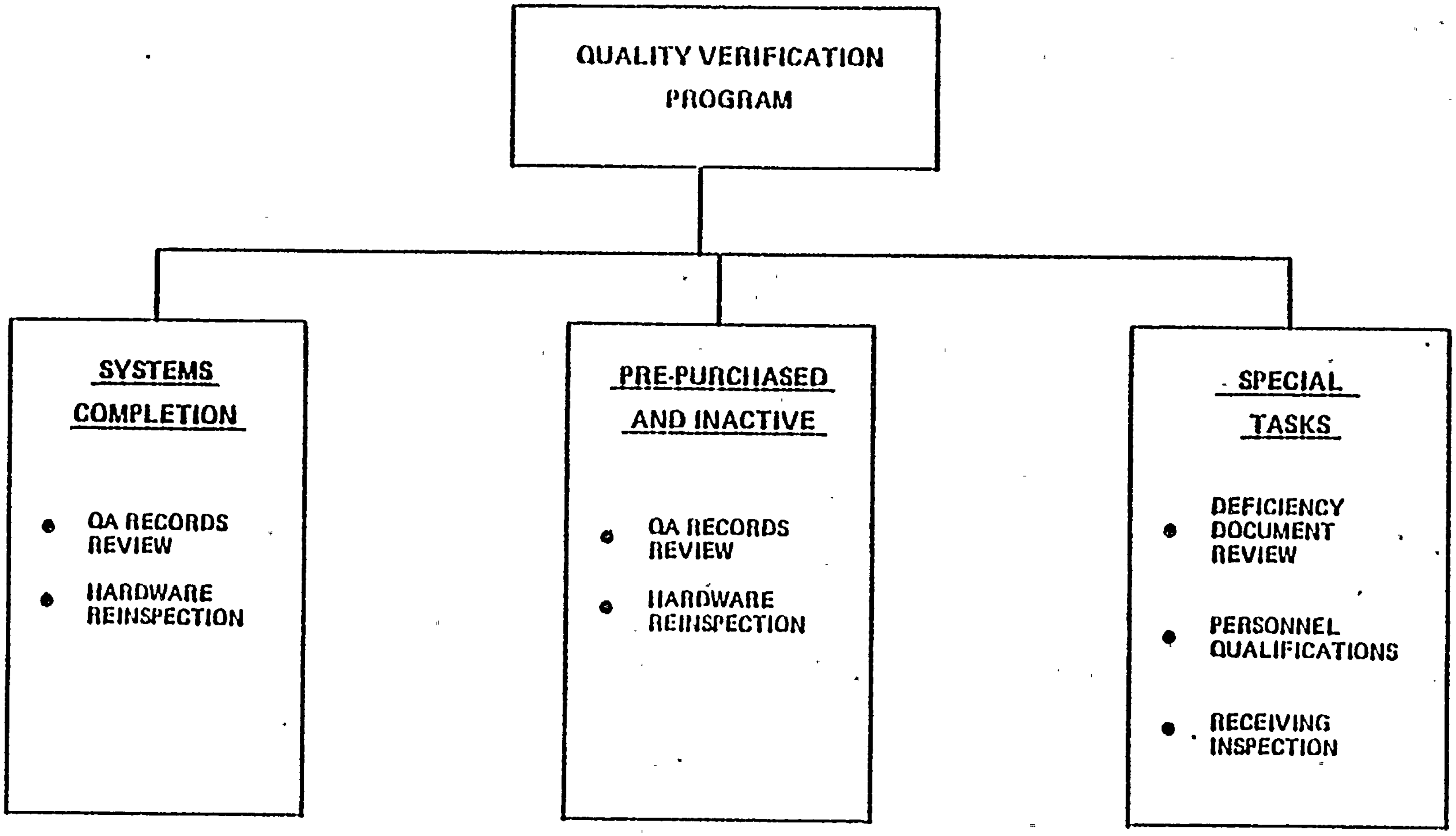

QUALITY VERIFICATION PROGRAM
SYSTEMS COMPLETION
QA RECORDS REVIEW
HARDWARE REINSPECTION
PRE-PURCHASED AND INACTIVE
QA RECORDS REVIEW
HARDWARE REINSPECTION
SPECIAL TASKS
DEFICIENCY DOCUMENT REVIEW
PERSONNEL QUALIFICATIONS
RECEIVING INSPECTION

Figure 2-1

QUALITY VERIFICATION PROGRAM FLOW DIAGRAM

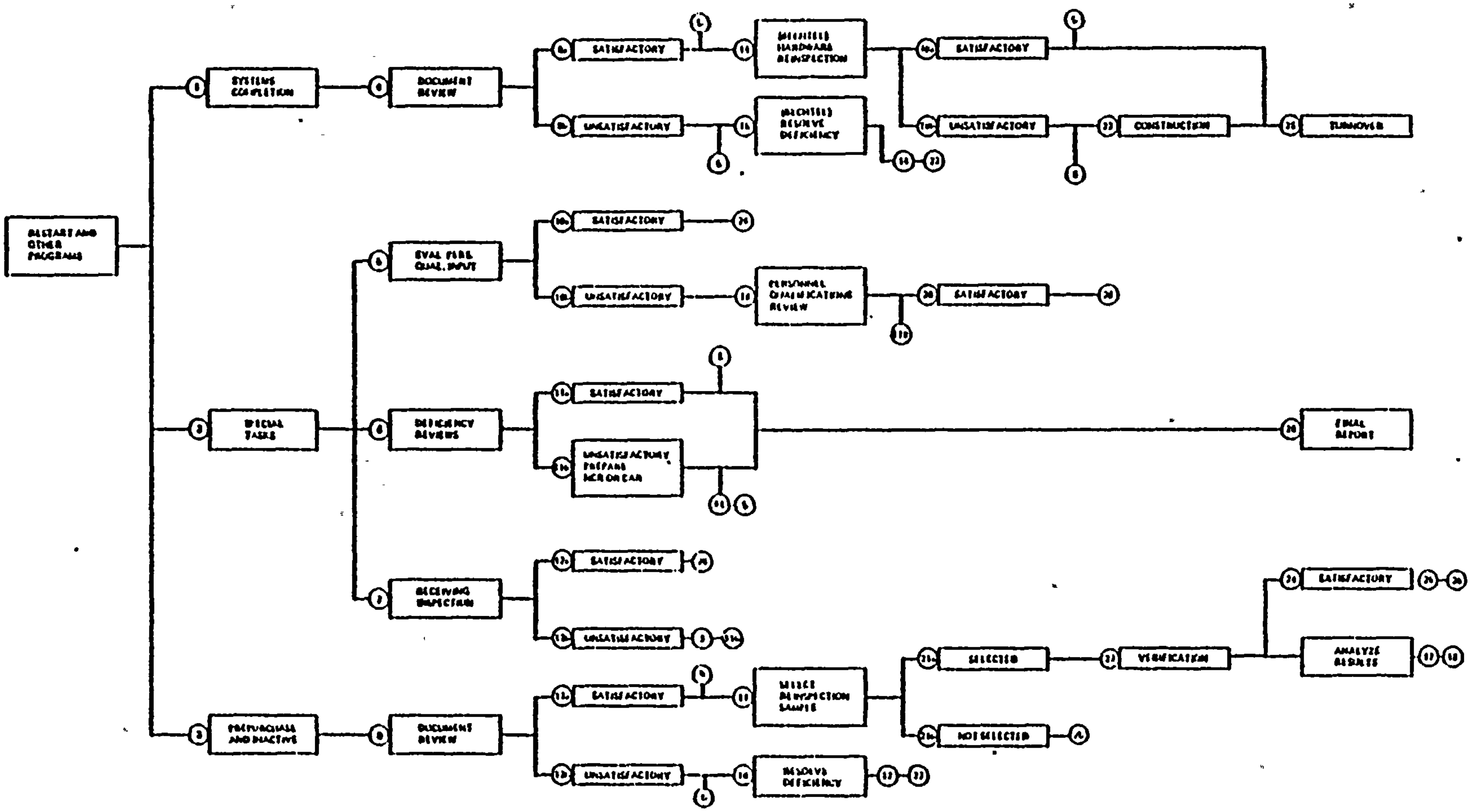
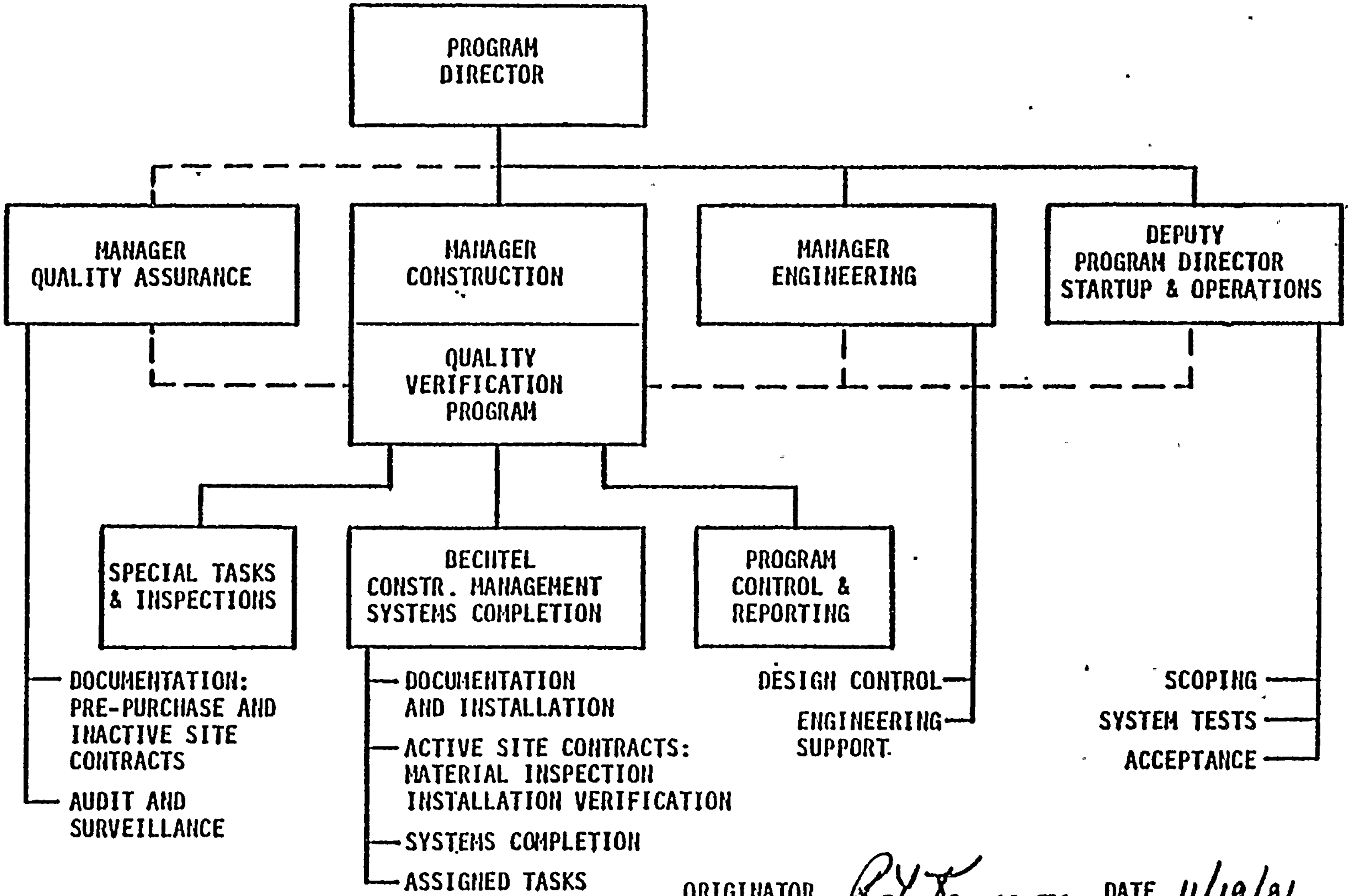


Figure 2-2

QUALITY VERIFICATION PROGRAM ORGANIZATION



ORIGINATOR R L [signature] DATE 11/19/81

APPROVED H.A. [signature] DATE 12/1/81

FIGURE 2-3

Quality Class I Systems Completion Plan (Attachment No. 3), and flow diagram for the verification process, Figure 2-4.

3.1 Document Reviews

Documentation associated with each safety-related system/facility will be reviewed under this program. These reviews will establish that the records meet specification, code, standard, and QA program requirements. Deficiencies will be processed in accordance with Project-approved procedures.

3.2 Hardware Reinspection

A sample of hardware and work activities will be selected for reinspection, such that the adequacy of the work and its associated records are verified. The selection criteria for reinspection of work activities will be documented as discussed in the Systems Completion Plan. The results from the Restart and other special programs will be considered in establishing these criteria.

4.0 PREPURCHASE AND INACTIVE SITE CONTRACTS

Most of the documentation associated with prepurchase and inactive construction contracts has been reviewed by the Supply System. Deficiencies identified in the review are being resolved. The Supply System will continue the document review responsibility for these contracts.

4.1 Document Reviews

Documentation Reviews associated with each safety-related item will establish whether or not the records meet specification, code, and Supply System's QA program requirements. Deficiencies identified in the review will be resolved in accordance with project procedures.

4.2 Selection of Hardware for Reinspection

The following evaluation will be made on prepurchase and inactive site contracts to determine the need for sample hardware reinspection:

- Were previous inspections or evaluations made by the Supply System/AE which would satisfy the objectives of the Quality Verification Program?
- What is status of documentation and problems encountered?
- Is the supplier an ASME certificate holder?
- Does contractor have an NRC-reviewed QA program? Vendor history on prepurchased equipment?

Attachment 1 shows a review checklist for assembling the above information.

VERIFICATION PROCESS

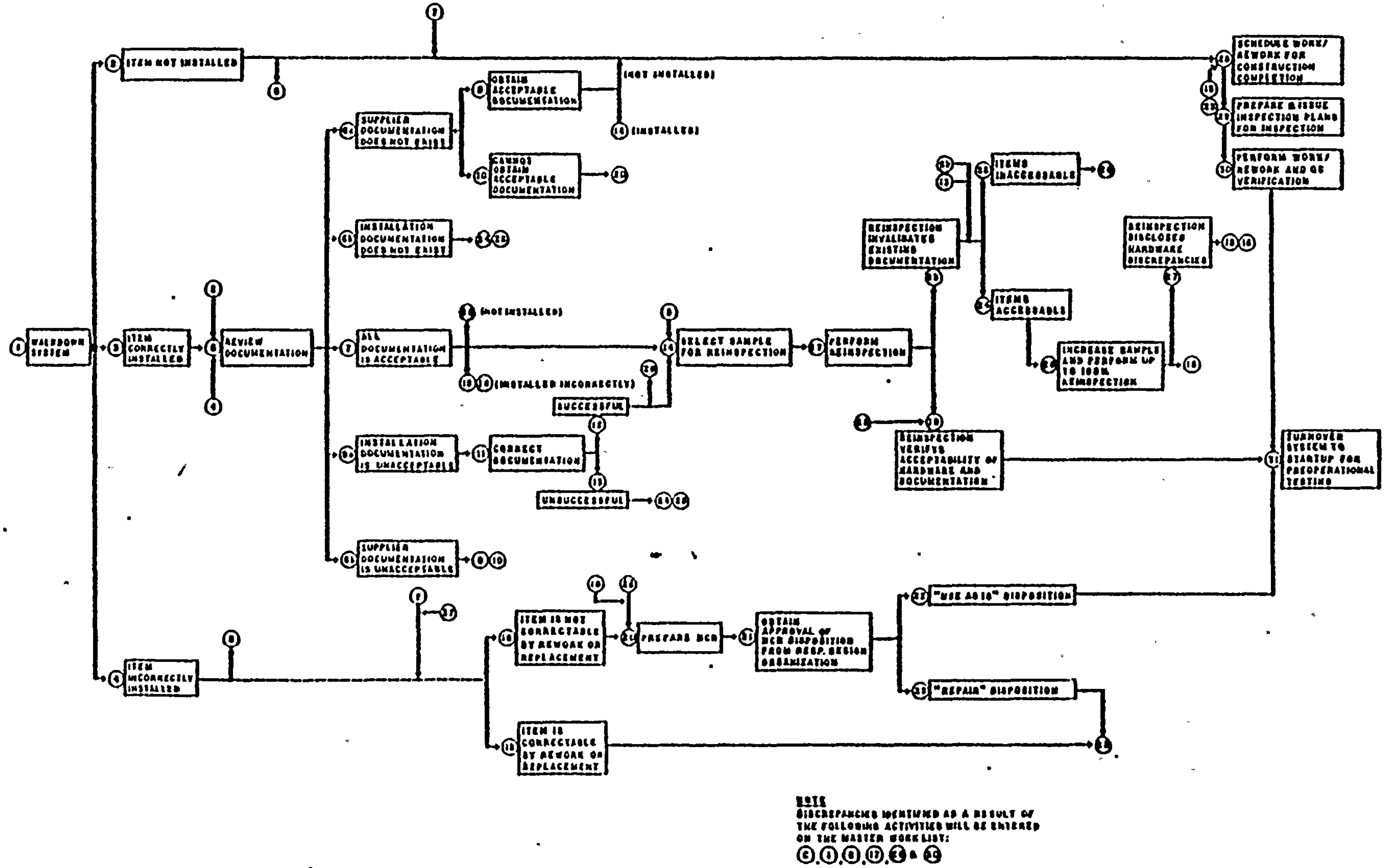


Figure 2-4

4.3 Hardware Reinspection

If the results of the evaluation indicate a need for sample reinspection, it will be performed by the Supply System or Bechtel. In general, the Supply System will perform reinspection of non-system related work, and Bechtel will perform inspections related to system completion. Prepurchased equipment will also be checked for physical configuration and obvious damage during system walkdown. Reinspections will be accomplished on a representative sample of hardware, using an approved sampling plan. If necessary, procedures will be consulted to guide the selection of inspection attributes.

If the results of the evaulation indicate that reinspection is not necessary, the basis for determining not to reinspect will be documented.

5.0 SPECIAL TASKS

Specific verification activities that are not compatible with the systems-oriented plan for completing construction will be accomplished as separate tasks. These will be coordinated with Bechtel's activities so that equipment and its supporting documentation required within startup systems are available for timely acceptance.

5.1 Deficiency Documentation

Deficiency documentation reviews will be accomplished to establish whether or not dispositions of non-conformances, design changes, field change requests, and information requests were made correctly. These reviews are not oriented to the systems approach. The review process described hereinafter is depicted in Figure 5-1, Flow Diagram, Deficiency Documentation Review.

5.1.1 Identification of Documentation

The following generic documents were identified as those which may need evaluation for correctness of disposition. They are listed below with the specific documents that will be considered in the Quality Verification Program.

- Non-Conformance Reports
  - NCR, Non-Conformance Report (WFPSS/B&R).
  - IR, Inspection Report (Contracts 215, 218).
  - ECAR, Engineering Corrective Action Report (Contract 213A).
  - DR, Deficiency Report (Contract 216).

FLOW DIAGRAM, DEFICIENCY DOCUMENTATION REVIEW

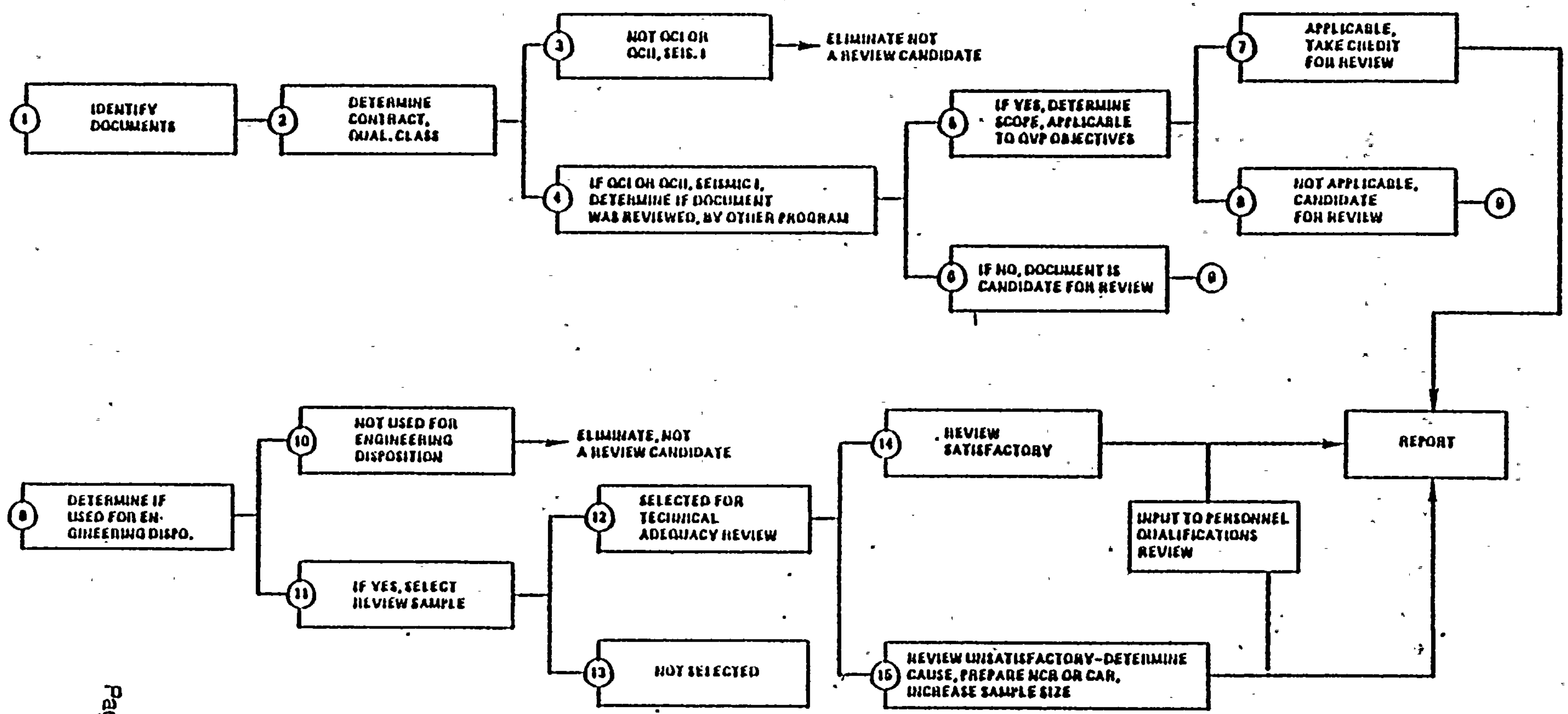


Figure 6-1

- o <u>Design Changes</u>
  - RCC, Request for Contract Change.
  - CWR, Contract Waiver Request.
  - ECN, Engineering Change Notice.
  - PED, Project Engineering Directive.
  - FRPED, Field Resolution PED.
- o <u>Field Change Requests</u>
  - RCC, Request for Contract Change.
  - CWR, Contract Waiver Request.
  - ECN, Engineering Change Notice.
  - FCR, Field Change Request (Contract 215).
- o <u>Information Requests</u>
  - RFI, Request for Information

5.1.2 <u>Selection of Documents for Review</u>

The use of the above documents will be reviewed to determine the following information, which will identify their eligibility for review in the Verification Program:

- o On what contracts were the documents used?
- o What was the purpose of the document?

  If used to obtain Engineering disposition or disseminate design resolution, document may be selected for review. If not, it may be set aside.
- o When was document used?
- o Has document been included in review by another program?

  If previously evaluated by another program, credit will be taken for that review, based on the following considerations:

  - What was scope of review?

    . Determine that information obtained satisfies the objective of the Verification Program.

- Who performed the review?

  Determine that the organization and/or personnel who performed the review were appropriate for the review, and their review included criteria which would meet the verification objectives.

- What is status of the review?

  Determine the status and priority of the review for timeliness with verification objectives.

- What are the results of the review?

  Determine what corrective actions resulted from the review, and if they have been implemented. What experience from previous review may be useful in verification.

Attachment 2a shows a sample chart to be used for assembling the above information on all design-change documentation. This information will be evaluated to determine further verification by the Project. Similar matrix charts will be utilized for Non-conformance Reports, Field Change Requests, and Information Requests.

5.1.3 Document Verification

Documents selected for review under this Quality Verification Program will be sampled (10% random sample) and reviewed for correctness of disposition. The review will be performed by personnel other than those who performed the work associated with the dispositions described on the review documents. Review criteria for the verification process include:

o Is an engineering disposition required to resolve the documented issue?

o Is a design resolution described on the document?

o Evidence of compliance with applicable codes, specifications, standards, and SAR requirements.

o In cases where compliance is absent, adequate justification for deviating.

o Evidence that design change was performed by Engineering personnel.

o Evidence that the disposition was properly reviewed and approved.

Attachment 2b shows a sample Document Review Checklist to be used for recording the above information for all documents reviewed. The results will be analyzed to determine if problems exist. Should this review result in discovery of significant problems in correctness of disposition, a larger sample will be reviewed. A corrective action plan will be developed to resolve problems arising from the reviews.

One of the considerations in developing the corrective action plans is to evaluate whether problems arising out of previous dispositions could be related to personnel qualifications. If so, it may become necessary to initiate a review to verify personnel qualifications.

5.2 Personnel Qualifications

Personnel qualifications will be addressed in the Verification Program by examination of documents which identify compliance with specific personnel requirements, as a part of the scope of documentation reviews discussed earlier in the plan. Also the sampling of work activities for reinspection under the System Completion Plan will serve to illustrate whether or not satisfactory work was accomplished by qualified personnel. Satisfactory reinspection results will provide a high level of confidence that the participants were qualified, including craftsmen, Quality Control Inspectors, and NDE personnel.

Qualifications of engineering personnel will be confirmed by review of deficiency dispositions discussed in Section 5.1. Review results will establish the actual performance of engineers and provide confidence that the personnel responsible for engineering dispositions associated with the work were qualified.

Contractor's engineering qualifications will be verified by similar methods, wherever contractors were charged with engineering responsibility. For example, where Inspection Reports noted discrepancies to be dispositioned by engineering personnel, these are covered by Section 5.1; and in those very limited cases where design performance may not have been verified by Project Engineering activities, a program of review for evidence of contractor personnel qualifications will be developed.

5.3 Receiving Inspection

Quality verification of past receiving inspections is divided between material currently in storage, and material already installed.

5.3.1 Stored Material

To gain a level of confidence in the past receiving inspection practices of the major active site contractors, Bechtel will direct repeat receiving inspections of material currently in storage and awaiting installation in System 58. The results of these inspections will be

5.3.1 Stored Material (Cont'd.)

analyzed to determine if further reinspection of stored material is required prior to installation in other systems. Also, results from reviews performed in the Restart Program will be considered in this determination.

5.3.2 Installed Material

Document reviews and hardware reinspections will be utilized to determine the adequacy of previously installed material, as described in Section 3.0 of this Program.

6.0 SCHEDULE

The Supply System intends to initiate the Quality Verification Program by applying Systems Completion Plan to the first system to be transferred to Bechtel for completion, the Standby Service Water System (No. 58). This affords the opportunity to evaluate details of both plans and to adjust them based on experience gained. Systems-completion reviews and reinspections will begin on System No. 58, along with identification of system boundaries, configuration verification, etc., and continue on a similar systems basis until construction has been resumed on all systems.

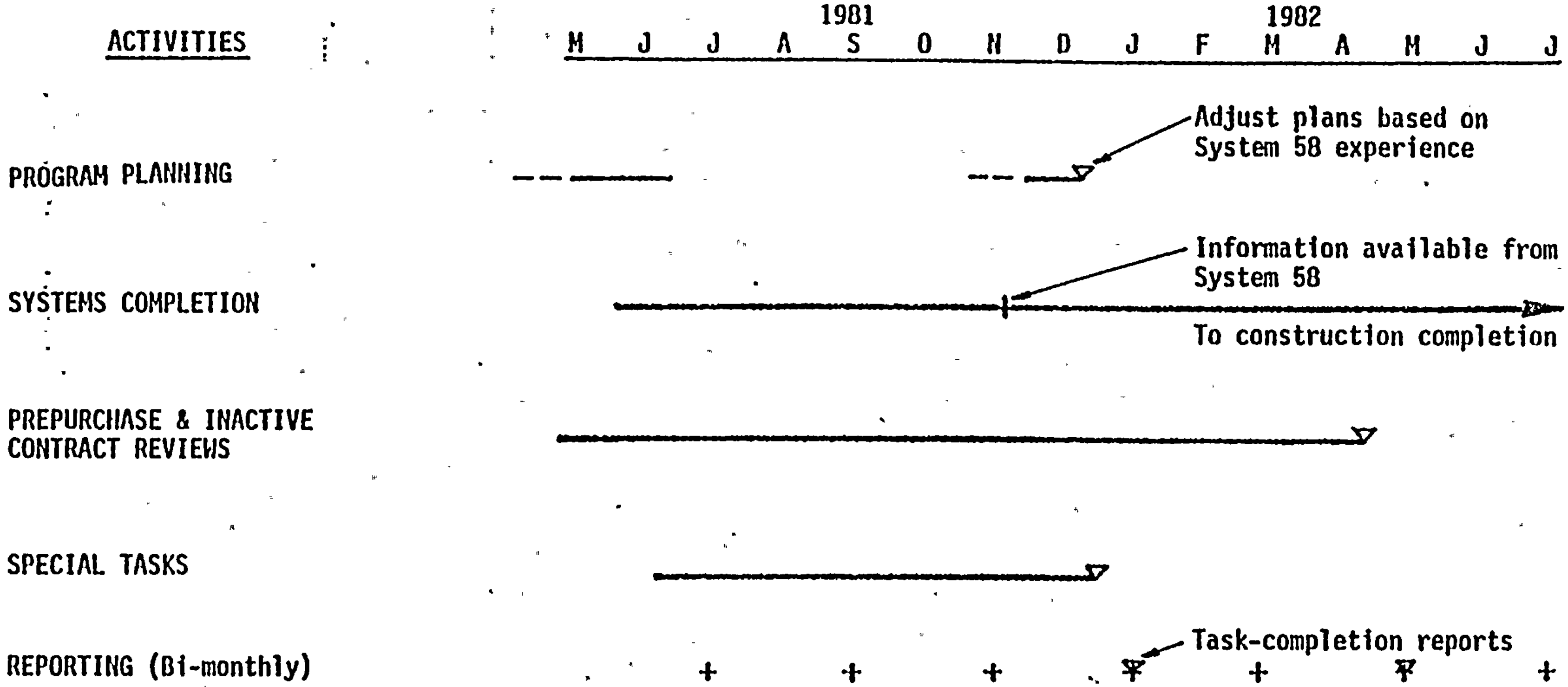
Review of documentation for prepurchase contracts and inactive site contracts is under way and is being accomplished by Project Quality Assurance as a part of their normal Documentation Review Program. Reinspections will be coordinated with Bechtel's activities in systems completion.

Some of the documentation reviews associated with the special tasks have begun. Completion of this work is expected to take up to several months, depending on the actual numbers of documents finally determined as review candidates from initial eligibility reviews.

The above activities are illustrated in the schedule shown in Figure 6-1, which is provided prior to commencement of the Program for scoping durations of the planned activities. Adjustments to the schedule will be made after some experience has been acquired in the execution of the Program.

7.0 REPORTING

Progress reporting of Quality Verification Program reviews will be included in the bi-monthly reports to the NRC, Region V. Deficiencies identified, which meet the requirements of 10CFR 50.55(e) and/or Part 21, will be reported to the NRC in accordance with approved procedures. Others will be summarized in the bi-monthly report.



QUALITY VERIFICATION PROGRAM SCHEDULE

FIGURE 6-1

Special reports will be prepared as appropriate at the conclusion of individual tasks.

Significant problems discovered during the Quality Verification Program will be evaluated and considered by the project management organization for appropriate action. Experience gained from this activity will be appropriately applied to other Supply System projects.

QC-I PRE-PURCHASED/CLOSED CONTRACT REVIEW CHECKLIST

Reviewers ______________________ Date ____________________

Contract No. ____________________ Description ______________

Present Contract Status ____

1. Documentation Status   Percentage ______________

Results of Documentation Review ______________________________

____

____

____

2. Determine Criticality/Priority Item ________________________________

____

____

3. Determine Whether Other Inspection or Evaluation Programs Satisfy Requirements ____

____

____

4. Determine Whether NRC Has Approved QA Program/NRC Vendor History __________

____

____

5. Determine Whether ASME Certificate Holder ________________________

____

____

6. Make evaluation on above to determine feasability of further reinspection based on results of Items 1 thru 5 and make recommendation for Systems Turnover Management Approval.

Approved by ______________________
Signature/Date

ATTACHMENT NO. 1

DESIGN CHANGE DOCUMENTS				HAS DOCUMENT BEEN REVIEWED BY ANOTHER PROGRAM?				
DOC. TYPE	CONTRACT	PURPOSE	WHEN	WHAT CAUSED REVIEW	SCOPE OF REVIEW	ORGANIZATION PERFORMING	STATUS OF REVIEW	RESULTS
RCC								
CWR								
ECN								
PED								
FRPED								

SAMPLE

ATTACHMENT 2a, SAMPLE

DOCUMENT ELIGIBILITY CHECKLIST

Reviewer ______________ Date __________ Approved ________________ Date _______________

DEFICIENCY DOCUMENT REVIEW FORM

Document Identification: ______________________________

Is The Technical Disposition Acceptable? Yes [ ] No [ ]

Comments

SAMPLE

Further Evaluations Required

______________________ ______________________
Engineering Reviewer Date

______________________ ______________________
Special Projects Department Date

Sheet 1 of ___

ATTACHMENT NO. 2b

ATTACHMENT 3 TO
QUALITY VERIFICATION PROGRAM

WNP-2

QUALITY CLASS I SYSTEMS COMPLETION PLAN

June 18, 1981

1.0 PURPOSE

This plan describes the method to be used for completion of Quality Class I systems. Concurrent with the performance of new work to effect systems completion, the plan includes provisions for the resolution and correction of past discrepencies in both hardware and documentation as well as verification of a selected sample of previously completed and accepted safety-related work and accompanying documentation. This plan is designed to be responsive to NRC concerns relative to verification of past work as set forth in their 10CFR50.54(f), Request Regarding Quality Assurance, dated June 17, 1980.

2.0 SCOPE/APPLICABILITY

This plan will be utilized by Bechtel and other site contractors working under Bechtel Construction Management in completing Quality Class I systems.

Bechtel will verify, using their total QA/QC program and this plan, those portions of the systems to be completed by Bechtel directly. Portions of the systems that are completed by other contractors working under Bechtel Construction Management will be verified by the other contractors using their Supply-System-approved total QA/QC programs and this plan. These other contractors will be under surveillance inspection by Bechtel QC, auditing by Bechtel QA, and management by Bechtel Construction. The efforts of both Bechtel and the other contractors involved in systems completion and verification will be conducted under the Supply System's overall administration and direction.

Verification activities described in this plan are fully applicable to Quality Class I items. Items designated as Quality Class II, Seismic Class I are also included in the verification program, however, only those attributes important to structural integrity under seismic loading are considered.

3.0 PREREQUISITIES

There are a number of prerequisite activities which must be performed prior to beginning the verification process for system completion. These prerequisites are:

A. Requirements for the minimum documentation needed to attest to the quality of past work performed by the contractors and their suppliers and subcontractors shall be established. The project contract specifications and other design documents referenced

in those specifications shall be used to determine the minimum quality verification documentation requirements. With this information, checklists shall be prepared and used as the basis for performing the reviews necessary to complete the document verification part of this plan.

B. Design configuration control for each system to be completed by this plan shall be established. The Architect/Engineer will provide the approved design configuration for each system to be completed by this plan. The design documents (specifications, drawings) applicable to each system will be identified along with all outstanding technical changes such as PEDs, RFIs or CWRs which have not been incorporated in the drawings and specifications. A design change control system which assures that future changes are communicated to Bechtel in a timely manner will be maintained by the Architect/Engineer throughout the systems completion process.

C. The cognizant Quality Assurance organization will identify, list and index by start-up system classification, all outstanding NRC, WPPSS/B&R and contractor discrepancy reports (NCRs, CARs, QAFs, IRs, etc.).

D. The contractor quality verification documentation, including supplier documentation for contractor purchased items, which has been previously prepared and is stored in the contractor's vaults will be organized, filed and indexed in a manner which will allow retrievability for review to support the verification process by start-up system.

It is not intended that this task include engineering documentation for such items as environmental qualifications, seismic qualification, performance tests, etc. WPPSS/B&R engineering will retain sole responsibility for obtaining and approving these kinds of documents.

4.0 SYSTEM COMPLETION AND VERIFICATION PROCESS

System completion and verification will be accomplished simultaneously in the following steps. The numbers in parentheses correspond to those shown on the attached "Quality Class I Systems Completion Flow Diagram for WNP-2", Revision 1 (4-2-81).

4.1 System Walkdown (1)

Each system will be walked down in accordance with an appropriate procedure to determine its present status of installation. The approved design documents that establish current design configuration of the system will be used for reference. The approved design documents will be those established in Prerequisite B, above. The walkdown will be a configuration and status check and not a detailed item by item inspection. Missing as well as added items not shown in the design will be noted.

The walkdown will be performed by Field Engineering with participation by Construction Quality Control. Results from this initial walkdown will be classified as follows:

a. Item installed in proper location and to correct configuration (3)

b. Item installed but damaged or installed to the wrong location or configuration (4)

c. Item not installed (2)

4.2 <u>Review Documentation and Outstanding Discrepancy Reports</u> (5)

Contractor installation quality verification documentation and supplier documentation for contractor purchased items will be reviewed by Construction Quality Control using the checklists developed in Prerequisite A, above. The documentation is reviewed to determine completeness and traceability but not technical content.

Outstanding discrepancy reports are reviewed by Construction Quality control and correllated with the results of the documentation review. Upon completion of the walkdown and this review, the documentation and physical status of the system will be known. Further processing to effect systems completion and verification will be done as follows.

4.3 <u>Item Not Installed</u> (2)

Construction Quality Control prepares an inspection plan and record (QCI/IR) to cover inspection of the construction activities required to install the missing items. Before installing any missing items, consideration is given to the accessibility for reinspection of other completed work in the system. Installation of missing items may be worked on by Construction at any time provided the necessary construction procedure and QCI/IRs have been prepared and Construction Quality Control performs receiving, in-process and final inspection of the items as defined in the QCI/IRs.

If the documentation review identifies existing installation documentation for items now found to be not installed, such documentation shall be voided following approved quality assurance procedures. Documentation of the new work is referenced to the previous documentation that has been voided.

When material required to complete the installation of missing items is obtained by Bechtel from the Supply System or other site contractors, Construction Quality Control will perform receiving inspection of such material prior to releasing it for use. Receiving inspection includes review of supplier documentation for completeness, traceability and technical content.

4.4 Item Installed to Correct Configuration/Supplier Documentation Does Not Exist or Is Unacceptable (6a) (8b).

Construction Quality Control coordinates with the Supply System and other site contractors, as applicable, to obtain supplier documentation or to obtain corrections to supplier documentation when appropriate justification exists. If acceptable documentation is obtained, the item is entered on a list of items that will be subject to verification reinspection.

If acceptable documentation cannot be obtained, a recommended disposition is formulated and a NCR is prepared. The NCR is submitted to WPPSS/B&R for approval fo the disposition for "repair" or "use-as-is" dispositions.

4.5 Item Installed to Correct Configuration/Installation Documentation Does Not Exist (6b)

If the item is accessible, Construction Quality Control issues a QCI/IR and reinspects the item. The completed QCI/IR is added to the record files as documentation of the acceptability of the installation.

If the item is inaccessible for inspection, a recommended disposition is formulated and a NCR is submitted to WPPSS/B&R for approval of the disposition for "repair" or "use-as-is" dispositions.

4.6 Item Installed to Correct Configuration/Installation Documentation is Unacceptable (8a)

Construction Quality Control coordinates with the contractor who performed the installation to obtain corrections to documentation when appropriate justification exists. If corrected docmentation is obtained, the item is entered on a list of items that will be subject to verification reinspection.

If acceptable documentation cannot be obtained, Construction Quality Control issues a QCI/IR and reinspects the item. The completed QCI/IR is added to the record files as documentation of the acceptability of the installation.

If the item is inaccessible for inspection, a recommended disposition is formulated and an NCR is prepared. The NCR is submitted to WPPSS/B&R for approval of the disposition for "repair" or "use-as-is" disposition.

4.7 Item Installed, but to an Incorrect Configuration, Damaged or Has Other Obvious Discrepancies (4) (27)

Items in this category include those found on the system walkdown; those having outstanding discrepancy reports against them as identified in Prerequisite C; and those found to be discrepant upon verification reinspection of a selected sample of previously accepted work.

Approved dispositions are obtained for items with previously prepared, outstanding discrepancy reports, (Project NCRs, IRs, etc.). Once obtained, the approved dispositions are worked off. Construction Quality Control performs inspection and documents repair, rework or replacement actions.

Items found to be discrepant from the system walkdown or upon verification reinspection of previously accepted work are treated as follows:

a. If the item was finally accepted to the current design requirements or if the item was not finally accepted and cannot be corrected by "rework" or "replacement", an NCR is prepared with a recommended disposition. The NCRs are submitted to WPPSS/B&R for approval of "repair" and "use-as-is" dispositions.

b. If the item was not finally accepted to the current design requirements and is correctable by simple "rework" or "replacement", Construction Quality Control prepares an inspection plan and record (QCI/IR) to cover inspection of the construction activities required to correct the item. Correction of discrepant items by "rework" or "replacement" may be performed by Construction at any time provided the necessary construction procedures and QCI/IRs have been prepared and Construction procedures and QCI/IRs have been prepared and Construction Quality Control performs receiving, in-process and final inspection of the items as defined in the QCI/IRs.

4.8 <u>Item Installed to Correct Configuration/Documentation is Acceptable (7)</u>

A sample of the hardware and accompanying documentation for items in this category will be selected for reinspection and review to verify their acceptability. The sample size and selection will be made by Field Engineering subject to review and approval by Quality Assurance. The number of items sampled shall not be less than 10% of the total number of items in this category.

The items selected for hardware reinspection and documentation review shall be those which past experience dictates to be the ones most likely to contain discrepancies. Criteria to be used for sample selection are:

a. Information provided by the Supply System from the results of their reviews of the contractor's procedures and personnel qualifications to effect restart.

b. Items which required the application of special processes, special equipment or complex procedures to produce an acceptable installation, e.g. pipe welding, heat treating, nondestructive examination; soils compaction; grouting and dry packing; cable routing and separation; electrical terminations; application and testing of special coatings; installation of concrete expansion anchors; mechanical equipment alignment, etc.

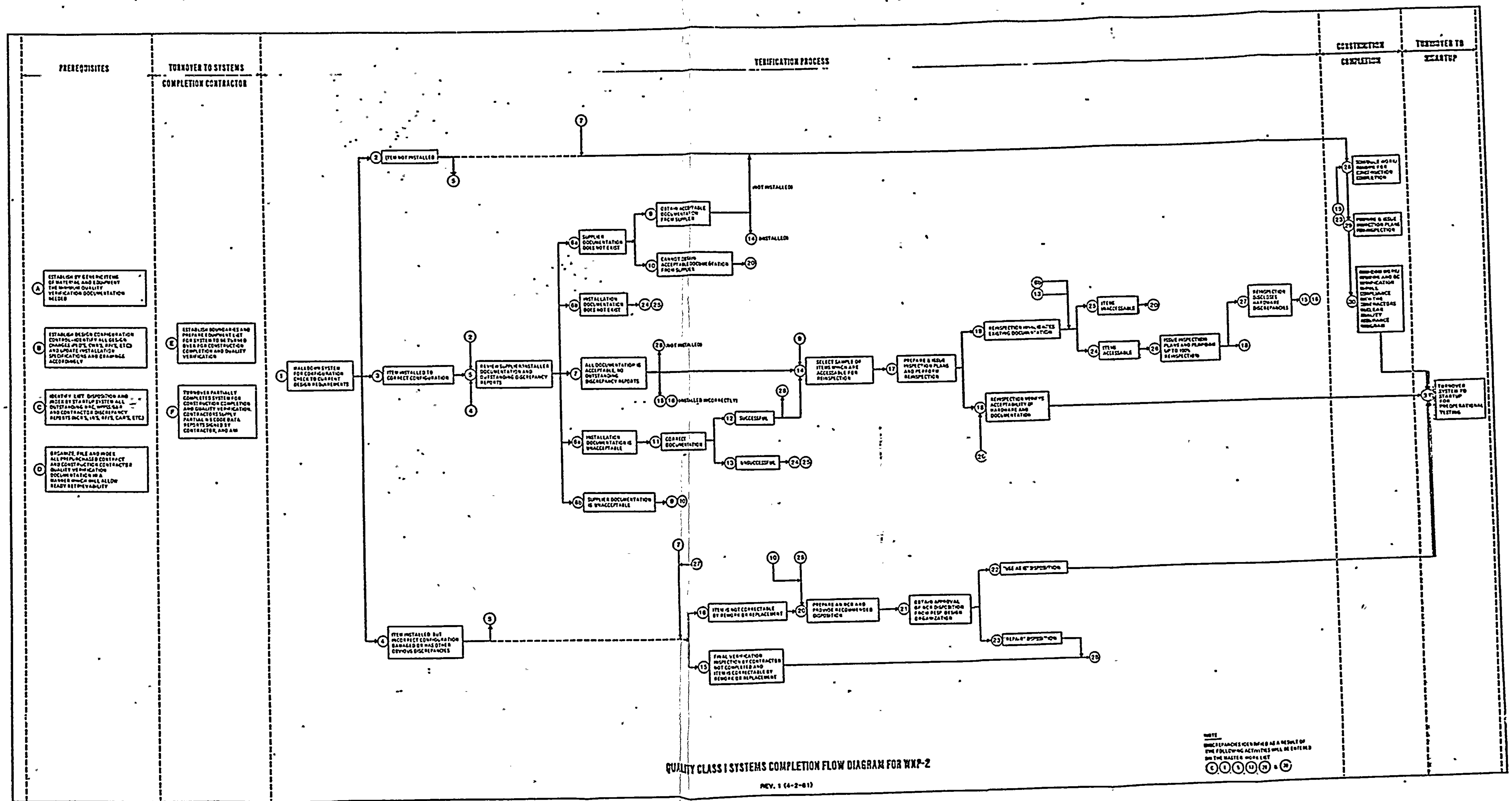
c. Information obtained from the earlier system walkdowns and documentation reviews which call into question the performance of individual inspectors.

d. Critical items for which significant discrepancies will not be readily revealed by construction testing or pre-operational and start-up testing.

e. NRC Bulletins

The actual hardware reinspections and documentation reviews to complete the verification sample will be done by Construction Quality Control using inspection plans and document review procedures (QCI/IRs). Nonconforming items revealed by these reinspections and reviews will be documented on Nonconformance Reports. These NCRs will be summarized by Quality Assurance on a semi-monthly basis to support the Supply System's reporting commitments to the NRC.

Results from the hardware reinspections and documentation reviews to satisfy the initial verification sample shall be reported by Construction Quality Control, evaluated by Field Engineering and reviewed and approved by Quality Assurance. As a part of their evaluation, Field Engineering shall determine the need, if any, for further sampling and selection of items for hardware reinspection and documentation review. The need for further sampling and selection, which may go as high as 100%, will be based upon the nature and number of discrepancies disclosed by the initial and subsequent verification sample. Substantive discrepancies in sufficient numbers to reveal a trend will require additional sampling and selection.


PREREQUISITES
TURNOVER TO SYSTEMS COMPLETION CONTRACTOR
VERIFICATION PROCESS
CONSTRUCTION COMPLETION
TURNOVER TO STARTUP
QUALITY CLASS I SYSTEMS COMPLETION FLOW DIAGRAM FOR WNP-2
REV. 1 (4-2-81)

I = Instrumentation
E = Electrical
BAL = Balance

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
1.1	Reactor Pressure Vessel System	RPV	7/26/82	3/1/83
1.2	Nuclear Boiler Instrumentation	NBI	(P3) 8/9/82 (P4) 2/14/83	3/14/83
3.0	Reactor Recirculation System	RRC	(P2) 5/31/82 (P3)I,E 6/21/82 (P4)I,E 6/21/82 (P4)BAL 8/16/82	1/31/83
4.1	Reactor Water Cleanup Piping	RWCUP	I 6/7/82 E 6/28/82 BAL 8/30/82	2/21/83
4.2	Reactor Water Cleanup Filter/Demineralizer	RWCUFD	(P2) I 6/7/82 (P2) E 6/28/82 (P2) BAL 8/30/82	2/21/83
5.0	Remote Shutdown System 1 Control	RSD	P/A'd	2/28/83
6.0	Reactor Core Isolation Cooling	RCIC	E,I 8/2/82 BAL 8/23/82	3/28/83
7.1	High Pressure Core Spray-Mechanical	HPCS-M	I 7/5/82 E 7/26/82 BAL 8/4/82	9/6/82
7.2-1	High Pressure Core Spray-Electrical (Package 1)	HPCS-E(1)	P/A'd	2/28/83
7.2-2	High Pressure Core Spray-Electrical (Package 2)	HPCS-E(2)	(P3) 8/2/82	1/17/83
8.0	Low Pressure Core Spray System	LPCS	P/A'd	8/30/82

ATTACHMENT 2

Date: 4/20/82

I = Instrumentation
E = Electrical
BAL = Balance

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
9.0	Residual Heat Removal System	RHR	(P4)I 6/21/82 (P4)E 6/28/82 (P4)BAL 7/19/82 (P5)I 6/21/82 (P5)E 6/28/82 (P5)BAL 8/16/82 (P6)I 6/21/82 (P6)E 6/28/82 (P6)BAL 8/16/82	1/31/83
10.0	Standby Liquid Control System	SLC	(P2) 7/19/82	9/27/82
11.0	Closed Cooling Water System	RCC	E,I 7/5/82 BAL 8/30/82	4/25/83
13.1	Control Rod Drive-Hydraulic Control	CRD-H	P/A'd	4/11/83
13.2	Control Rod Drive-Manual Control	CRD-MC	5/10/82	2/14/83
14.0	Process Computer	C	P/A'd	T/O'd
15.0	Reactor Protection System	RPS	10/4/82	2/21/83
16.1	Source Range Monitoring	SRM	1/10/83	6/20/83
16.2	Intermediate Range Monitoring	IRM	1/10/83	6/20/83
16.3	Average Power Range Monitoring	APRM	1/10/83	4/25/83
17.0	Traversing Incore Probe System	TIP	3/14/83	6/27/83
18.1	Rod Worth Minimizer	RWM	P/A'd	T/O'd

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ATTACHMENT 1

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

I = Instrumentation
E = Electrical
BAL = Balance

System Number	Title	Abbrev.	P/A Date	T/O Date
18.2	Rod Sequence Control System	RSCW	P/A'd	T/O'd
19.0	Leak Detection	LD	4/25/83	6/13/83
20.1	Fuel Handling and Vessel Service Equipment	FH & VSE	10/4/82	12/13/82
20.2	CRD Installation Equipment	CRD-IE	9/13/82	10/4/82
22.0	Primary Containment Atmospheric Control System	CAC	3/14/83	4/18/83
23.0	Primary Containment Cooling System	CRA	8/30/82	1/3/83
24.0	Primary Containment Instrument Air	CIA	3/21/83	5/2/83
25.0	Primary Containment Atmospheric Monitoring System	CMS	3/7/83	5/2/83
31.1	Floor Drain Processing	FDR	12/6/82	6/6/83
31.2	Equipment Drain Processing	EDR	2/7/83	6/6/83
33.0	Chemical Waste Processing System	CWR	2/14/83	6/13/83
34.0	Solid Waste Processing System	PWR	3/7/83	6/27/83
35.0	Radioactive Drains and Sumps	RDS	I,E 10/18/82 BAL 3/7/83	6/6/83
36.0	Process Radiation Monitoring System	PRM	(CONT RM)11/1/82 BAL 3/21/83	5/30/83

Date: 4/20/82

I = Instrumentation
E = Electrical
BAL = Balance

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
37.1	Area Radiation Monitors	ARM	(CONT RM)11/1/82 BAL 3/7/83	4/11/83
37.2	Environs Monitors	ERM	(CONT RM)11/1/82 BAL 3/7/83	4/11/83
38.0	Fuel Pool Cooling and Cleanup System	FPC	(P3)E,I 8/16/82 (P3)BAL 9/6/82	1/10/83
39.0	Standby Gas Treatment System	SGT	2/21/83	4/4/83
40.1	Off Gas Processing	OG-P	1/24/83	3/21/83
40.2	Off Gas Refrigeration	OG-R	1/24/83	3/21/83
45.0	Supervisory Control System	SC	P/A'd	T/O'd
46.1-1	500/25KV Distribution (Package 1)	500/25KV (1)	5/31/82	6/28/82
46.1-2	500/25KV Distribution (Package 2)	500/25KV (2)	5/31/82	6/28/82
46.2-1	230/115KV Distribution (Package 1)	230/115KV (1)	P/A'd	7/18/83
46.2-2	230/115KV Distribution (Package 2)	230/115KV (2)	P/A'd	7/18/83
46.3	6.9K Distribution	6.9KV	P/A'd	7/18/83
46.4-1	4.16KV Distribution (Package 1)	4.16KV (1)	P/A'd	7/18/83

I = Instrumentation
E = Electrical
BAL = Balance

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
46.4-2	4.16KV Distribution (Package 2)	4.16KV (2)	P/A'd	7/18/83
46.4-3	4.16KV Distribution (Package 3)	4.16KV (3)	P/A'd	7/18/83
46.5-1	480V Distribution (Package 1)	480V (1)	P/A'd	7/18/83
46.5-2	480V Distribution (Package 2)	480V (2)	P/A'd	7/18/83
46.5-3	480V Distribution (Package 3)	480V (3)	P/A'd	7/18/83
46.5-4	480V Distribution (Package 4)	480V (4)	P/A'd	7/18/83
46.5-5	480V Distribution (Package 5)	480V (5)	P/A'd	7/18/83
46.5-6	480V Distribution (Package 6)	480V (6)	P/A'd	7/18/83
46.5-7	480V Distribution (Package 7)	480V (7)	As required	7/18/83
46.6	Low Voltage Distribution	LV	As required	3/21/83
46.7	Instrument Power	IP	P/A'd	T/O'd
46.8	Emergency Lighting	EL	As required	4/25/83
47.1	Standby Diesel Generator	DG	BAL 7/5/82	10/25/82
47.2	Diesel Oil Storage and Transfer	DO	BAL 7/5/82	10/25/82

Date: 4/20/82

I = Instrumentation
E = Electrical
BAL = Balance

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
48.1	Turbine and Accessories	T	P/A'd	10/4/82
48.2	DEH Control	DEH	(P4) 5/17/82 (P5) 5/17/82	7/12/82
48.3	Turbine Lube Oil	LO	P/A'd	7/12/82
48.4	Turbine Supervisory Instrumentation	TSI	P/A'd	7/12/82
49.0	Annuciator System	ANN	P/A'd	10/18/82
50.1-1	250V DC Distribution (Package 1)	250VDC (1)	P/A'd	5/2/83
50.1-2	250V DC Distribution (Package 2)	250VDC (2)	P/A'd	5/2/83
50.2-1	125V Distribution (Package 1)	125VDC (1)	P/A'd	1/3/83
50.2-2	125V Distribution (Package 2)	125VDC (2)	P/A'd	5/2/83
50.2-3	125V Distribution (Package 3)	125VDC (3)	P/A'd	4/18/83
50.3	24V Distribution	24VDC	P/A'd	5/2/83
51.1	Excitation and Voltage Regulation	E/R	7/12/82	7/19/82
51.2	Generator Hydrogen Cooling	HC	7/12/82	7/19/82
51.3	Generator Hydrogen Seal Oil	SO	P/A'd	7/19/82

Date: 0/82

ATTACHMENT 1

I = Instrumentation
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INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
51.4	Generator Hydrogen Storage and Supply	H2	P/A'd	7/5/82
51.5	Generator Stator Cooling	STC	P/A'd	T/O'd
51.6	Isolated Phase Bus Duct Cooling	BDC	5/31/82	6/28/82
55.0	Tower Makeup System	TMU	P/A'd	5/17/82
56.1	Condenser Cooling	CW	P/A'd	5/3/82
56.2	Cooling Tower	CT	P/A'd	T/O'd
57.0	Plant Service Water	TSW	P/A'd	11/29/82
58.0	Standby Service Water	SW	(P5)I,BAL 6/21/82 (P6)I,BAL 7/5/82 (P7)I,BAL 8/2/82	3/21/83
59.1	Makeup Water Treatment Plant	WT-P	P/A'd	T/O'd
59.2	Makeup Water Treatment Chlorinator	WT-C	P/A'd	T/O'd
60.0	Demineralized Water Storage and Transfer	DW	P/A'd	6/6/83
61.0	Potable Hot and Cold Water	PW	(P5) 11/22/82	12/13/82
62.1	Fire Protection Water	FPW	P/A'd	7/19/82
62.2	Turbine Building Deluge	T-DEL	P/A'd	7/19/82

014.7

Date: 4/20/82

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INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
62.3	Radwaste Building Deluge	W-DEL	P/A'd	7/19/82
62.4	Reactor Building Deluge	R-DEL	5/31/82	7/19/82
62.5	Diesel-Generator Building Deluge	D-DEL	P/A'd	7/19/82
62.6	Miscellaneous Fire Protection	MFP	6/28/82	7/19/82
63.1	Main Steam Piping	MSP	(P2) 7/19/82	7/11/83
63.2	Main Steam Leakage Control	MSLC	5/2/83	7/11/83
64.0	Extraction Steam System	BS	(P3) 11/29/82	1/31/83
65.0	Sealing Steam	SS	P/A'd	1/3/83
66.0	Condenser Air Removal	AR	(P3) 5/3/82	3/14/83
68.1	Auxilary Boiler	AB	P/A'd	10/4/82
68.2	Heating Steam	HS	P/A'd	10/4/82
69.1	Condensor	CONDR	(P4) 11/1/82	1/3/83
69.2	Condensate Piping	CONDP	P/A'd	1/3/83
70.0	Condensate Storage and Transfer	CST	P/A'd	6/6/83
71.0	Condensate Filter Demineralizer System	CPR	P/A'd	2/28/83

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INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
72.1	Feedwater Equipment	RFW	(P5) 8/30/82	7/11/83
72.2	Feedwater Turbines and Auxillaries	RFWDT	P/A'd	5/2/83
72.3	Feedwater Control	TWC	3/14/83	6/27/83
74.0	Heater Vents and Drains Systems	HD	11/1/82	4/11/83
75.0	Turbine Oil Purification and Transfer	TO	P/A'd	11/1/82
76.0	Non-Radioactive Drains	ED/FD	7/4/83	7/18/83
77.0	Sanitary Systems	PSD	11/15/82	12/13/82
78.1	Control and Service Air System-Turbine Building	CAS-T	P/A'd	5/2/83
78.2	Control and Service Air System-Radwaste Building	CAS-W	P/A'd	5/30/83
78.3	Control and Service Air System-Reactor Building	CAS-R	(P3) 4/4/83	5/2/83
79.0	Plant Communication System	PCOM	8/2/82	8/23/82
80.0	Reactor Building HVAC System	R-H&V	7/19/82	2/7/83
81.0	Reactor Building Emergency Cooling System	R-HVAC	9/13/82	1/3/83
82.0	Turbine Building H&V System	T-H&V	6/14/82	8/9/82
84.0	Control, Cable, and Critical Switchgear Rooms HVAC System	CR-HVAC	5/17/82	10/4/82

Date: 4/20/82

I = Instrumentation
E = Electrical
BAL = Balance

INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
85.1	Radwaste Building HVAC	W-HVAC	P/A'd	8/2/82
85.2	Radwaste Chilled Water	WCH	P/A'd	8/2/82
87.0	Standby Service Water Pumphouse H&V	SP-H&V	P/A'd	8/2/82
88.0	Diesel Generator Building H&V	D-H&V	P/A'd	8/23/82
89.1	Service Building HVAC	S-HVAC	P/A'd	10/4/82
89.2	Service Building Heating Hot Water System	SHHW	P/A'd	10/4/82
89.3	Service Building Chilled Water System	SCH	P/A'd	6/28/82
89.4	Water Treatment HVAC	WT-HVAC	P/A'd	10/4/82
89.5	Machine Shop HVAC	MS-H&V	P/A'd	10/4/82
89.6	Security Building HVAC	SB-HVAC	P/A'd	6/7/82
89.7	Technical Support Center HVAC	TSC-HVAC	10/11/82	11/8/82
92.0	Off-Gas Vault HVAC	OG-HVAC	12/20/82	3/14/83
93.0	Seismic Monitoring System	SM	4/11/83	5/23/83
94.0	Circulating Water Pumphouse H&V	CP-H&V	P/A'd	T/O'd
95.0	Makeup Water Pumphouse H&V	MP-H&V	P/A'd	T/O'd

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INTEGRATED PROJECT SCHEDULE, REV.1
PROVISIONAL ACCEPTANCE AND TURNOVER DATES

System Number	Title	Abbrev.	P/A Date	T/O Date
96.0	Cooling Tower Electrical Building H&V	CT-H&V	P/A'd	T/O'd
97.0	Meteorological System	M	P/A'd	T/O'd
101.0	Heat Tracing/Freeze Protection	HT/FP	11/15/82	3/14/83
102.0	Power Plant Information Communications System	PPICS	7/12/82	10/18/82
103.0	Transient Data Acquisition System (STARTAC)	TDAS	1/10/83	3/7/83
104.0	Security System	SEC	(P18) 6/28/82	(T1)5/31/82 (T2)8/30/82
105.0	Cathodic Protection	CP	9/6/82	10/4/82
106.0	Process Sampling	PS/PSR	As required	5/16/83
107.0	Cranes and Hoists	MT-REACTOR MT-OTHER	8/2/82 As required	8/16/82 8/1/83
108.0	Miscellaneous Equipment	ME	As required	9/5/83
109.0	Facilities	FAC	As required	9/5/83
110.0	Loose Part Detection	LPD	(P1) 1/3/83 (P2) 1/3/83 (P3) 1/3/83	3/7/83

IMPLEMENTATION

The implementation of the STS on an individual license application will proceed in three phases. The major steps within each phase are indicated below.

Phase I

The applicant should;

1. Obtain copies of the STS from the LPM.

2. Identify and mark those specifications not required because of plant design or other factors. Specifications within this category should be retained in position within the document package for later review and discussion.

3. Identify those areas where specifications are required but are not provided in the STS.

4. Provide the applicable values of the parameters and variables identified by blanks or parentheses in the STS.

5. Provide the figures, graphs and other information required to complete the STS package.

Phase II

1. The Commission staff will review the information provided in the marked up STS package resulting form the Phase I preparation.

2. An applicant/staff meeting will be held to resolve noted differences of position and other related comments from the applicant, vendor and A.E.

Phase III

1. The Commission will provide a Proof and Review edition of the technical specification for final review by all parties based upon the resolution of comments and positions in Phase II.

2. Final comments and corrections will be incorporated into the document as received.

3. The Technical Specifications will be issued by the Commission as Appendix "A" of the Operating License.

EXAMPLES OF TECH SPEC ISSUES IDENTIFIED

ISSUE	CONCERN
1. Control Rod Operability 3/4.1.3.1	Provisions of specification 3.0.4 with regard to inoperable control rods do not reflect the conditions assumed in the FSAR transient and safety analysis
2. MSIV Leakage Rate 3/4.6.1.2	The approach to establishment of STS allowable leakage limits for MSIV's vary from plant to plant
3. Recirculation Pump Operation 3/4.4.1.1	Action statement requiring immediate scram on loss of both recirculation pumps imposes a transient on the plant not warranted by plant status
4. Main Turbine Bypass System 3/4.7.10	Various options for appropriate action statements (such as MCPR penalty, 25% power derate) should be accepted as generic resolution are available
5. Snubbers 3/4.7.4	Existing surveillance requirements do not recognize the current plant design (primarily a large increas in number of snubbers installed)
6. Control Rod Scram Accumulator 3/4.1.3.5	While recognizing the automatic scram on low CRD pump discharge pressure is an acceptable resolution other options are being evaluated and may be presented on specific dockets
7. EOC-RPT Response Time 1.12	Response time as presented in STS could be modified to reflect the parameters testable by standard method as previous submitted by LRG
8. Operational Leakage 3/4.4.3.2	Clarification of valve isolation provisions of Action statment will faciliate uniform implementatic
9. AC Power Source 3/4.8.1.1	Action statements require high frequency (8 hours) disesel testing

ATTACHMENT 5

TECHNICAL SPECIFICATION SIGN-OFF SHEET

Tech. Spec. Section: 3/4.4.5

Subject: Specific Activity

Lead Technical Reviewer: L. F. Coleman

Mark-Up Due to Licensing: 9/15/81

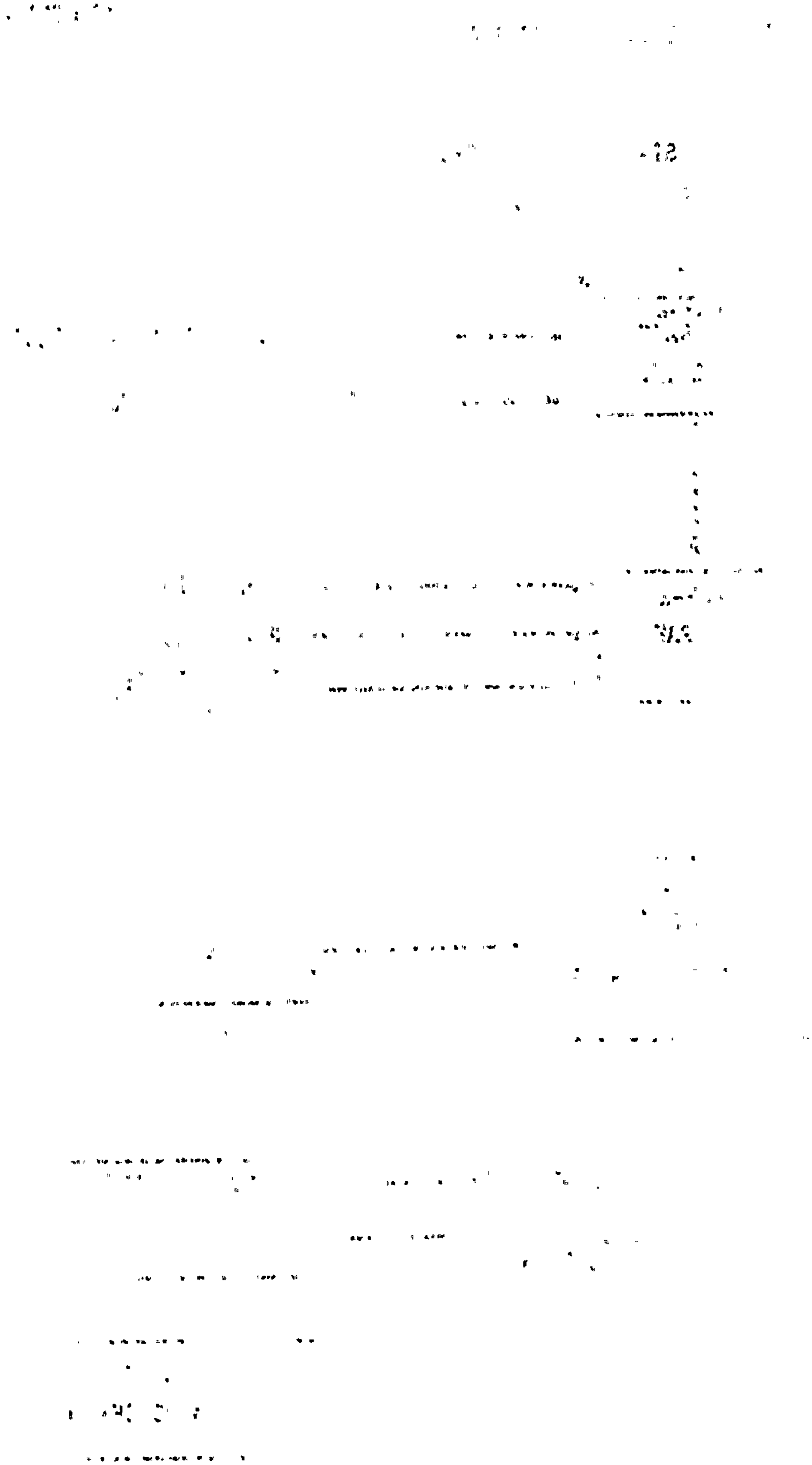
The mark-ups should include a brief technical description of why the changes were made and a list of "later"s to go in the OCI log.

L. F. Coleman — 01/06/82
Lead Technical Reviewer(s) — Date

C. A. McNitt — 01/07/82
Manager, Safety Engineering Group, WNP-2 — Date

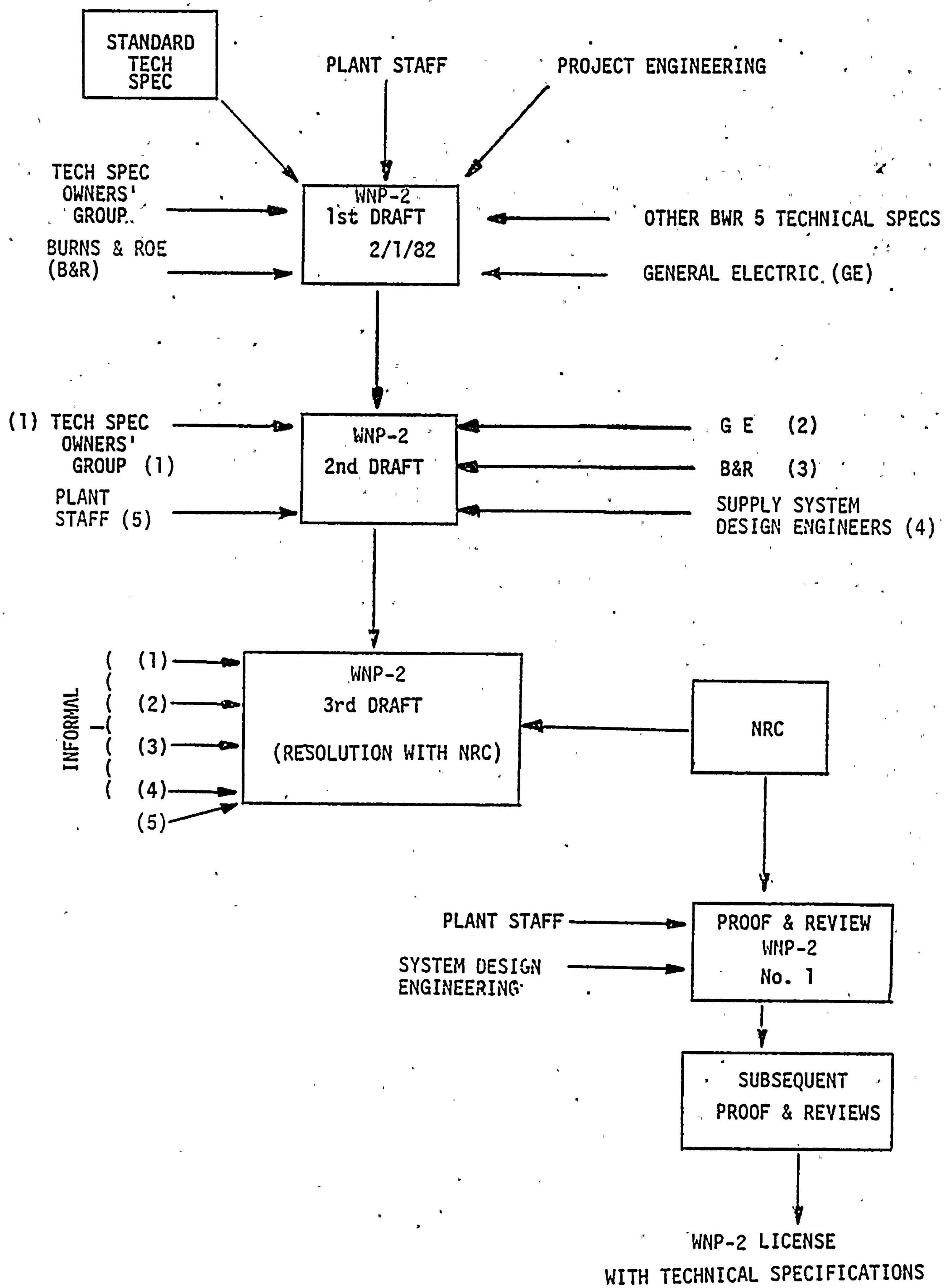
C. M. Powers /cc — 1/8/82
Technical Superintendent — Date

D. C. Timmins — 1/12/82
~~Design Engineering Supervisor~~ — Date
Asst. Mgr., Engineering



ATTACHMENT 6

TECHNICAL SPECIFICATION GENERATION PROCESS



ATTACHMENT 7

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 ECCS - OPERATING

LIMITING CONDITION FOR OPERATION

3.5.1 ECCS divisions 1, 2 and 3 and the automatic depressurization system (ADS) shall be OPERABLE with:

a. ECCS division 1 consisting of:

1. The OPERABLE low pressure core spray (LPCS) system with a flow path capable of taking suction from the suppression chamber and transferring the water through the spray sparger to the reactor vessel.

2. The OPERABLE low pressure coolant injection (LPCI) subsystem "A" of the RHR system with a flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel.

Seven

3. ~~(At least) (7)~~ OPERABLE ADS valves.

b. ECCS division 2 consisting of:

1. The OPERABLE low pressure coolant injection (LPCI) subsystems "B" and "C" of the RHR system, each with a flow path capable of taking suction from the suppression chamber and transferring the water to the reactor vessel.

Seven

2. ~~(At least) (7)~~ OPERABLE ADS valves.

c. ECCS division 3 consisting of the OPERABLE high pressure core spray (HPCS) system with a flow path capable of taking suction from the suppression chamber and transferring the water through the spray sparger to the reactor vessel.

APPLICABILITY: OPERATIONAL CONDITION 1, 2* # and 3*.

*The ADS is not required to be OPERABLE when reactor steam dome pressure is less than or equal to 100 psig.

#See Special Test Exception 3.10.6.

FEB 01 1982

EMERGENCY CORE COOLING SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION:

a. For ECCS division 1, provided that ECCS divisions 2 and 3 are OPERABLE:

1. With the LPCS system inoperable, restore the inoperable LPCS system to OPERABLE status within 7 days.

2. With LPCI subsystem "A" inoperable, restore the inoperable LPCI subsystem "A" to OPERABLE status within 7 days.

3. With the LPCS system inoperable and LPCI subsystem "A" inoperable, restore at least the inoperable LPCI subsystem "A" or the inoperable LPCS system to OPERABLE status within 72 hours.

4. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. For ECCS division 2, provided that ECCS divisions 1 and 3 are OPERABLE:

1. With LPCI subsystem "B" or "C" inoperable, restore the inoperable LPCI subsystem "B" or "C" to OPERABLE status within 7 days.

2. With LPCI subsystems "B" and "C" inoperable, restore at least the inoperable LPCI subsystem "B" or "C" to OPERABLE status within 72 hours.

3. Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours*.

c. For ECCS division 3, provided that ECCS divisions 1 and 2 and the RCIC system are OPERABLE:

1) With ECCS division 3 inoperable, restore the inoperable division to OPERABLE status within 14 days.

2) Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. For ECCS divisions 1 and 2, provided that ECCS division 3 is OPERABLE:

1) With LPCI subsystem "A" and LPCI subsystem "B" or "C" inoperable, restore at least the inoperable LPCI subsystem "A" or the inoperable LPCI subsystem "B" or "C" to OPERABLE status within 72 hours.

*Whenever two or more RHR subsystems are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

EMERGENCY CORE COOLING SYSTEMS

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

2) With the LPCS system inoperable and LPCI subsystems "B" or "C" inoperable, restore at least the inoperable LPCS system or the inoperable LPCI subsystem "B" or "C" to OPERABLE status within 72 hours.

3) Otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours*.

e. For ECCS divisions 1 and 2, provided that ECCS division 3 is OPERABLE and divisions 1 and 2 are otherwise OPERABLE:

1. With one of the above required ADS valves inoperable, restore the inoperable ADS valve to OPERABLE status within 14 days or be in at least HOT SHUTDOWN within the next 12 hours and reduce reactor steam dome pressure to ≤ ~~(100)~~ psig within the next 24 hours.

2. With two or more of the above required ADS valves inoperable, be in at least HOT SHUTDOWN within 12 hours and reduce reactor steam dome pressure to ≤ ~~(100)~~ psig within the next 24 hours.

f. With an ECCS discharge line "keep filled" ~~(pressure)~~ ~~(pump failure)~~ alarm instrumentation channel inoperable, perform Surveillance Requirement 4.5.1.a.1 at least once per 24 hours.

g. With an ECCS header delta P instrumentation channel inoperable, restore the inoperable channel to OPERABLE status with 72 hours or determine ECCS header delta P locally at least once per 12 hours; otherwise, declare the associated ECCS inoperable.

h. With the Surveillance Requirement of Specification 4.5.1.d.2 not performed at the required interval due to low reactor steam pressure, the provisions of Specification 4.0.4 are not applicable provided the appropriate surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test.

i. In the event an ECCS system is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation, the total accumulated actuation cycles to date and the current value of the useage factor for each affected safety injection nozzle whenever its value exceeds 0.70.

*Whenever two or more RHR subsystems are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

4.5.1. ECCS division 1, 2 and 3 shall be demonstrated OPERABLE by:

a. At least once per 31 days for the LPCS, LPCI and HPCS systems:

1. Verifying that the system piping from the pump discharge valve to the system isolation valve is filled with water.

2. Performance of a CHANNEL FUNCTIONAL TEST of the:

a) Discharge line "keep-filled" pressure ~~(pump failure)~~ alarm instrumentation, and

b) Header delta P instrumentation.

3. Verifing that each valve, manual, power operated or automatic, in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. Verifing that, when tested pursuant to Specification 4.0.5, each:

1. LPCS pump develops a flow of at least ~~(6350)~~ 6250 gpm against a test line pressure greater than or equal to ~~(452)~~ later psig.

2. LPCI pump develops a total flow of at least ~~(7000)~~ 7067 gpm against a test line pressure greater than or equal to ~~(???)~~ Later psig.

3. HPCS pump develops a flow of at least ~~(650)~~ 6250 gpm against a test line pressure greater than or equal to ~~(397)~~ Later psig.

c. For the LPCS, LPCI and HPCS systems, at least once per 18 months:

1. Performing a system functional test which includes simulated automatic actuation of the system throughout its emergency operating sequence and verifying that each automatic valve in the flow path actuates to its correct position. Actual injection of coolant into the reactor vessel may be excluded from this test.

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

2. Performing a CHANNEL CALIBRATION of the:

   a) Discharge line "keep filled" *pressure* ~~(pump failure)~~ alarm instrumentation and verifying the:

      1) High pressure setpoint and the low pressure setpoint of the:

         (a) LPCS system to be ≤ 585 ~~(450)~~ psig and ≥ ~~(40)~~* psig, respectively.

         (b) LPCI subsystems to be ≤ *400* psig and ≥ ~~(40)~~* psig, respectively.

      2) Low pressure setpoint of the HPCS system to be ≥ 50 ~~(40)~~ psig.

   b) Header delta-P instrumentation and verifying the setpoint of the:

      1) LPCS system and LPCI subsystems to be ± *1* psid.

      2) HPCS system to be 5.0 ~~(0.5)~~ ± *0.25* psid less than the normal indicated Static ΔP.

3. Verifying that the suction for the HPCS system is (automatically) transferred from the condensate storage tank to the suppression chamber on a condensate storage tank low water level signal and on a suppression chamber high water level signal.

d. At least once per 18 months for the ADS by:

1. Performing a system functional test which includes simulated automatic actuation of the system throughout its emergency operating sequence, but excluding actual valve actuation.

2. Manually opening each ADS valve (when the reactor steam dome pressure is greater than or equal to 100 psig) and observing ~~(the expected change in the indicated valve position)~~ *that either:

   a) The control valve or bypass valve position responds accordingly, or

   b) There is a corresponding change in the measured steam flow. *

   add c) The accoustical sensor mounted on the valve indicates that steam is flowing through the valve.

* To be determined during pre-op testing

PROMPT NOTIFICATION WITH WRITTEN FOLLOWUP

6.9.1.8 The types of events listed below shall be reported within 24 hours by telephone and confirmed by telegraph, mailgram, or facsimile transmission to the Director of the Regional Office, or his designate no later than the first working day following the event, with a written followup report within 14 days. The written followup report shall include, as a minimum, a completed copy of a licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

a. Failure of the reactor protection system or other systems subject to limiting safety system settings to initiate the required protective function by the time a monitored parameter reaches the setpoint specified as the limiting safety system setting in the technical specifications or failure to complete the required protective function.

b. Operation of the unit or affected systems when any parameter or operation subject to a limiting condition for operation is less conservative than the least conservative aspect of the limiting condition for operation established in the technical specifications.

c. Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment.

d. Reactivity anomalies involving disagreement with the predicted value of reactivity balance under steady state conditions during power operation greater than or equal to 1% delta k/k; a calculated reactivity balance indicating a SHUTDOWN MARGIN less conservative than specified in the technical specifications; short-term reactivity increases that correspond to a reactor period of less than 5 seconds or, if subcritical, an unplanned reactivity insertion of more than 0.5% delta k/k; or occurrence of any unplanned criticality.

e. Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents analyzed in the SAR.

f. Personnel error or procedural inadequacy which prevents or could prevent, by itself, the fulfillment of the functional requirements of systems required to cope with accidents analyzed in the SAR.

g. Conditions arising from natural or man-made events that, as a direct result of the event, require unit shutdown, operation of safety systems, or other protective measures required by technical specifications.

PROMPT NOTIFICATION WITH WRITTEN FOLLOWUP (Continued)

h. Errors discovered in the transient or accident analyses or in the methods used for such analyses as described in the safety analysis report or in the bases for the technical specifications that have or could have permitted reactor operation in a manner less conservative than assumed in the analyses.

i. Performance of structures, systems, or components that requires remedial action or corrective measures to prevent operation in a manner less conservative than assumed in the accident analyses in the safety analysis report or technical specifications bases; or discovery during unit life of conditions not specifically considered in the safety analysis report or technical specifications that require remedial action or corrective measures to prevent the existence or development of an unsafe condition.

THIRTY DAY WRITTEN REPORTS

6.9.1.9 The types of events listed below shall be the subject of written reports to the Director of the Regional Office within thirty days of occurrence of the event. The written report shall include, as a minimum, a completed copy of a licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

a. Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.

b. Conditions leading to operation in a degraded mode permitted by a limiting condition for operation or plant shutdown required by a limiting condition for operation.

c. Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.

d. Abnormal degradation of systems other than those specified in 6.9.1.8.c above designed to contain radioactive material resulting from the fission process.

ATTACHMENT 7

the maintenance and use of equipment installed in radioactive waste systems, pursuant to paragraph (a) of this section; an (2) a revised estimate of the information required in paragraph (b)(2) of this section if the expected releases and exposures differ significantly from the estimates submitted in the application for a construction permit.

[35 FR 18387, Dec. 3, 1970, as amended at 40 FR 58847, Dec. 19, 1975]

§ 50.35 Issuance of construction permits.[1]

(a) When an applicant has not supplied initially all of the technical information required to complete the application and support the issuance of a construction permit which approves all proposed design features, the Commission may issue a construction permit if the Commission finds that (1) the applicant has described the proposed design of the facility, including, but not limited to, the principal architectural and engineering criteria for the design, and has identified the major features or components incorporated therein for the protection of the health and safety of the public; (2) such further technical or design information as may be required to complete the safety analysis, and which can reasonably be left for later consideration, will be supplied in the final safety analysis report; (3) safety features or components, if any, which require research and development have been described by the applicant and the applicant has identified, and there will be conducted, a research and development program reasonably designed to resolve any safety questions associated with such features or components; and that (4) on the basis of the foregoing, there is reasonable assurance that, (i) such safety questions will be satisfactorily resolved at or before the latest date stated in the application for completion of construction of the proposed facility, and (ii) taking into consideration the site criteria contained in Part 100 of this chapter, the proposed facility can be constructed and operated at the proposed location without undue risk to the health and safety of the public.

NOTE: When an applicant has supplied initially all of the technical information required to complete the application, including the final design of the facility, the findings required above will be appropriately modified to reflect that fact.

(b) A construction permit will constitute an authorization to the applicant to proceed with construction but will not constitute Commission approval of the safety of any design feature or specification unless the applicant specifically requests such approval and such approval is incorporated in the permit. The applicant, at his option, may request such approvals in the construction permit or, from time to time, by amendment of his construction permit. The Commission may, in its discretion, incorporate in any construction permit provisions requiring the applicant to furnish periodic reports of the progress and results of research and development programs designed to resolve safety questions.

(c) Any construction permit will be subject to the limitation that a license authorizing operation of the facility will not be issued by the Commission until (1) the applicant has submitted to the Commission, by amendment to the application, the complete final safety analysis report, portions of which may be submitted and evaluated from time to time, and (2) the Commission has found that the final design provides reasonable assurance that the health and safety of the public will not be endangered by operation of the facility in accordance with the requirements of the license and the regulations in this chapter.

(Sec. 185, 68 Stat. 955; 42 U.S.C. 2235)

[27 FR 12915, Dec. 29, 1962, as amended at 31 FR 12780, Sept. 30, 1966; 35 FR 5318, Mar. 31, 1970; 35 FR 6644, Apr. 25, 1970; 35 FR 11461, July 7, 1970]

§ 50.36 Technical specifications.

(a) Each applicant for a license authorizing operation of a production or utilization facility shall include in his application proposed technical specifi-

[1] The Commission may issue a provisional construction permit pursuant to the regulations in this part in effect on March 30, 1970, for any facility for which a notice of hearing on an application for a provisional construction permit has been published on or before that date.

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cations in accordance with the requirements of this section. A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications.

(b) Each license authorizing operation of a production or utilization facility of a type described in § 50.21 or § 50.22 will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to § 50.34. The Commission may include such additional technical specifications as the Commission finds appropriate.

(c) Technical specifications will include items in the following categories:

(1) *Safety limits, limiting safety system settings, and limiting control settings.* (i)(A) Safety limits for nuclear reactors are limits upon important process variables which are found to be necessary to reasonably protect the integrity of certain of the physical barriers which guard against the uncontrolled release of radioactivity. If any safety limit is exceeded, the reactor shall be shut down. The licensee shall notify the Commission, review the matter and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude reoccurrence. Operation shall not be resumed until authorized by the Commission.

(B) Safety limits for fuel reprocessing plants are those bounds within which the process variables must be maintained for adequate control of the operation and which must not be exceeded in order to protect the integrity of the physical system which is designed to guard against the uncontrolled release of radioactivity. If any safety limit for a fuel reprocessing plant is exceeded, corrective action shall be taken as stated in the technical specification or the affected part of the process, or the entire process if required, shall be shut down, unless such action would further reduce the margin of safety. The licensee shall notify the Commission, review the matter and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude reoccurrence. If a portion of the process or the entire process has been shut down, operation shall not be resumed until authorized by the Commission.

(ii)(A) Limiting safety system settings for nuclear reactors are settings for automatic protective devices related to those variables having significant safety functions. Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting shall be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. If, during operation, the automatic safety system does not function as required, the licensee shall take appropriate action, which may include shutting down the reactor. He shall notify the Commission, review the matter and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude reoccurrence.

(B) Limiting control settings for fuel reprocessing plants are settings for automatic alarm or protective devices related to those variables having significant safety functions. Where a limiting control setting is specified for a variable on which a safety limit has been placed, the setting shall be so chosen that protective action, either automatic or manual, will correct the abnormal situation before a safety limit is exceeded. If, during operation, the automatic alarm or protective devices do not function as required, the licensee shall take appropriate action to maintain the variables within the limiting control setting values and to repair promptly the automatic devices or to shut down the affected part of the process and, if required, to shut down the entire process for repair of automatic devices. The licensee shall notify the Commission, review the matter and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude reoccurrence.

(2) *Limiting conditions for operation.* Limiting conditions for operation are the lowest functional capability or performance levels of equip-

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ment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specification until the condition can be met. When a limiting condition for operation of any process step in the system of a fuel reprocessing plant is not met, the licensee shall shut down that part of the operation or follow any remedial action permitted by the technical specification until the condition can be met. In the case of either a nuclear reactor or a fuel reprocessing plant, the licensee shall notify the Commission, review the matter, and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude reoccurrence.

(3) *Surveillance requirements.* Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within the safety limits, and that the limiting conditions of operation will be met.

(4) *Design features.* Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in paragraphs (c) (1), (2), and (3) of this section.

(5) *Administrative controls.* Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner.

(d)(1) This section shall not be deemed to modify the technical specifications included in any license issued prior to January 16, 1969. A license in which technical specifications have not been designated shall be deemed to include the entire safety analysis report as technical specifications.

(2) An applicant for a license authorizing operation of a production or utilization facility to whom a construction permit has been issued prior to January 16, 1969, may submit technical specifications in accordance with this section, or in accordance with the requirements of this part in effect prior to January 16, 1969.

(3) At the initiative of the Commission or the licensee, any license may be amended to include technical specifications of the scope and content which would be required if a new license were being issued.

[33 FR 18612, Dec. 17, 1968, as amended at 39 FR 24626, July 5, 1974]

§ 50.36a Technical specifications on effluents from nuclear power reactors.

(a) In order to keep releases of radioactive materials to unrestricted areas during normal reactor operations, including expected operational occurrences, as low as is reasonably achievable, each license authorizing operation of a nuclear power reactor will include technical specifications that, in addition to requiring compliance with applicable provisions of § 20.106 of this chapter, require:

(1) That operating procedures developed pursuant to § 50.34a(c) for the control of effluents be established and followed and that equipment installed in the radioactive waste system, pursuant to § 50.34(a), be maintained and used.

(2) The submission of a report to the appropriate NRC Regional Office shown in Appendix D of Part 20 of this chapter within sixty (60) days after January 1 and July 1 of each year specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six (6) months of operation, and such other information as may be required by the Commission to estimate maximum potential annual radiation doses to the public resulting from effluent releases. Copies of such report shall be sent to the Director of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. If quantities of radioactive materials released during the reporting period are significantly above design objectives, the report shall cover this specifically. On the basis of such reports and any additional information the Commission may obtain from the li-

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[35 FR 18388, Dec. 3, 1970, as
FR 8789, Mar. 3, 1975; 40 FF
1975; 40 FR 58847, Dec. 1
16446, Apr. 19, 1976]

§ 50.37 Agreement limiting stricted Data.

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censee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

(b) In establishing and implementing the operating procedures described in paragraph (a) of this section, the licensee shall be guided by the following considerations: Experience with the design, construction and operation of nuclear power reactors indicates that compliance with the technical specifications described in this section will keep average annual releases of radioactive material in effluents at small percentages of the limits specified in § 20.106 of this chapter and in the operating license. At the same time, the licensee is permitted the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power even under unusual operating conditions which may temporarily result in releases higher than such small percentages, but still within the limits specified in § 20.106 of this chapter and the operating license. It is expected that in using this operational flexibility under unusual operating conditions, the licensee will exert his best efforts to keep levels of radioactive material in effluents as low as practicable. The guides set out in Appendix I provide numerical guidance on limiting conditions for operation for light-water-cooled nuclear power reactors to meet the requirement that radioactive materials in effluents released to unrestricted areas be kept as low as is reasonably achievable.

[35 FR 18388, Dec. 3, 1970, as amended at 40 FR 8789, Mar. 3, 1975; 40 FR 19442, May 5, 1975; 40 FR 58847, Dec. 19, 1975; 41 FR 16446, Apr. 19, 1976]

§ 50.37 Agreement limiting access to Restricted Data.

As part of his application and in any event prior to the receipt of Restricted Data or the issuance of a license or construction permit, the applicant shall agree in writing that he will not permit any individual to have access to Restricted Data until the Civil Service Commission shall have made an investigation and report to the Commission on the character, associations, and loyalty of such individual, and the Commission shall have determined that permitting such person to have access to Restricted Data will not endanger the common defense and security. The agreement of the applicant in this regard shall be deemed part of the license or construction permit, whether so stated therein or not.

§ 50.38 Ineligibility of certain applicants.

Any person who is a citizen, national, or agent of a foreign country, or any corporation, or other entity which the Commission knows or has reason to believe is owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government, shall be ineligible to apply for and obtain a license.

(Sec. 161, as amended, Pub. L. 83-703, 68 Stat. 948 (42 U.S.C. 2201); sec. 201, as amended, Pub. L. 93-438, 88 Stat. 1243 (42 U.S.C. 5841))

[21 FR 355, Jan. 16, 1956, as amended at 43 FR 6924, Feb. 17, 1978]

§ 50.39 Public inspection of applications.

Applications and documents submitted to the Commission in connection with applications may be made available for public inspection in accordance with the provisions of the regulations contained in Part 2 of this chapter.

STANDARDS FOR LICENSES AND CONSTRUCTION PERMITS

§ 50.40 Common standards.

In determining that a license will be issued to an applicant, the Commission will be guided by the following considerations:

(a) The processes to be performed, the operating procedures, the facility and equipment, the use of the facility, and other technical specifications, or the proposals, in regard to any of the foregoing collectively provide reasonable assurance that the applicant will comply with the regulations in this chapter, including the regulations in Part 20, and that the health and safety of the public will not be endangered.

(b) The applicant is technically and financially qualified to engage in the proposed activities in accordance with the regulations in this chapter.