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POWER SYSTEMS

MPRM-DDC-1

'84 MAY 15 P1:00

Docket No. STN 50-470F

February 16, 1984
LD-84-008

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Comprehensive Vibration Assessment Program

Reference: NUREG-0852, Safety Evaluation Report, dated November 1981

Enclosure: Proprietary Affidavit for CEN-263(V)-P

Dear Mr. Eisenhut:

Combustion Engineering hereby submits for your review the preliminary Comprehensive Vibration Assessment Program (CVAP) report from the prototype System 80™ plant as required by Section 3.9.2 of the Reference Report. Twenty-five (25) copies (numbered 0001-0025) of the proprietary version and fifteen (15) copies of the non-proprietary version are provided. Enclosed you will also find the appropriate supporting proprietary affidavit.

If we can be of further assistance, please contact me or Mr. T. J. Collier of my staff at (203) 285-5215.

Very truly yours,

COMBUSTION ENGINEERING, INC.

A. E. Scherer
Director
Nuclear Licensing

AES:las
Enclosure
cc: G. Meyer, Project Manager, USNRC

~~8402220489~~

NRC Question:

640.16 In response to Item 640.5 (Question 14A.6), you committed to provide copies of startup test procedures to NRC for review at least 60 days prior to fuel loading. FSAR Section 14.2.11 should be revised to be consistent with this commitment (Amendment 12 modification).

APS Response:

Amendment 12 reflects the PVNGS commitment to meet the intent of Regulatory Guide 1.68, Appenix B, Rev. 0. That is, to provide in a timely manner Phase I through IV test procedures to assist the NRC Regional personnel in implementing their inspection program.

With regard to the Startup Test Program, Phases II through IV, the intent of Amendment 12 of the PVNGS FSAR was to relax our previous statement of having all startup test procedures available for review by the NRC 60 days prior to fuel load. The anticipated length of the startup test program will be one year, consisting of approximately 128 test procedures to be performed at various times throughout the program for a minimum total of 240 test performances. With the large number of individual test procedures to be provided, it is not unreasonable to specify that the approved test procedures would be available for the NRC review 60 days prior to its intended performance.

Our full intent, however, was to have 60 days prior to fuel load at a minimum, the following procedures available for the inspector's review:

1) Administrative procedures governing the conduct of the initial startup test program.

2) Controlling procedure documents for Startup Test Program milestones that include prerequisites, precautions and instructions in establishing the plant conditions required to conduct the individual test procedures:

   (a) Fuel Loading
   (b) Post Hot Functional Test
   (c) Initial Criticality
   (d) Low Power Physics Test
   (e) Power Ascension

In addition, a majority of the 128 individual test procedures were also to be available for the inspector's review at this time.

To avoid any confusion or misunderstanding of the wording in section 14.2.11, the following is proposed:

"Phase I test procedures are scheduled to be approved and available for review by the NRC inspectors at least 60 days prior to their scheduled performance date. Phase II through IV Startup Test Program

administrative control procedures, the majority of the individual test procedures and the following milestone controlling procedure documents: Fuel Loading, Post Core HFT, Initial Criticality, Low Power Physics Test and Power Ascension, are scheduled to be approved and available for review at least 60 days prior to fuel load. The remaining individual test procedures will be scheduled for approval and available for review by the NRC inspectors at least 60 days prior to their intended performance date."

Also attached is a marked up copy of FSAR Section 14.2.11 reflecting this proposed change.

APS believes this revision satisfies the intent of Reg. Guide 1.68, Rev. 0 in providing, in a reasonable time period prior to procedure performance, a procedure for the NRC inspector's review to assist them in establishing an inspection program during major milestones of the initial startup test program.

14.2.10.2 Initial Criticality

Refer to CESSAR Section 14.2.10.2 for a description of initial criticality.

14.2.11 TEST PROGRAM SCHEDULE

The test program for each unit encompasses approximately 24 months. Approximately 2 months of this time has prerequisite tests as the controlling path. Preoperational and pre-core hot functional testing are the controlling path for about 16 months. The remaining 6 months are devoted to fuel loading, post-core hot functionals, low power physics, and power ascension testing.

The scheduling of individual tests or test sequences is made to ensure that systems and components that are to prevent or mitigate the consequences of postulated accidents are tested prior to fuel loading. Tests that require a substantial core power level for proper performance are performed at the lowest power level commensurate with obtaining acceptable test data. Safety-related systems are tested to provide reasonable assurance that they operate satisfactorily when required, prior to exceeding 25% of rated thermal power.

Prerequisite testing will commence when construction has turned over testable portions of systems. Preoperational and subsequent testing will commence when systems are released to Startup Department. Test procedures will contain a list of prerequisites which must be completed and verified prior to the start of a particular test. The use of prerequisites in test procedures ensures that the safety of the plant is not dependent on the performance of untested systems. 12

~~Phase I test procedures~~ are scheduled to be approved and available for review by NRC ~~inspectors at least~~ 60 days prior to their ~~scheduled~~ performance date or 60 days prior to fuel ~~loading~~. 12 12

* INSERT A

12 Fuel ~~loading and Phase~~ II through Phase IV startup ~~test procedures~~ are scheduled to be ~~approved and available~~ for review by NRC inspectors at ~~least~~ 60 days prior to their intended ~~performance~~ date.

14.2.12 INDIVIDUAL TEST DESCRIPTIONS

Individual test descriptions are listed in table 14.2-1 and are presented in appendix 14B.

Insert A

"Phase I test procedures are scheduled to be approved and available for review by the NRC inspectors at least 60 days prior to their scheduled performance date. Phase II through IV Startup Test Program administrative control procedures, the majority of the individual test procedures and the following milestone controlling procedure documents: Fuel Loading, Post Core HFT, Initial Criticality, Low Power Physics Test and Power Ascension, are scheduled to be approved and available for review at least 60 days prior to fuel load. The remaining individual test procedures will be scheduled for approval and available for review by the NRC inspectors at least60 days prior to their intended performance date."

NRC Question:

640.17 In the FSAR, Chapter 14 Table of figures, FSAR Figures 14.2-1 and 14.2-2 state that they will be provided later. Figure 14.2-1 is referenced in FSAR Subsection 14.2.2.11 (Organizational Responsibilities), while Figure 14.2-2 is not referenced in the current FSAR Chapter 14 submittal. The figures should be provided or deleted (Amendment 12 modification).

APS Response:

APS has recently undergone a realignment of the organization that resulted in additional revision to FSAR Chapter 14 since Amendment 12 was submitted. Attached is a marked up copy of FSAR Chapter 14.2 reflecting these changes. Figure 14.2-2 will be deleted from the text.

NRC Question: 640.18

a. In response to item 640.10 (5) part 2 (Question 14A.15), you committed to revise the 125V DC Power System test (Appendix 14B.4) to demonstrate that the DC loads will function as necessary to assure plant safety at a battery terminal voltage equal to the acceptance criterion that has been established for minimum battery terminal voltage for the discharge load test. Revise Appendix 14B.4 to demonstrate that all DC loads required for safe shutdown, as installed, will function properly at the minimum battery terminal voltage (Amendment 12 modification).

b. Provide assurance that voltage measurements will be taken at each load required for safe shutdown to assure an acceptable voltage drop from the appropriate Class IE bus to each load.

APS Response:

a. The APS response to NRC Question 640.10 (5) can be found in Section 14A.15 of the PVNGS FSAR. Item (2) of the APS response states: "Section 14B.4 will be amended in the future to include the requirement to verify that DC loads will function, as necessary, at a battery terminal voltage equal to the acceptance criteria established for minimum battery terminal voltage."

The APS response does not state that the minimum battery terminal voltage that is established for the discharge load test will be used as the battery terminal voltage for the DC system test. APS has instead relied upon previous NRC guidance (Telecons in December, 1983 with Bill

Long, NRC) to determine the upper bound starting battery terminal voltage for the DC system test. Per the previous NRC Guidance, the upper bound battery terminal voltage is that voltage defined by the PVNGS Technical Specifications below which the battery is declared to be inoperable.

The purpose of the DC system test is to verify the operability of the DC loads, in the system, at the minimum operable (acceptable) battery terminal voltage. FSAR Appendix 14B.4 will be amended to state that it will be verified that the DC loads required for safe shutdown not verified by vendor tests and systems analysis, will function properly, as installed, at a battery terminal voltage equal to the minimum acceptable battery terminal voltage (see attached FSAR pages).

APS Response:

b. As stated in the responses to 640.18a, the purpose of the DC system test is to verify the operability of the DC loads, in the system, at the minimum acceptable battery terminal voltage. By verifying the operability of the DC loads required for safe shutdown, installed in the system, at the minimum acceptable battery terminal voltage conditions, APS is assured that the DC loads will function in the manner so as to bring PVNGS to a safe shutdown. Therfore, it is our intent to only verify operability and not the voltage seen by each load.

14B.4 125V DC POWER SYSTEM

1.0 OBJECTIVE

To demonstrate, by verification of the system design and by component performance testing, that the 125V DC Power System provides a reliable source of power for startup, operation, and shutdown under normal and emergency conditions, and to verify that the four separate power sources and their respective loads are independent of each other.

2.0 PREREQUISITES

2.1 Construction activities completed on components to be tested.

2 2.2 Meters and relays calibrated.

2.3 Batteries fully charged with normal height of electroyte.

2.4 Load resistor bank available for battery capacity test.

2.5 Construction activities completed on safety related equipment supplied by the battery system for the integrated system test.

2.6 Battery room ventilation available.

2.7 Appropriate ac and dc power sources available.

3.0 TEST METHOD

3.1 Inspection to verify that construction and component installation is in accordance with the system design.

3.2 Battery capacity and charger performance will be verified in both float and equalize mode.

3.3 Bus transfer devices will be tested.

3.4 Alarms and tripping devices will be tested.

3.5 The ground detector will be checked. 2

3.6 The load capacity of the battery will be measured by discharging the battery through a variable resistive load programmed to match the emergency discharge requirements of the battery. (Battery charger disconnected.)

3.7 Individual cell voltage will be monitored during the design discharge test. 8

3.8 Verify that DC loads REQUIRED FOR SAFE SHUTDOWN, not verified by vendor tests AND SYSTEM ANALYSIS, will function properly, AS INSTALLED, at a battery terminal voltage equal to the minimum acceptable battery terminal voltage. 12 8

4.0 ACCEPTANCE CRITERIA 2

4.1 The 125V DC Power System will perform the functions described in applicable portions of Section 8.3.2 when using the above test methods. 8 2

4.2 DC supplied loads REQUIRED FOR SAFE SHUTDOWN, not verified by vendor tests AND SYSTEM ANALYSIS will function, as ~~necessary,~~ INSTALLED AND REQUIRED at a battery terminal voltage equal to the acceptance criteria established for minimum battery terminal voltage. 12 8

ATTACHMENT

REVISED FSAR CHAPTER 14.2

14.2 SPECIFIC INFORMATION TO BE INCLUDED IN FSAR

14.2.1 SUMMARY OF TEST PROGRAM AND OBJECTIVES

14.2.1.1 Summary of the Startup Test Program

The Startup Test Program includes testing activities commencing with system ~~turnover~~ TRANSFER from construction and ending with the completion of the power ascension testing. This test program demonstrates that components and systems operate in accordance with design requirements and meet the requirements of 10CFR50, Appendix B, Criterion XI. The Startup Test Program results confirm that performance levels meet the operational safety requirements delineated in the FSAR, and verify the adequacy of component and system design and system operability over the operating range of the system. It also aids in the establishment of baseline performance data and serves to verify that normal operating procedures and emergency procedures accomplish their intended purposes. The Startup Test Program consists of Prerequisite Testing plus the following four phases: 12 8 12 8 12 2 10

- Phase I — Preoperational Testing 4
- Phase II — Fuel Loading and Post Core Hot Functional Testing
- Phase III — Initial Criticality and Low Power Physics Testing
- Phase IV — Power Ascension Testing

4

The Administrative Controls established for use during the Startup Program are contained in the Station Manual. 12

14.2.1.1.1 Prerequisite Testing

Prerequisite Testing consists of tests and inspections required to assure construction is complete and that systems are ready for Phase I Testing. 8 12

The Startup Test Program is conducted in accordance with the OPERATIONS Quality Assurance ~~During Operations Phase'~~ Program described in section 17.2.

Prerequisite testing VERIFIES ~~will verify'~~ that construction activities associated with the respective structures, components, and systems have been satisfactorily completed. Prerequisite testing ~~will~~ consists of preliminary tests and inspections which include, but are not limited to, initial instrument calibration, flushing, cleaning, circuit integrity and separation checks, hydrostatic pressure tests and functional tests of components. Delineation of specific prerequisite tests requirements will be established in accordance with ~~Station Manual~~ STARTUP ADMINISTRATIVE Procedures.

14.2.1.1.2 Phase I Testing - Preoperational Testing

Phase I - Preoperational Testing IS ~~will be~~ performed to demonstrate that ~~the'~~ structures, systems, and components operate in accordance with ~~the'~~ design operating modes, ~~and~~ throughout the full design operating range. Where required, simulated signals or inputs are used to demonstrate the full range of the systems that are used during normal operation. Systems that are not used during normal plant operation, but must be in a state of readiness to perform safety functions, are checked under various modes and test conditions prior to fuel load.

Whenever practical, these tests are performed under the conditions expected when the systems would be required to function. When these conditions cannot be attained or appropriately simulated at the time of the test, the system is tested to the extent practical under the given conditions, with additional testing completed at a time when appropriate conditions ~~are~~ CAN BE attained.

Preoperational Testing ensures that systems and equipment perform in accordance with the Safety Analysis Report. Analysis of test results is made to verify that systems and components are performing satisfactorily, and if not, to provide a basis for recommended corrective action.

An index of preoperational tests is provided in section 14.2.12, and a description of each test procedure is provided in Appendix 14B. 2

14.2.1.1.3 Phase II Testing - Fuel Loading and Post Core Hot Functional Testing 8

Refer to CESSAR section 14.2.1.2 for a description of Initial Fuel Loading and Post Core Hot Functional Testing.

14.2.1.1.4 Phase III Testing - Initial Criticality and Low Power Physics Testing 12

Refer to CESSAR Section 14.2.1.2 for a description of Initial Criticality and Low Power Physics Testing. 2

14.2.1.1.5 Phase IV Testing - Power Ascension Tests 12

Refer to CESSAR Section 14.2.1.2 for a description of Power Ascension Testing. 2

14.2.2 ORGANIZATION AND STAFFING

INSERT #1

~~The APS Executive Vice President, ANPP, is responsible for the design, construction, startup, and operation of the Palo Verde Nuclear Generation Station. The responsibility for construction completion, startup, and operation is delegated to the Vice President, Nuclear, who in turn delegates those responsibilities as follows:~~ 12

- ~~Prerequisite and Phase I test program to the Startup Manager~~
- ~~Phase II through IV test programs and plant operations to the Manager of Nuclear Operations.~~

Responsibilities associated with startup test programs include the preparation of test procedures, performance of applicable

Insert #1 To Page 14.2-3

14.2.2.2 Transition Department

The transition Department is responsible for Project Management during the transition phase (subsystem transfer from Construction to subsystem acceptance by Operations) of the project. This includes providing central project direction and coordination of support activities by other interfacing organizations.

The Transition Department is composed of representatives from the principal interface organizations (Combustion Engineering, Bechtel Power Corp., Nuclear Construction, Nuclear Engineering, Startup, Operations, and Scheduling) and is headed by the Manager, Transition. APS Quality Assurance provides a representative to the Transition Department to assist in quality assurance matters.

initial tests, and the preparation of appropriate test related documentation. Test procedures are prepared by either the Startup or Nuclear Operation Departments with assistance from the NSSS supplier, Combustion Engineering Inc. (CE); the architect engineer, Bechtel Power Corporation (BPC); and other vendors as required. These procedures are subject to review and comment by the appropriate design organizations.

The organizations assigned ~~to conduct~~ RESPONSIBILITY FOR CONDUCTING the tests are responsible for establishing specific requirements for scheduling, and accomplishing testing, as well as for providing the necessary direction and coordination of groups having responsibility for specific activities in the startup test program. The organizations participating in the initial test program are discussed in the following sections.

14.2.2.1 DELETED

14.2.2.2 DELETED

INSERT #2

Insert #2 To Page 14.2-4

14.2.2.2.1 Manager, Transition

The Manager, Transition is reponsible for the Startup Program, setting engineering/construction priorities to meet the startup schedules, completing systems prior to acceptance by Operations and supporting operations to full power. The Manager, Transition is assisted in his duties by the Startup Manager who is assigned the responsibility for the functional and technical aspects for the Startup Program.

14.2.2.3 Startup Department

The Startup Department is responsible for the Prerequisite and Phase I test programs at PVNGS. The Startup Manager is responsible to the ~~Vice President, Nuclear~~ MANAGER, TRANSITION for the conduct of the Startup Test Program through Phase I testing. The functions and responsibilities of key members of the Startup Department are described in sections 14.2.2.3.1 through 14.2.2.3.~~8~~ 6. 12

14.2.2.3.1 Startup Manager 10

The Startup Manager is responsible to the ~~Vice President of Nuclear Operations~~ MANAGER TRANSITION for the TECHNICAL AND FUNCTIONAL ASPECTS OF THE STARTUP PROGRAM INCLUDING THE conduct of the Prerequisite and Phase I TEST programs and is specifically charged with the following additional responsibilities: 12

- ~~Maintain liaison with the Manager of Nuclear Operations, Unit One Completion Manager, and the Project Scheduling Manager, keeping them informed of status, problems, and support requirements.~~ 10
- ~~Approve/recommend~~ approval of Startup Administrative Control Procedures. 12
- Review and approve requests for vendor assistance.
- Review and recommend approval of requests for ~~construction and engineering~~ modifications or changes required during the test program. 10
- Review progress of startup activities with contractors, vendors, and company management.
- Represent the Startup Department on interdepartmental and interorganizational committees associated with the startup test program. 12 10

- Delegate, as necessary, the authority to perform duties normally associated with the position of Startup Manager.
- Establish and dissolve those positions/organizations not specifically chartered by this document as deemed necessary to complete Phase I testing.
- APPROVAL OF PREREQUISITE AND PHASE I TEST PROCEDURES

14.2.2.3.2 Unit Startup Manager

- Maintain liaison with the Bechtel ~~Resident Engineer~~ PROJECT MANAGER and the Combustion Engineering Corporation Site Manager, keeping them informed of status, problems, and support requirements.
- Review and recommend the approval of requests for vendor assistance associated with their respective organizations.
- Review and approve/recommend approval of test procedures, test procedure modifications, and test data in accordance with the ~~Station Manual~~ STARTUP ADMINISTRATIVE CONTROL PROCEDURES.
- Review progress of startup activities with contractors and vendor.
- Represent the Startup Department on interdepartmental and interorganizational committees associated with the respective unit test programs.
- Accept systems for test and operation.
- Review and recommend approval of startup administrative control procedures.

INSERT 2A

Insert #2A To Page 14.2-6

14.2.2.3.3 Startup Program Control Manager

Responsible for Startup Information Management Programs including document control and computerized testing and work activity tracking programs. Also responsible for the coordination of activities involved in the receipt and release of subsystems through Startup.

14.2.2.3.4 Startup Administrative/Technical Support Manager

Responsible for the development and implementation of programs necessary for the support of testing activities; including administrative controls, test procedure preparation, cost and budgeting support, and material control.

14.2.2.3.5 Manager - Test Working Group

The functions and responsibilities of this individual are explained in section 14.2.2.9.

14.2.2.3.~~3~~6 Group Supervisors

- Supervise and/or coordinate the activities of assigned personnel.
- Assign test responsibility to Lead Startup Engineers.
- ~~Coordinate the preparation and maintenance of the assigned Startup Administrative Procedures.~~
- Issue periodic progress reports and work schedules for their Startup Group, AS REQUIRED.
- Issue special reports concerning startup activities as directed by the Unit Startup Manager.
- Maintain liaison with contractors and vendors to coordinate their activities relating to the startup test programs.
- Direct the work of the C-E/BPC technical personnel assigned during the startup test program.
- Request, coordinate, and monitor vendor representative assistance, as required. 12
- Review ~~and recommend approval of~~ test procedures, test procedure modifications, and test results in accordance with ~~established procedures.~~ STARTUP ADMINISTRATIVE CONTROL PROCEDURES.
- Review and recommend changes in plant design and/or construction activities to facilitate testing, operation, and maintenance.

14.2.2.3.~~4~~7 Lead Startup Engineer

- Assign a Principal Startup Engineer for each ASSIGNED system or subsystem ~~assigned to him,~~ and periodically review assignments to maintain an appropriate distribution of work load.
- Supervise the activities of and provide guidance to assigned Principal Startup Engineers and assure that

their activities are conducted in accordance with the ~~PVNGS Station Manual,~~ STARTUP PROCEDURES.

- Provide technical guidance and assistance in the preparation of test procedures.
- Determine the testing requirements, sequence, and test method on assigned systems. Recommend plant scheduling changes as necessary to support the testing effort.
- Review ~~and recommend approval of~~ test procedures, test procedure modifications, and test data in accordance with ~~established procedures.~~ STARTUP ADMINISTRATIVE CONTROL PROCEDURES.
- Recommend changes in plant design and/or construction to facilitate testing, operation, and maintenance.
- Review periodic progress reports and work schedules.
- Assist in the preparation of special reports concerning startup activities when required.
- Review system discrepancies and deficiencies and the status of their resolution and correction for ASSIGNED systems ~~assigned to him.~~

12

14.2.2.3.~~5~~8 Test Directors/Principal Startup Engineers

- Conduct~~s~~ assigned tests using and insuring compliance with approved test procedures.
- Suspend~~s~~ testing if the test cannot safely be conducted as written until the problem is resolved.
- Sign~~s~~ off individual steps in preoperational test procedures and ensure~~s~~ that required data is recorded.

- Assure~~s~~ ~~that~~ required startup materials, instruments, and consumables are available to support scheduled startup activities.
- Conduct~~s~~ pre-test and pre-shift startup briefings.

14.2.2.3.~~b~~ a Startup Engineer

- Conduct work assignments in accordance with ~~Station Manual procedures.~~ STARTUP ADMINISTRATIVE CONTROL PROCEDURES.
- Prepare assigned test procedures.
- Review engineering drawings and documents and prepare requests for construction and engineering changes, to facilitate both operation and maintenance. 12

The Startup Department will be augmented by contractor and vendor support personnel, as necessary. These personnel may be integrated into the Startup Department and function in any position designated by the Startup Manager.

14.2.2.4 DELETED

14.2.2.5 <u>Palo Verde Nuclear Generating Station Organization</u> 10

The PVNGS Station Organization is described in section 13.1 and will be utilized to the fullest extent practicable in the Startup Test Program. Plant Staff Personnel will support the Startup Test Program by: 2 12

- Providing procedures.
- Perform when requested, component~~s~~ tests (~~i.e.~~ e.g., wiring verification and instrument calibration). 2
- Perform preventive and corrective maintenance on permanent plant equipment accepted for startup testing.

2 • Operate permanently installed equipment for testing during the conduct of that startup test program.

• Provide technical support and assistance for Startup testing and related activities.

• Conducting Phase II through IV test programs. The responsibility and authority of key members involved in the test program are described in sections 14.2.2.5.1 through 14.2.2.5.~~3~~4.

INSERT #3

14.2.2.5.1 Engineering Manager

INSERT #4

• ~~Maintain~~ liaison with the Technical Support Manager, Bechtel Resident Engineer, ~~and the~~ Combustion Engineering Site Manager, AND TRANSITION MANAGER keeping them informed of status, problems, and support requirements.

• Review and recommend the approval of requests for vendor assistance as recommended by the Engineering Department Supervisors.

12 • Review and ~~approve/recommend approval~~ APPROVAL / CONCURRANCE of test procedures, test procedure ~~modifications~~ CHANGES, and test ~~data~~ RESULTS in accordance with the Station Manual.

• Review and recommend approval of requests for construction and engineering modifications or changes required during the test program.

• Review progress of startup activities with contractors and vendors.

• Represent the Engineering Department on interdepartmental and interorganizational committees associated with the Startup test program.

14.2.2.5.2 Engineering Group Supervisors

• Supervise and/or coordinate the activities of their sections.

Insert #3 To Page 14.2-10

14.2.2.5.1 Technical Support Manager

- o Review and approve Phase II thru IV test procedures.
- o Review and approve Phase II thru IV test results as specified in Technical Specifications Section 6.5.

Insert #4 To Page 14.2-10

14.2.2.5.1.1

The Engineering Manager is responsible to the Director of Nuclear Operations for the conduct of Phase II thru IV test programs and the completion of outstanding prerequiste and Phase I program tests on systems jurisdictionally controlled by Operations personnel. In addition, he is charged with the following responsibilities:

- Assign test responsibility to Responsible Engineers.
- Maintain liaison with contractors and vendors to coordinate their activities relating to the preoperational test program.
- Direct the work of the C-E NSSS technical personnel assigned during Phase II through IV test program.
- Request, coordinate, and monitor vendor representative assistance, as required.
- Review and recommend approval of test procedures, test procedure modifications, and test results in accordance with established procedures.

14.2.2.5.3 Test Program Director

- Direct the performance of testing activities through the Shift Test Directors.
- Ensure that required records, reports, test results and other documents are prepared and routed as required by Station Manual procedures. 12
- Recommend plant scheduling changes and work arounds as necessary to support the testing effort.
- Assure that required startup materials, instrument and consumable supplies are available to support scheduled startup activities.
- Coordinate the preparation and maintenance of Phase II through IV startup test procedures with assigned station groups.
- Issue periodic progress reports and work schedules for Phase II through IV activities.
- Issue special reports concerning startup activities as directed by the Engineering Manager.

14.2.2.5.4 Shift Test Directors

- Represents the Test Program Director on shift.
- Directs testing activities of Responsible Engineers on shift in coordination with the Shift Supervisor.
- Implement the startup schedule on shift.
- Review maintenance/surveillance activities on shift for impact on scheduled testing.
- Provide interim approval of test procedure changes with the Shift Supervisor.
- Provide interim approval of Test Exception Reports.

14.2.2.5.5 Responsible Engineers

- Assures that assigned test procedures are written, reviewed, and approved in accordance with the Station Manual as scheduled. 12
- Assures all prerequisites for assigned tests are completed prior to the performance of the test.
- Conducts assigned tests using and insuring compliance with approved test procedures.
- Keeps the Test Program Director informed of the status of the preparation and performance of assigned tests.
- Suspends testing if the test cannot safely be conducted as written until the problem is resolved.
- Signs off individual steps in test procedures and ensures that required data is recorded.
- Assures that required startup materials, instruments, and consumables are available to support scheduled startup activities.
- Conducts pre-test and pre-shift startup briefings.

14.2.2.6 Combustion Engineering

C-E will provide onsite technical assistance to Arizona Public Service Company during the installation, startup, testing, and initial operations of each NSSS. Through this effort, C-E aids APS and assures itself that each NSSS is installed, started, tested, and operated in conformance with design intent. C-E onsite personnel provide technical assistance and act as technical liaison with C-E Headquarters to resolve problems within C-E scope. C-E provides a member of the Test Working Group. C-E will review and comment on test procedures involving their scope of supply.

14.2.2.7 Bechtel Power Corporation (BPC)

BPC, under the direction of Arizona Public Service Company, has been designated as the Engineer-Constructor of PVNGS. As the Engineer, BPC will provide a representative to serve as a member of the Test Working Group, and staff augmentation addressed in section 14.2.2. As the Constructor, BPC will coordinate the construction schedules with Test Program requirements and provide manpower support as needed to meet the schedule, to correct deficiencies, or to make repairs.

14.2.2.8 Other Technical Specialties

In addition to the Staff described in section 14.2.2, Arizona Public Service Company will augment the Startup Staff from other contractors and vendors as deemed necessary.

14.2.2.9 Test Working Group

~~The Test Working Group (TWG) was formed prior to commencement of Phase I Preoperational Testing.~~ The function of THE TEST WORKING GROUP (TWG) is to advise the Startup Manager OF THE TECHNICAL ADEQUACY OF THE ~~in the administrative control and performance of Phase I testing.~~ PHASE I TESTING PROGRAM. The TWG functions include coordinating organizational responsibility in areas of test procedure ~~review, approval recommendations, evaluations,~~ AND TEST RESULTS REVIEWS, EVALUATIONS AND APPROVAL RECOMMENDATIONS.

~~and approval of test results.~~ The TWG is headed by a chairman appointed by the Startup Manager and consists of the following minimum membership:

- Startup Representative
- C-E Project Representative
- Bechtel Project Representative
- APS Nuclear Engineering Representative
- Operating Department Representative

If any of the TWG members are unable to attend meetings, an alternate member with full authority to act for that member is present when that member's input is required.

In addition, the TWG is responsible to the Startup Manager for the following functions during the startup:

- Review of Phase I test procedures.
- Review of changes to Phase I test procedures.
- Review of results of Phase I ~~and~~ tests ~~performed under the test program.~~

14.2.2.10 Plant Review Board

The Plant Review Board will review procedures for use beginning with initial fuel loading as discussed in section 13.4.1. The membership of this group is described in section 13.4. In addition to the functions described in section 13.4, this group will review the results of startup tests performed in accordance with procedures requiring their review; AND BEFORE FUEL LOAD, REVIEW A LISTING OF ALL PREREQUISITE AND PHASE I CARRYOVER TESTS TO PHASE II THROUGH IV, THE JUSTIFICATION FOR THEIR DEFERAL BEYOND FUEL LOAD AND A PROPOSED SCHEDULE FOR THIER PERFORMANCE.

INSERT #5

Insert #5 To Page 14.2-14

. . .and as required prerequisite and Phase I tests performed by the plant organization staff on plant systems accepted from the Startup Department.

14.2.2.10.1 Plant Review Board Test Results Review Group

Prior to initial fuel loading the Plant Review Board will establish the Test Results Review Group (TRRG). The TRRG will review and recommend approval of test procedures in accordance with Section 6.5.1 of PVNGS Technical Specifications. The TRRG will also be responsible for the review and approval RECOMMENDATION of test results. The TRRG is headed by the Engineering Manager as established by Station Manual procedures and contains members with expertise in the following areas.

- Reactor Physics 12
- Mechanical Engineering
- Electrical Engineering
- I&C
- Plant Operations
- Chemistry
- Radiation Protection
- ~~Operations QA/QC~~
- QUALITY SYSTEMS AND ENGINEERING

14.2.2.11 Organizational Responsibilities 10

The organization chart showing lines of authority for the functional groups involved in Startup Testing through Phase I is provided in figure 14.2-1. Additional personnel to assist the plant staff during the testing and startup period will be provided by other APS resources, Bechtel and C-E, or others as required. 2 12 2

APS management retains overall responsibility for preoperational testing and startup through the Vice President, Nuclear PRODUCTION. 12

The Operations Manager under the ~~Manager~~ DIRECTOR of Nuclear Operations is responsible for:

- Preparation of operating and emergency procedures
- Operation of plant equipment during system testing Phases I, II, III and IV.
- Providing a TWG member.

14.2.2.11.1 The Unit Startup Manager~~s~~ under the Startup Manager~~s~~ ~~is~~ ARE responsible for the activities discussed in 14.2.2.3.2.

14.2.2.11.2 The C-E Project Manager is responsible for the preparation of the NSSS test guidelines or procedures. The C-E Site Manager, reporting to the C-E Project Manager, is responsible for the following:

- Providing a TWG member.
- Reviewing test procedures pertaining to or interfacing with C-E supplied systems, equipment, and changes thereto, including the reviews discussed in LLIR, Item I.C.7.
- Evaluating test results for tests pertaining to C-E supplied systems and equipment.
- Coordinating the resolution of problems dealing with NSSS equipment.
- Providing technical consultation on matters relating to the operation and testing of C-E supplied systems and equipment.
- Providing adequate qualified support personnel including vendor representatives as necessary.

14.2.2.11.3 The Bechtel project organization provides technical advice and consultation on matters relating to the design, construction, operation, and testing of systems and equipment. 10 2

Accordingly, the Bechtel project organization is responsible for the following: 10

- Providing a TWG member.
- Reviewing test procedures pertaining to Bechtel scope of supply systems (e.g. balance of plant systems). 2
- Evaluating balance of plant test results.
- Coordinating resolution of problem areas by providing technical support and liaison with the Startup Organization and the Bechtel construction and design groups. 10
- Providing startup assistance as requested. 12 2

14.2.2.11.4 The APS Nuclear Engineering representative acts as a TWG member and provides liaison with APS Nuclear Engineering during the startup effort. 12 2

14.2.2.12 Qualifications 10

Staffing and qualifications of the plant organization are detailed in Chapter 13, "Conduct of Operations". 2

14.2.2.12.1 ~~Startup~~ Personnel Qualification Requirements 10

~~Startup personnel~~ PERSONNEL RESPONSIBLE FOR CONDUCT OF STARTUP PROGRAM TESTS (including TWG/TRRB members) shall be qualified as follows: 2

A. Minimum qualification of individuals that direct or supervise the conduct of individual PREREQUISITE AND Phase I ~~prerequisite and preoperational tests.~~ 12

1. At the time of assignment to the function, the individual should have a Bachelor's Degree in engineering or the physical sciences or the equivalent, and 1 year of applicable power plant experience. Included in the 1-year of experience should be at least 3 months of indoctrination/training in nuclear power plant systems and component operation of a nuclear power plant that is substantially similar in design to PVNGS. In addition the individual will undergo indoctrination/training on the PVNGS plant, or,

2. A high school diploma, or the equivalent, and 4 years of power plant experience. Credit for up to 2 years of this 4-year experience may be given for related technical training on a one-for-one time basis. Included in the 4 years of experience should be at least 3 months of indoctrination/training in nuclear power plant systems and component operation of a nuclear power plant that is substantially similar in design to PVNGS. In addition the individual will undergo indoctrination/training on the PVNGS plant, or,

3. Be qualified to the requirements of section 14.2.2.12.1. ~~(2) or (3)~~ B.1, B.2 or C.

B. Minimum qualifications of individuals that direct or supervise the conduct of individual Phase II through IV tests:

1. At the time of assignment to the function, the individual should have a Bachelor's Degree in engineering or the physical sciences or the equivalent, and 2 years of applicable power plant experience of which at least 1 year shall be applicable nuclear power plant experience, or,

2. A high school diploma or the equivalent and 5 years of applicable power plant experience of which at least 2 years shall be applicable nuclear power plant experience. Credit for up to 2 years of non-nuclear experience may be given for related technical training on a one-for-one time basis, or, 2 9

3. Written authorization from the ~~Manager~~ Director of Nuclear Operations that the individual is qualified to supervise or direct specific Phase II through IV test(s), based on a case-by-case evaluation of the individual's qualifications relative to the specific test(s). In all cases a shift test director who is qualified per ~~A~~ 1 or ~~B~~ 2 above, will be available for consultation regarding the specific test. 12

Included in the experience should be at least 3 months of indoctrination/training in nuclear power plant systems and component operation of a nuclear power plant that is substantially similar in design to PVNGS. In addition the individual will undergo indoctrination/training on the PVNGS plant. 8

C. Minimum qualifications of individuals assigned to groups ~~and~~ responsible for review and approval of Phase I ~~through IV~~ Test procedures and/or review and approval of test results. 2 4

At the time the activity is being performed, individuals assigned to perform these activities shall have a minimum of 8 years of applicable power plant experience with a minimum of 2 years of applicable nuclear power plant experience. A maximum of 4 years of non-nuclear experience may be fulfilled by satisfactory completion of academic training at the college level. 2

Included in the experience should be at least 3 months of indoctrination/training in nuclear power plant systems and component operation of (1) PVNGS or (2) a 8 10

nuclear power plant of substantially similar design. In addition individuals qualifying under item (2) will undergo indoctrination/training on the PVNGS plant.

D. The review and approval of Phase II through IV Test procedures and the review and approval of test results will be done per Section 6.5.1 of the PVNGS Technical Specifications.

INSERT #6 E.

14.2.2.13 Utilization of the Plant Staff

The plant operating, maintenance, and engineering personnel are utilized to the extent practicable during the Startup Test

Insert #6 To Page 14.2-17A

E. Subsequent to system acceptance, the minimum qualification for individuals that direct or supervise and review/approve prerequisite and Phase I test procedures and test results:

1. Startup personnel who direct or supervise the conduct of Phase I tests shall be qualified to the requirements of section 14.2.2.12.1.A.

2. Plant operations personnel who direct or supervise the conduct of prerequisite tests shall be qualified to the requirements of section 13.1.3. Plant operation personnel who direct or supervise the conduct of Phase I tests shall be qualified to the requirements of section 14.2.2.12.1.B.

3. Plant operation personnel who review and approve Phase I test procedures and test results shall be qualified to the requirements of section 13.1.3.

   The review and approval of test procedures and test results will be done in accordance with the Station Manual Procedures.

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Program. The plant staff operates permanently installed and powered equipment for PHASE I THROUGH IV ~~preoperational~~ and subsequent system tests. Service personnel such as instrument, chemistry, computer, radiation protection, and maintenance personnel are used extensively to perform tests and inspections applicable to their field of specialization.

Phase II through IV and subsequent test procedures and test results are reviewed by the plant staff as specified in the Station Manual.

14.2.3 TEST PROCEDURES

The Startup Manager has the responsibility for assuring the preparation and designating the approval process for Prerequisite and Phase I test procedures at PVNGS. The TECHNICAL SUPPORT ~~Engineering~~ Manager is responsible for insuring that Phase II through IV test procedures are prepared and approved in accordance with the Station Manual. Detailed procedure guidelines and procedures provided by the appropriate design organization are utilized to develop various system test procedures. Thus, test procedures are based on requirements of system designers. If a design organization prepares sufficiently detailed procedures, these procedures may serve in lieu of test guidelines. Procedures prepared by outside organizations will undergo the same review process as procedures prepared by PVNGS plant staff.

14.2.3.1 Prerequisite Test Procedure Preparation

Prerequisite test procedures are prepared under supervision of the STARTUP MANAGER ~~manager of the assigned startup organization~~.

Test procedures will be prepared using pertinent reference material provided by the appropriate design and/or vendor organization.

Prerequisite test procedures contains the following major divisions: 8

- Purpose/Objective 4
- Reference
- Definitions and Abbreviations
- Precautions and limitations
- Prerequisites (initial conditions)
- Instructions (including acceptance criteria)
- Restoration

Prerequisite test procedures are reviewed as specified in administrative procedures. At the completion of these reviews, any changes are incorporated in the test procedure by the originating organization.

The Unit Startup Manager has approval authority for assigned prerequisite tests and may in writing delegate approval authority. 12

14.2.3.2 Test Procedure Preparation

Detailed test procedures for Phase I tests are prepared under the Unit Startup Manager's supervision. The test procedures for Phase II through IV tests are prepared under the supervision of the Engineering Manager. Each test procedure will be prepared using pertinent reference material provided by the appropriate design and vendor organizations, the FSAR, the Technical Specifications, and the applicable regulatory guides. A test procedure is prepared for each specific system test to be performed during the four phases of the test program. Each system test procedure contains the following major divisions: 12

- Test Objectives
- Acceptance Criteria
- References

- Prerequisites
- System Initial Conditions
- Environmental Conditions
- Special Precautions
- Detailed Procedure (including data collection)
- Restoration
- Documentation of Test Results

Phase I Test procedures are reviewed as specified in STARTUP administrative control procedures. At the completion of these reviews, any REQUIRED changes are incorporated in the test procedure by the originating organization.

The Startup Manager has the approval authority for Phase I test procedures.

Startup test procedures for post-fuel load tests (Phases II through IV) and changes to such procedures will be reviewed and approved in accordance with the requirements of the facility Technical Specifications.

14.2.3.3 Special Test Procedures

Special test procedures may become necessary during the Phase I through IV test program for investigative purposes. The preparation, review, and approval of these special procedures are governed by STARTUP ADMINISTRATIVE CONTROL PROCEDURES ~~Station Manual procedure~~. Special test procedures that deal with nuclear safety are processed under the same controls as normal startup test procedures.

14.2.4 CONDUCT OF TEST PROGRAM (Phases I through IV)

When a Phase I through Phase IV system test procedure has been released for performance, a Test Director/Principal Startup

Engineer/Responsible Engineer will be responsible for (1) ensuring that prerequisites are satisfactorily met or allowable exceptions are noted in accordance with Station Manual procedures and (2) verifying that the testing is performed as required by the procedure. The test is then performed by PVNGS operating personnel or others in accordance with the approved test procedure. 12

The OPERATIONS Shift Supervisor is responsible for the safe operation of the plant during the performance of Phase I through Phase IV testing. The OPERATIONS Shift Supervisor takes action necessary to assure the safe operation of the facility. He may stop any system test in progress and place the plant in a safe condition. 8 9 4 2

The Test Director/Principal Startup Engineer/Responsible Engineer ensures that the tests are conducted in accordance with the test procedure. 12

Required data resulting from the test is compiled within the test procedure in specified data blanks or on specially prepared data sheets. Personnel completing data forms or checklists will sign and date the forms. Upon test completion, the test data is compared with the test acceptance criteria, and any discrepancies noted are resolved in accordance with applicable Station Manual Procedures. 12

Once a procedure has been approved, procedure changes will be made in accordance with the provisions of the Station Manual. 4

14.2.4.1 Sign-Off Provisions 12

Each approved test procedure shall contain sign-off provisions for prerequisites and for all procedural steps. For component tests the person conducting the test is responsible for signing and dating each data form in the spaces provided, as the data is entered. For Phase I through IV test prerequisites, the Test Director/Principal Startup Engineer/Responsible Engineer shall 12 8 2 12

12 initial the appropriate space in the test procedure. Sign-off
2 of the individual steps within the body of the test procedure is the responsibility of the Test Director/Principal Startup
12 Engineer/Responsible Engineer.

INSERT #7

2 14.2.4.2 Maintenance/Modification Procedures

Work authorization documents, controlled in accordance with the Station Manual, are used to initiate maintenance and implement modifications ~~of~~ on systems that are jurisdictionally turned over from the construction organization. The work authorization document assigns the organization responsible for the completion of the activity and specifies any retest
12 requirements. Upon completion of the activity a copy of the signed-off form is returned to the responsible testing organization to ensure retest requirements are met. Results of retests due to maintenance will be reviewed by the appropriate Principal Startup Engineer/Responsible Engineer or the Shift Supervisor. Results of retests due to modifications will be reviewed and approved in the same manner as those from the original tests.

14.2.4.3 Test Performance

12 For prerequisite and Phase I through Phase IV testing an
INDIVIDUAL ~~engineer~~ who is qualified in accordance with section 14.2.2.12.1
12 will be designated as the Test Director/Principal Startup
10 Engineer/Responsible Engineer. The official copy of the test procedure shall be available in the test area during the performance of a preoperational or startup test. The person
2 conducting the test is charged with responsibility for performing the test in accordance with the approved test procedure. If, during the performance of the test, it is determined that the test cannot be conducted as written, it is the responsibility
12 of the person conducting the test to resolve the problem in accordance with approved administrative control procedures.

Insert #7 To Page 14.2-21A

For Prerequisite Tests a qualified individual designated by the Test Director/Principal Startup Engineer may sign-off procedural steps and data sheets.

14.2.5 REVIEW, EVALUATION, AND APPROVAL OF PHASE I THROUGH PHASE IV TEST RESULTS 8

Individual test results will be reviewed and approved as provided in the Station Manual. Completed procedures and test reports will 2 be reviewed for acceptance. The specific acceptance criteria 11 for determining the success or failure of the test will be 2 included as part of the procedure and will be used during the 12 review.

The Principal Startup Engineer/Responsible Engineer will 12 present the completed test procedure and test report with 4 remarks and recommendations to the responsible Group Supervisor as appropriate. The Group Supervisor will review the completed 12 procedure for conformance with testing requirements as well as 4 for acceptance of the test results. Following this review, ~~the~~ SPECIFIED procedure and THEIR test report will be submitted to either the Test Working Group or Test Results Review Group and Plant Review 12 Board, for final review, evaluation, and approval recommendation. If the as-built configuration of a system is not capable 8 of demonstrating its ability to meet the acceptance criteria, 9 an engineering evaluation will be performed.

Test results for each phase of the test program will be reviewed and verified as complete (as required) and satisfactory before testing in the next phase as started. Preoperational testing on a system will not normally be started until all applicable prerequisite tests have been completed, reviewed, and approved. Prior to initial fuel loading and the commencement of initial criticality, a comprehensive review of required completed preoperational procedures HAVE BEEN ~~will be~~ conducted by the Test Working Group AND OR THE TRRG ~~and the Plant Review Board~~. This review will provide assurance that required plant systems and structures will be capable of supporting the initial fuel loading and subsequent startup testing.

It is intended that Phase I testing be completed prior to commencing initial fuel loading. ~~Testing identified which has not been completed will be reviewed by the Test Working Group and Test Results Review Group. Technical justification will be provided.~~ (INSERT #8)

Phase I tests which will be performed after initial fuel loading will be performed under the administrative controls governing Phase II through IV testing. These tests will be performed by either Startup or Operations personnel as determined on a case by case basis.

The startup testing phases (Phases II, III, and IV) of the test program are subdivided into the following categories: initial fuel load, postloading hot functional testing, initial criticality, low-power physics testing, and power ascension testing. It ends with the completion of testing at 100% power. Each subdivision is a prerequisite which must be completed, reviewed, and approved before tests in the next category are started. Power ascension tests will be scheduled and conducted at predetermined power levels. The testing plateaus to be used for PVNGS startup testing are specified in CESSAR Section 14.2.1.2. Insofar as practical, so that the safety of the plant will not be totally dependent on the performance of untested systems,

Insert #8 To Page 14.2-22

In attempting to accomplish this task, plant systems under jurisdictional control of the Startup Department will be the responsibility of the Startup Manager to complete as delineated in section 14.2.2.3.1. If prerequisite and Phase I testing is incomplete at time of system acceptance by operations personnel, the Engineering Manager, under the direction of the Director of Nuclear Operations, will ensure completion of the testing per the Station Manual administrative control procedures.

The TRRG will review and recommend to the PRB approval of Phase I test procedures and test results that have not been completed at the time of system acceptance. Prerequisite tests will be reviewed and approved in accordance with the Station Manual.

systems relied upon to prevent, limit, or mitigate the consequences of postulated accidents will be tested to verify that operating requirements are met prior to exceeding approximately 25% power.

The plateaus for the power ascension testing are indicated in each test summary. Results from each test conducted at a given plateau will be evaluated prior to proceeding to the next level. For those tests which result in a plant transient for which a realistic plant transient performance analysis has been performed, the test results will be compared to the results of the realistic transient analysis rather than the results of the transient analysis based on accident analysis assumptions. 4

Following completion of testing at 100% of rated power, final test results will be reviewed, evaluated, and approved.

14.2.5.1 Review, Evaluation, and Approval of Prerequisite Test Results 12

Prerequisite test results will be reviewed and approved in accordance with STARTUP ADMINISTRATIVE CONTROL PROCEDURES. ~~Station Manual procedures.~~

14.2.6 TEST RECORDS

A single copy of each Phase I through Phase IV test procedure is designated as the official copy to be used for testing. The official copy and information specifically called for in the test procedure, such as completed data sheets, instrumentation calibration data, chart recordings, are retained at PVNGS for the life of the plant in accordance with Station Manual procedures for record retention. 8

14.2.7 CONFORMANCE OF TEST PROGRAMS WITH REGULATORY GUIDE

The Startup Test Program is consistent with CESSAR Section 14.2.7 and the recommendations of the following Regulatory Guides associated with startup:

Regulatory Guides 1.9, 1.18, 1.20, 1.30, 1.37, 1.41, 1.52, 1.68, 1.68.2, 1.79, 1.80, 1.108, 1.116, 1.118, and 1.140 with exceptions as noted and revisions as specified in section 1.8. 12

14.2.8 UTILIZATION OF REACTOR OPERATING AND TESTING EXPERIENCES IN DEVELOPMENT OF TEST PROGRAM

PVNGS Operations reviews reactor operating and testing experiences at other facilities similar in design and capacity to PVNGS.

This review is accomplished by circulating Licensee Event Reports (LERs) or summaries of LERs and NRC I&E Bulletins,
12 Circulars, and Notices to Startup and Operation personnel so that pertinent information can be utilized in the startup
12 program.

14.2.9 TRIAL USE OF PLANT OPERATING AND EMERGENCY PROCEDURES

The schedule for the development of plant operating and emergency procedures is discussed in section 13.5. Whenever practical, test procedures reference the plant operating and emergency procedures. In the test program, plant operating procedures are used extensively in the operation of the plant. Plant emergency procedures are verified whenever possible during the test program. When practical, surveillance test procedures are performed after completion of preoperational tests.

14.2.10 INITIAL FUEL LOADING AND INITIAL CRITICALITY

14.2.10.1 Fuel Loading

Refer to CESSAR Section 14.2.10.1 for a description of initial fuel loading. Core alterations during initial fuel loading are directly supervised by a person holding a Senior Reactor Operator License.

14.2.10.2 Initial Criticality

Refer to CESSAR Section 14.2.10.2 for a description of initial criticality.

14.2.11 TEST PROGRAM SCHEDULE

The test program for each unit SHOULD encompasses approximately 24 months. Approximately 2 months of this time has prerequisite tests as the controlling path. Preoperational and pre-core hot functional testing are the controlling path for about 16 months. The remaining 6 months are devoted to fuel loading, post-core hot functionals, low power physics, and power ascension testing.

The scheduling of individual tests or test sequences is made to ensure that systems and components that are to prevent or mitigate the consequences of postulated accidents are tested prior to fuel loading. Tests that require a substantial core power level for proper performance are performed at the lowest power level commensurate with obtaining acceptable test data. Safety-related systems are tested to provide reasonable assurance that they operate satisfactorily when required, prior to exceeding 25% of rated thermal power. Prerequisite FOLLOWED BY PHASE I testing will commence when construction has TRANSFERRED ~~turned over~~ testable portions of systems. ~~Preoperational and subsequent testing will commence when systems are released~~ to THE Startup Department. Test procedures will contain a list of prerequisites which must be completed and verified prior to the start of a particular test. The use of prerequisites in test procedures ensures that the safety of the plant is not dependent on the performance of untested systems. 12

~~Phase I test procedures are scheduled to be approved and available for review by NRC inspectors at least 60 days prior to their scheduled performance date or 60 days prior to fuel loading.~~ 12 12

INSERT #9

Insert #9 To Page 14.2-24A

Phase I test procedures are scheduled to be approved and available for review by the NRC inspectors at least 60 days prior to their scheduled performance date. Phase II through IV Startup Test Program administrative control procedures, the majority of the individual test procedures and the following milestone controlling procedure documents: Fuel Loading, Post Core HFT, Initial Criticality, Low Power Physics Test and Power Ascension, are scheduled to be approved and available for review at least 60 days prior to fuel load. The remaining individual test procedures will be scheduled for approval and available for review by the NRC inspectors at least 60 days prior to their intended performance date.

SPECIFIC INFORMATION TO
BE INCLUDED IN FSAR

12 ~~Fuel loading and Phase II through Phase IV startup test procedures are scheduled to be approved and available for review by NRC inspectors at least 60 days prior to their intended performance date.~~

14.2.12 INDIVIDUAL TEST DESCRIPTIONS

Individual test descriptions are listed in table 14.2-1 and are presented in appendix 14B.

Table 14.2-1

INDEX OF INDIVIDUAL TEST DESCRIPTIONS (Sheet 1 of 3) 8

Phase I Tests 12

See CESSAR Section 14.2.12 for a description of preoperational tests performed on equipment within the C-E licensing scope of supply. See section 1.9.2.4 for exceptions to or deviations from CESSAR Section 14.2.12 test descriptions. 10 12 10

See CESSAR Sections 4.2.5, 5.1.4, 5.4.7.1.3, 6.3.1.3, 6A-7.0, 6B-7.0, 7.1.3, 7.2.3, 7.3.3, 8.3.1, 8.3.2, 9.1.4.6, 9.3.4.6 for BOP CESSAR system interfaces which will be tested. 6

CESSAR Section 14.2.12.2.8 item 2.5 requiring COLSS to be in operation is not applicable for Precore RCS flow measurement. 12

Phase I Tests on Other Systems

1. Main Steam, Main Steam Isolation Valves and Safety Valves
2. Containment Spray System
3. Condensate Storage Tank and Transfer System
4. Class IE 125 VDC Power System
5. Class IE 4.16KV Power System
6. Class IE 480V Power Switchgear System
7. Class IE 480V Power MCC System 2
8. Class IE Instrument AC Power
9. Diesel Generator Electrical Tests and Load Sequencing
10. Emergency Lighting
11. Pipe Shock and Vibration Test
12. Containment Isolation Actuation System
13. Auxiliary Feedwater System
14. Reactor Containment Integrated and Local Leak Rate Tests
15. Diesel Fuel Oil Storage System

Table 14.2-1

6 INDEX OF INDIVIDUAL TEST DESCRIPTIONS (Sheet 2 of 3)

16. Diesel Generator Mechanical Systems
17. Essential Chilled Water System
18. Essential Cooling Water System
19. Fuel Pool Cooling and Cleanup System
20. Essential Spray Pond System
21. Auxiliary Building Essential HVAC & Fuel Building Essential Exhaust Systems
22. Diesel Generator Building HVAC
23. Control Building Essential HVAC
24. Containment Hydrogen Control System
25. Radioactive Waste Drain System
26. Radiation Monitoring System
27. Iodine Removal Subsystem
28. Nuclear Cooling Water System
2 29. Post Accident Monitoring System
30. Plant Computer
31. Loose Parts Monitoring System
32. Plant Annunciator
33. Seismic Instrumentation
34. Gas Analyzer
35. Inplant Communications Systems
36. Private Offsite Communication System
37. Circulating Water System
38. Fire Protection System
39. Turbine Electro-Hydraulic Control
40. Gaseous Radwaste System
41. Containment Purge and HVAC System
42. Instrument Air System
43. Polar Crane
8 44. Containment HVAC
45. Feedwater System

Table 14.2-1

INDEX OF INDIVIDUAL TEST DESCRIPTIONS (Sheet 3 of 3)

46.	Radwaste Bldg HVAC
47.	Turbine Bldg HVAC
48.	Radwaste Solidification System
49.	Liquid Radwaste System
50.	Secondary Chemistry Control System
51.	Load Group Assignment Verification

8

SEE ATTACHED FIGURE 14.2-1

Figure 14.2-1 (LATER)

~~Figure 14.2-2 (LATER)~~

12

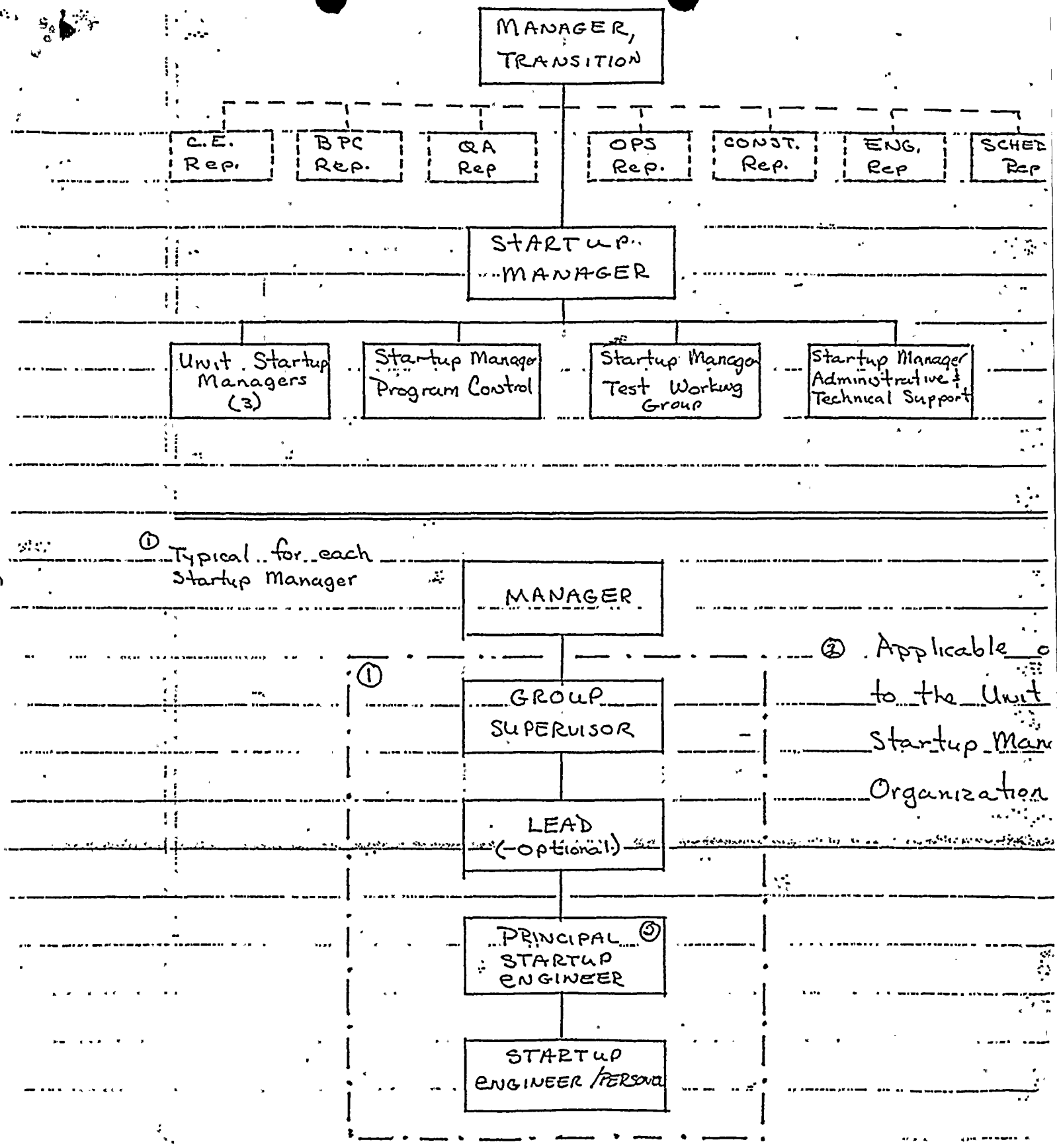
MANAGER, TRANSITION
C.E. Rep.
BPC Rep.
QA Rep
OPS Rep.
CONST. Rep.
ENG. Rep
SCHED Rep
STARTUP MANAGER
Unit Startup Managers (3)
Startup Manager Program Control
Startup Manager Test Working Group
Startup Manager Administrative & Technical Support
① Typical for each Startup Manager
MANAGER
GROUP SUPERVISOR
LEAD (-optional)
PRINCIPAL STARTUP ENGINEER
STARTUP ENGINEER /PERSONNEL
② Applicable to the Unit Startup Man Organization

Figure 14.2-1