VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

February 26, 1981

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulations
Attn: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 081
NO/JLW/DWL:ms
Docket No. 50-280
License No. DPR-32

Gentlemen:

SURRY POWER STATION UNIT 1
INTEGRATED STARTUP TEST PROGRAM

We are submitting, for your review, our Integrated Startup Test Program for inspection and testing to be completed prior to returning Surry Power Station Unit No. 1 to operation after the Steam Generator Repair Program. This letter is to meet the requirements of Amendment No. 46 to the Operating License for Surry Power Station Unit No. 1 to submit the test program sixty days prior to fuel loading. The Integrated Startup Test Program is comprised of two phases: Preoperational Tests and Startup Tests. The format of the program follows the intent of Regulatory Guide 1.68, Revision 2, August, 1978, "Preoperational and Initial Startup Test Programs for Water-Cooled Power Reactors." In some cases interpretation is necessary since Surry Unit No. 1 is a previously licensed PWR plant that has undergone major equipment replacement and modification rather than being new construction.

The tests in the Preoperational Test phase are designed to provide assurance that components and subsystems of new, modified, and original systems function safely within established design criteria. The Preoperational Tests on a new or modified system are conducted prior to fuel loading. This test phase also allows the plant operating staff to become familiar with the operation of a new or modified system and to verify by trial use, to the extent practical, that the operating procedures are adequate.

The tests in the Startup Test phase are designed to provide assurance that systems that were previously demonstrated as functioning safely, and the new or modified systems will function to "(1) provide for safe normal operation and high tolerance for systems malfunctions and transients, (2) ensure that, in the event of errors, malfunctions, and off-normal conditions, the reactor protection systems and other design features will arrest the event or limit its consequences to defined and acceptable levels, and (3) ensure that adequate safety margins exist for events of extremely low probability or for arbitrarily postulated hypothetical events without substantial reduction in the safety margin for the protection of public health and safety." The Start-up Tests are performed during and after fuel loading to confirm the design basis and demonstrate that the plant will continue to operate in accordance with design.

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Per Criterion 1 of Appendix A to 10 CFR 50 all structures, systems, and components will be tested or demonstrated operable to levels commensurate with the importance of the safety functions. In addition, the extent of testing will vary directly with the amount of construction done to and around the particular equipment or system. The sequence of tests will be conducted so that the safety of the plant is never totally dependent on the performance of untested structures systems or components.

The key points of the Integrated Startup Test Program are presented below. The referenced Appendices provide additional details of the program. Further information including the Integrated Startup Test Schedule is available for the NRC site inspector at the station. These Appendices are working documents that will be revised as required within the framework of this letter.

ORGANIZATION

Appendix D contains the "Procedure for Conducting the Integrated Startup Test Program for Post Steam Generator Replacement and PO&M Design Changes." This document defines the organizations, responsibilities, actions, and administrative controls for each phase of the program.

The management and direction of the Integrated Startup Test Program is under the direct control of Vepco with principal authority assigned to the Superintendent of Operations for Surry Power Station. The Startup Group is composed of Stone & Webster Engineering Corporation advisory engineers and Vepco station operations and engineering personnel. The Startup Group has overall responsibility for implementation and documentation of the program.

The conduct and direction of the tests in the Preoperational Test phase are controlled by the Startup Group. The conduct and direction of the tests in the Startup Test phase are controlled by Vepco Station operations and engineering staff with technical support from the Startup Group.

In all cases the test procedures require approval of the Station Nuclear Safety and Operating Committee prior to implementation. Deviations to approved test procedures are documented and become part of the final test results. Administrative controls for making changes to approved procedures are provided in the Vepco Nuclear Power Station Quality Assurance Manual. The acceptance criteria for all tests are approved by the Station Nuclear Safety and Operating Committee. Design related deficiencies are resolved by the Startup Group with the assistance of the Vepco project engineer and Vepco operations or outside consultants as deemed necessary.

TEST PHASES

Preoperational and Startup Test Phases are shown on the network in Appendix A and defined in more detail in Appendix D. Each phase of the Integrated Startup Test Program is composed of a series of tests as described below:

1. Preoperational Test Phase

   The Preoperational Test phase consists of functional tests of new, modified and affected original equipment and systems. This phase includes tests, adjustments, calibrations, and systems operations

necessary to assure that the subsequent testing can be safely undertaken. This phase also includes a walkdown of systems adjacent to construction work for damage. Any repairs and subsequent testing of equipment will be accomplished by a field change to the Design Change. Major milestones during the Preoperational Test phase are outlined in Appendix A. Major Preoperational Tests are listed in Appendix B. The actual sequence of individual tests is formulated prior to performance of the tests considering equipment and system availability and is maintained on an Integrated Startup Test Schedule. The Startup Group analyzes the preoperational test results. The acceptance criteria for all tests are approved by the Station Nuclear Safety and Operating Committee. In instances where performance of components or systems deviates from predicted results, further engineering evaluations, rework, and/or retesting is performed to resolve the discrepancies before the test is considered satisfactory. Assistance from the Vepco project engineer and Vepco operations or outside consultants is solicited as deemed necessary. Systems which have to be modified as a result of the Preoperational Test are retested to verify acceptance performance. The major prefuel loading Preoperational Tests are outlined in Appendix B. Components and systems are tested and evaluated according to approved testing procedures. Preoperational Tests are performed to verify, as near as possible, the performance of the system under actual operating conditions. Where required, simulated signals or inputs are used to verify the full operating range of the system and to calibrate and align the systems and instruments at these conditions.

2. Startup Test Phase

The major testing milestones during the Startup Test phase are identified on the network (Appendix A) and discussed below. Major Startup Tests are listed in Appendix C.

a. Post-Fuel Loading Tests

Systems that are not used during normal plant operation, but must be in a state of readiness to perform safety functions, are tested or demonstrated operable prior to plant conditions requiring them to be available as defined in the Technical Specifications. Abnormal unit conditions are simulated during testing as required and when such conditions do not endanger personnel or equipment, or contaminated systems whose cleanliness has been established. Fuel loading begins when all prerequisite system tests and operations are satisfactorily completed. Upon completion of fuel loading, the reactor upper internals and pressure vessel head are installed. Additional mechanical and electrical tests are performed on the rod control system, rod position indication, and in-core moveable detector system. The purpose of this segment of the Startup Test Phase is to prepare the system for nuclear operation and to establish that all design requirements necessary for operation are achieved.

b. Hot Functionals

Prior to initial criticality, the following hot functional tests are performed: heatup of the primary system, thermal expansion testing of affected systems, vibration testing of construction affected equipment, and reactor coolant pump coast down time check. The primary system operational pressure test is conducted in accordance with the Technical Specifications.

c. Criticality and Low Power Physics Tests

On completion of hot functional tests, nuclear operation of the reactor begins. These final segments of Startup Testing include criticality and low power physics testing. The purpose of these tests is to verify the operational characteristics of the unit and core, to acquire data for the proper calibration of set points, and to ensure that operation is within license requirements. Appendix C includes the major Startup Tests which are performed from fuel loading to rated power. The actual sequence of tests is formulated by station engineering and operating personnel considering test requirements and equipment availability.

Procedures are prepared to specify the sequence of tests and measurements and the conditions under which each is to be performed to ensure safety of operation and consistency of the results obtained. If significant deviations from design calculation exist, unacceptable behavior is revealed, or apparent anomalies develop, the testing would be suspended and the situation reviewed to determine whether a question of safety is involved prior to resumption of testing.

d. Power Level Escalation Testing

When the operating characteristics of the reactor and unit are verified by low power physics testing, a program of power level escalation in successive stages is used to bring the unit to its full rated power level. Both reactor and unit operational characteristics are examined at each stage of the power escalation program.

e. At Power Testing

On completion of power level escalation testing the following at power tests are performed: final steam generator carryover testing, secondary plant heat balance checks, condensate polishing chemistry performance testing, and load rejection testing with the condensate polisher in service.

EXTENT OF TESTING

All Unit No. 1 systems and systems common to both Unit No. 1 and Unit No. 2 are included in the Integrated Startup Test Program. These programs are listed in the System Index (Attachment 8.4 of Appendix D). This listing includes all systems associated with Unit No. 1 that have undergone major modification, new systems, and systems that have remained operational since Unit 1 shut down.

The purpose of this breakdown is to identify all station systems and to determine the degree of Preoperational Testing required. Because of the various amounts of construction done to and around each system, a graded approach for the extent of the testing is employed. The tests required for individual components within a system will be developed by the Startup Group and listed on a test matrix for that system.

In areas such as Unit No. 1 containment, where extensive work has been performed, all equipment and systems will be checked during the Preoperational Testing or Startup Testing phase. In other areas, such as the Auxiliary Building where little work has been performed, selected system walkdowns will be employed in conjunction with normal station startup procedures to verify the operability of the equipment.

Those systems that are new or have undergone major design basis changes will undergo complete component testing and performance testing to verify design and installation.

SUMMARY

This letter outlines in detail the Integrated Startup Test Program we plan to implement to demonstrate our ability to safely return Surry Power Station Unit No. 1 to power. The Integrated Startup Test Prgram will provide the necessary assurance that the plant can be operated in accordance with design requirements and in a manner that will not endanger the health and safety of the public.

Very truly yours,

B. R. Sylvia
Manager - Nuclear
Operations and Maintenance

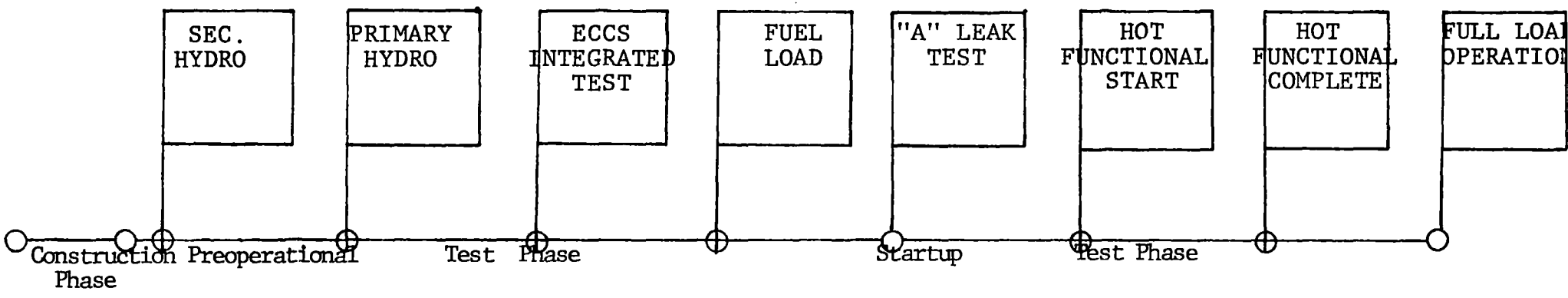
cc: Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
Region II
Atlanta, Georgia 30303

LIST OF APPENDICES

APPENDIX A

STARTUP NETWORK

STARTUP NETWORK
SURRY UNIT NO.1



APPENDIX B

LIST OF MAJOR PREOPERATIONAL TESTS AND CHECKS

LIST OF PREOPERATIONAL TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
I. PLANT INSTRUMENTATION		
1. Nuclear Instrumentation	Prior to core loading	Nuclear instruments are aligned and source range detector response to a neutron source checked as the primary source is loaded.
2. Process Instrumentation	Ambient and/or at temperature	Required equipment is aligned per station procedures.
II. REACTOR COOLANT SYSTEM		
1. Pressure Boundary Integrity Tests		
a. Hydrostatic test	Below 200 ^{o}F (after verification of cleanliness and fill of system)	Cold hydrostatic testing of each Reactor Coolant System loop will be performed at test pressures as specified by ASME standards for the system. Prior to pressurization, the effected portions of the system will be heated above the minimum temperature for pressurization. The pressure is then increased in increments, and at each increment inspections are made for leakage. Leaky valves or mechanical joints are not a basis for rejecting the test. Overpressure protection is provided during testing.
b. Baseline data for inservice inspection	During preoperational testing	Systems and components that require inspection in accordance with Section XI of the ASME Code are examined for base line data. Data from these inspections provide base line data for subsequent inservice inspections.
2. Component Tests		
a. Pressurizer Safety Valve	Ambient pressure	The setpoints of the safety valves are verified using existing station procedures.

LIST OF PREOPERATIONAL TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
	III. REACTIVITY CONTROL SYSTEMS	
1. Automatic Reactor Power Control Test Systems	Preoperational testing	The system alignment is verified at preoperational conditions to demonstrate the response of the system to simulated inputs. These tests are performed to verify that the systems will operate satisfactorily at power.
	IV. REACTOR PROTECTION SYSTEMS	
1. Reactor Protection System	Prior to core loading	Prior to core loading the Reactor Protection is tested to demonstrate operability, proper logic, redundancy, and coincidence. The protection channels are verified through to tripping of the reactor trip breakers.
2. Engineered Safety Features	Prior to core loading	Prior to core loading the Engineered Safety Features logic systems are tested to demonstrate operability, proper logic, redundancy, and coincidence.
	V. POWER CONVERSION SYSTEM	
	Done under Startup Testing	
	VI. AUXILIARY SYSTEMS	
1. Residual Heat Removal System Test	Prior to core loading	This system essentially remained in service except for maintenance work on the pumps and the addition of an expansion loop to the recirculation line. Normal system OP's and PT's will be used to run the system in support of various pre-core loading tests.

LIST OF PREOPERATIONAL TESTS AND CHECKS

	TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
2.	Containment Instrument Air System	Prior to core loading	The instrument air system, including compressors, is tested to verify proper operation.
3.	Neutron Shield Tank Cooling System	After core loading	The system is operationally checked out to verify heat exchange operability.
4.	Leak Detection System Tests	Prior to and during preoperational tests	Temperature detectors in the drain lines from pressurizer safety valves and the reactor vessel head seal and their alarm functions are checked. Pressurizer relief tank level and temperature sensors are calibrated and associated alarms checked.
	VII. ELECTRICAL SYSTEM		
1.	Emergency Power Systems	Prior to core loading	The automatic starting and loading of the diesel generators is demonstrated under loss of emergency buss alternating current power.
	VIII. CONTAINMENT SYSTEMS		
1.	Reactor Containment Tests	After core loading	Containment Type A leakage tests will be performed in accordance with USNRC approved topical report BN-TOP-1 Rev. 1, which provides for a reduced duration test. Containment Type B & C leakage tests will be performed in accordance with Appendix J to 10CFR50.

LIST OF PREOPERATIONAL TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
2. Containment Isolation Tests	Prior to core loading	The operation of actuation systems and components used for containment isolation is verified.

IX. GASEOUS RADIOACTIVITY REMOVAL SYSTEMS

Systems remained in service. No special testing will be performed other than normal OP's and PT's.

X. EMERGENCY CORE COOLING SYSTEM

1. High Pressure Safety Injection Tests	After core loading	The High Pressure Safety Injection Tests will officially be performed during Hot Functional Testing. The Charging System will actually be used during many of the pre-fuel loading tests and normal operations under OP's and PT's. Additional performance tests, other than OP's and PT's will be accomplished during Hot Functionals when the testing can be performed at actual plant conditions. This approach will be taken since no major rework was performed on this sytem. Components that are disconnected during the Steam Generator Replacement Project are individually tested under station approved procedures.
2. Low Pressure Safety Injection Tests	Prior to core loading	The Low Head Safety Injection System is checked to verify design flow, flow path and pump operating characteristics. More specifically that: a. Valves installed for redundant flow path operate as designed.

LIST OF PREOPERATIONAL TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
		b. Pump operating characteristics are verified with the reactor coolant system at ambient conditions.
		c. Valves and motors operate on operator initiation and/or automatically on initiation of safety injection signal.
		d. Level and pressure instruments are properly calibrated.
XI. FUEL STORAGE AND HANDLING SYSTEM		
1. Refueling Equipment (hand tools and power equipment, including protective interlocks)	Prior to core loading	Tests are performed prior to core loading to demonstrate the functioning of the fuel transfer system.
XII. REACTOR COMPONENTS HANDLING SYSTEM		
	Done during startup	
XIII. RADIATION PROTECTION SYSTEM		
1. Criticality and area monitor tests	Prior to core loading	The radiation alarms associated with core loading are checked out and the alarm setpoints verified.

APPENDIX C

LIST OF MAJOR STARTUP TESTS AND CHECKS

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
	I. PLANT INSTRUMENTATION	
1. Nuclear Instrumentation (excore)	Prior to criticality	Just before criticality all channels are checked to verify high level trip functions, alarm setpoints, audible count rates where applicable, and operation of strip chart recorders, and any auxiliary equipment.
2. Process Instrumentation (Temperature, pressure, level, and flow instruments)	Ambient and/or at temperature	Equipment is aligned per station procedures.
	II. REACTOR COOLANT SYSTEM	
1. Vibration and amplitude	After fuel load	Vibration sensors on the main coolant pumps are monitored in order to check for excessive vibration while starting and stopping the pumps.
2. Expansion and Restraint	During plant heat-up	During the heat-up to operating temperature, selected point on components and piping of the Reactor Coolant System are checked at various temperatures to verify unrestricted expansion. Points of interference detected during the heat-up are corrected prior to increasing temperature.
3. Integrated Hot Functional Tests	Heatup and at temperature Hydrostatic testing has been satisfactorily completed and Reactor Coolant System instruments aligned and operational. Associated auxiliary systems shall be operational to the extent required to support hot functional testing.	The Reactor Coolant System is tested using pump heat to reverify heat-up procedures and to demonstrate satisfactory performance of components and systems exposed to reactor coolant system temperature. Proper operation of instrumentation, controllers and alarms, is checked against design operation conditions of auxiliary systems and setpoints verified. Among the demonstrations performed are:

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
		a. To check that water can be charged b the Chemical and Volume Control System at rated flow against normal reactor coolant pressures.
		b. To check letdown design flow rate fo each operating mode.
		c. To check response of system to chang in pressurizer level.
		d. To check operation of the excess letdown and seal water flow paths.
		e. To check steam generator level instrumentation response to level changes.
		f. To check thermal expansion of selected system components and piping.
		g. To perform isothermal calibration of resistance temperature detectors and incore thermocouples.
		h. To operationally check out the Residual Heat Removal System.
4. Components Tests		
a. Pressurizer	At operating temperature.	During the hot functional testing the pressure controlling capability of the pressurizer is demonstrated to be within the controlling band. With reactor coolant pumps operating and with full spray, the pressure-reducing capability of the pressurizer is verified. With the spray secured and all heaters energized, the pressure-increasing capabilit of the pressurizer is verified.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR MEASUREMENT	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
		Pressurizer Relief valves are functionally checked.
b. Reactor Coolant Pumps and Motors	At ambient conditions and during heat-up and at temperature.	As the pumps and motors are placed in operation they are checked for: 1. Direction of rotation (initial start only) 2. Vibration 3. Power requirements 4. Lubrication 5. Cooling 6. Megger and hi pot test (as applicable 7. Overload protection 8. Correct power supply voltage
c. Steam Generators	At ambient conditions and during heat-up and at temperature	The proper operation of instrumentation and control system of steam generators are checked during heat-up and at temperature. The heat transfer capability of the steam generators is demonstrated. The functioning of the blowdown system will be checked.
5. Pressure Test of Reactor Coolant System	Prior to criticality	Following core loading and installation of the Reactor Vessel head and torquing of the reactor vessel heads studs, pressure testing is performed in accordance to Tech. Spec.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR MEASUREMENT	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
6. Chemical Tests (to establish water quality)	Prior to heat-up during startup testing	Water for Reactor Coolant System fill and makeup is analyzed for chloride content, conductivity, total suspended solids, pH, clarity, and fluorides to requirements specified by the chemistry manual for NSSS. Following core loading and prior to exceeding 250 ^{o}F, hydrazine is added to scavenge oxygen prior to critical operation. Prior to, at criticality, and during power escalation, chemical analysis is performed to verify requirements.
7. Reactor Coolant Flow Test	Prior to plant criticality	Following core loading, measurements are made of elbow tap differential pressures to make relative comparison. At hot shutdown conditions following core loading, measurement of loop elbow differential pressure drops were made. Using these data with the reactor coolant pump performance curve, the calculated flow is verified to the design flow. Flow coastdown and transients following reactor coolant pump stoppages are also determined at shutdown conditions following core loading.
	III. REACTIVITY CONTROL SYSTEMS	
1. Chemical and Volume Control System Tests	At ambient and/or at operating conditions. System components operationally checked out.	Makeup and letdown operations are conducted with the Chemical and Volume Control System to check out the different modes of dilution and boration and verify flows in the different modes. The adequacy of of heat tracing to maintain the required Boric Acid concentration in solution is verified. The ability to adequately sample is demonstrated.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
2. Emergency Boration System Tests	During hot functional	The flow path of the Emergency Boration system is verified by pumping into the Reactor Coolant System.
3. Incore Monitor System Test		
a. Incore Thermocouples	During heat-up and at temperature.	During heat-up and at temperature the incore thermocouples are calibrated to the average of the Reactor Coolant System resistance temperature detectors. All readout and temperature compensating equipment is checked during the calibration and isothermal corrections for the operative thermocouples are determined.
b. Moveable Detector System	At ambient conditions following core loading and critical testing.	After core loading, the installation checkout of the moveable detector system will be completed.
4. Control Rod Systems Tests		
a. Rod Control System	Ambient conditions following core loading and hot conditions after core loading.	During the installation check of this system it is energized and operationally checked out with mechanisms connected to each power supply. The ability of the system to step mechanism is verified the alarm and inhibit functions checked out and the correct values of system parameters adjusted to specified values. After core loading the operation of each rod over its full range of travel is demonstrated.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
b. Rod Drop Tests	Cold and hot plant conditions following core loading.	At cold and hot plant conditions followir core loading the drop times of the full length rods are measured. The drop time is measured from the release of the rod until the rod enters the top of the dash-pot. This time was verified to be less than the maximum value specified in the Technical Specifications.
c. Rod Position Indication	At ambient conditions and at temperature following core loading.	During rod control system tests the position indication system was aligned to provide rod movement indication. Rod bottom setpoints will be adjusted during these tests. After plant heat-up individual rod positions are calibrated to within tolerances specified by the tes procedure.
IV. REACTOR PROTECTION SYSTEM		
	Done during Preoperational Testing	
V. POWER CONVERSION SYSTEM		
1. System Tests		
a. Vibration Frequency and Amplitude	Hot Functional Testing and/or plant heat-up following criticality	When the main turbine is rolled, vibratio readings are monitored. (Turbine vibrations are also monitored throughout the power escalation program.) Major equipment (e.g., feedwater pumps and condensat pumps) are operated as they become available and are observed for indications of excessive vibration.
b. Expansion and Restraint	During heat-up, and at temperature	During heat-up to operating temperature, selected points on the components and and piping of the systems are checked at various temperatures to verify that they can expand unrestricted.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
2. Components and Individual System		
a. Steam Generator Pressure Relief and Safety Valves	Pressure Conditions	The setpoint of safety valves was verified by in-plant tests at pressure and temperature conditions when the unit was shutdown. Setpoints were check by using a pressure assist device which adds to the force due to pressure. Once the valve leaves the seated position the assist device was vented, allowing the valve to reseat immediately. Steam relief valve setpoint checks were made during instrument alignment.
b. Emergency Feedwater (Auxiliary) System	Prior to criticality	Prior to criticality the emergency feedwater system is checked out to verif its ability to feed the steam generators Automatic starting is checked during checkout of the safeguards logic system tests.
c. Turbine Control and Bypass Valves	Hot Functional testing and/or power operation following criticality	During hot functional testing the turbine control system will be demonstrated in turbine operation up to and including a period of operation at synchronous speed. The turbine bypass valves to the condenser and their associated control systems are operationally checked out during hot functional testing.
d. Feedwater and Feedwater Control System	Hot functional testing and at Power	The feedwater and condensate pumps are operationally checked out during hot functional testing. During power escalation the power is increased and the ability of the feedwater pumps and control system to maintain level in the system generators are aligned. Prior t filling the system and during fill, the system is used to monitor level in the steam generator.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
e. Condenser Circulation Water	Prior to hot functional testing	Prior to hot functional testing the main circulating water system valves are tested to verify operability.
f. Makeup Water and Chemical Treatment	During Steam generator fill, hot functional testing and at power	The makeup system to the steam generators is checked out during hot functional testing and at power. The chemical treatment system is checked out when chemicals are added to the steam generators at heat-up to steaming conditio
VI. AUXILIARY SYSTEMS		
1. Reactor Coolant System Makeup Test (CVCS)		See III REACTIVITY CONTROL SYSTEM, Item 1.
2. Seal and Pump Cooling Water Test (CVCS)	Prior to heat-up and at temperature	Prior to reactor coolant pump operation and with the system pressurized, flow to the pump seals and cooling water is set. Flow is adjusted to specified values using installed instruments. During hot functional testing when at operating temperature and pressure, seal and cooling flows and temperatures are checked.
3. Secondary Vent and Drain System Test	During hot functional testing	During hot functional testing following core loading the secondary system is vented while pressurizing the secondary system. Secondary drains are tested for unrestricted flow in accordance with operating procedures.
4. Component Cooling System Test	Ambient and/or hot plant conditions	Component cooling flow to the various components in the affected systems is adjusted, the system operationally checked out, and setpoints verified.
5. Residual Heat Removal System Test	Prior to and during hot functional testing	Heat removal capability demonstrated.

LIST OF STARTUP TESTS AND CHECKS

	TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
6.	Service Water System Test	Prior to hot functional	The system is operationally checked out to verify pressure and flow. Service water flow is verified to components in the system.
7.	Control Rod Drive Mechanism and Rod Position Indication Coil Cooling System Test	Prior to and/or during hot functional testing	The system is operationally checked out to verify air flow, temperatures and motor current.
8.	Primary Sampling System	Prior to and/or during hot functional testing	Operations are performed to: a. Demonstrate that liquid and gas samples can be obtained from sample points. b. Demonstrate that valves, instruments, and controls function properly. c. Verify proper functioning of the sample cooler.
9.	Primary Pressure Relief System	Prior to hot functional testing and at pressure conditions	The pressurizer relief tanks associated valves and instrumentation are checked out to verify performance of design functions. For testing of pressurizer relief and safety valves see II REACTOR COOLANT SYSTEM.

VII. ELECTRICAL SYSTEM TESTS

Done during Preoperational Testing

VIII. CONTAINMENT SYSTEMS

1.	Containment Ventilation System Test	Prior to and/or during hot functional testing	The system is operated to balance air flows and to verify the ability to maintain temperatures below maximum allowable limits.

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
2. Post Accident Heat Removal System Tests (Containment Sprays)	Prior to criticality	Tests are performed to verify pump operating characteristics, and response to control signals, sequencing of pumps, valves and controller (and to ensure that spray nozzles were unobstructed.)
	IX. GASEOUS RADIOACTIVITY REMOVAL SYSTEMS	
	Done during Preoperational Testing	
	X. EMERGENCY CORE COOLING SYSTEM	
1. Accumulator Tests	During hot functional	Flow through the accumulator lines is initiated to demonstrate that the check valves are free to open. Tests are also made to verify that accumulator pressure could be maintained.
	XI. FUEL STORAGE AND HANDLING SYSTEM	
1. Spent Fuel Storage Radiation Monitoring Equipment	Prior to plant startup	Refer to Appendix B, XIII RADIAITON PROTECTION SYSTEM, Item 1.
	XII. REACTOR COMPONENTS HANDLING SYSTEM	
1. Reactor Component Handling System (Polar Crane)	Prior to use for installation of components within the containment	Testing was conducted on the polar crane in accordance with standard crane testing procedures during steam generator replacement.
	XIII. RADIATION PROTECTION SYSTEM	
	Done during Preoperational Testing	

LIST OF STARTUP TESTS AND CHECKS

TITLE OF TEST OR CHECK	PLANT CONDITION/PREREQUISITE	TEST OBJECTIVE
XIV. INITIAL CRITICALITY AND LOW POWER TESTS		
1. Initial Criticality	Plant at hot shutdown	The objective is to bring the reactor critical from the plant conditions specified. Prior to start of rod withdrawal, the nuclear instrumentation had been aligned, checked, and conservative reactor trip setpoints made per procedures. At preselected points in rod withdrawal, data is taken and inverse count rate plots made to enable extrapolating to the expected critical rod position. In addition, the following tests associated with modified system will be performed: blowdown system capability test and thermal expansion monitoring.
XV. POWER ASCENSION		
1. Power Ascension	Criticality	Normal post refueling testing will apply for power ascension. In addition the following design tests associated with modified systems will be performed: steam generator carryover tests steam generator thermal and hydraulic performance verification steam generator water level stability and control demonstration condensate polishing performance testing load rejection testing with condensate polisher

APPENDIX D

PROCEDURE FOR CONDUCTING THE INTEGRATED STARTUP TEST PROGRAM

PROCEDURE

FOR CONDUCTING THE

INTEGRATED STARTUP TEST PROGRAM

FOR POST

STEAM GENERATOR REPLACEMENT

AND

P.O. & M. DESIGN CHANGES

SURRY POWER STATION

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA

Superintendent Operations: _____

Lead Advisory Engineer: _____

INTEGRATED STARTUP TEST PROGRAM

TABLE OF CONTENTS

SURRY UNIT 1
VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA

1.0 PURPOSE AND SCOPE

1.1 To provide a procedure for the accomplishment of the tests and checks to be completed prior to plant operations.

1.2 To define the phases of the Integrated Startup Test program.

1.3 To define the responsibilities of the organizations participating in the Integrated Startup Test program.

1.4 To provide the necessary administrative controls to ensure all prerequisites are complete prior to commencing the next phase of testing.

1.5 To define responsibilities for the preparation of test procedures and test matrices.

2.0 REFERENCES

2.1 VEPCO Nuclear Power Station Quality Assurance Manual

2.2 Stone & Webster Logic Diagrams and System Descriptions

2.3 VEPCO Calibration Procedures

2.4 Final Design Change Packages for each modification

3.0 DEFINITIONS

3.1 Phases of the Integrated Startup Test Program

The Integrated Startup Test program is divided into two phases: Preoperational Tests and Startup Tests. The objectives and responsibilities of each phase are defined below.

The Preoperational Tests are under the direction of the Startup Group and are designed to assure proper functioning of new, modified and existing equipment, subsystems and systems.

The Startup Tests are under the direction of Station Operations and are designed to assure the proper integrated operation of all required systems prior to the next sequence of power operation.

3.2 General Electrical, Instrument and Mechanical Test Procedures

These procedures are referred to as TEP's TIP's and TMP's. These generic procedures are approved by the Station Nuclear Safety and Operating Committee and are used to verify proper installation and initial operability of equipment. These procedures are used during Preoperational Test phase.

3.3 Cleaning And Flushing

3.3.1 Cleaning Procedures

Cleaning will be performed in accordance with issued guides and general procedures to ensure satisfactory cleanliness of systems and components. Cleaning will include mechanical cleaning and hand cleaning. The Station Nuclear Safety and Operating Committee shall designate cleanliness grades for individual systems via approved design change packages.

3.3.2 Flushing Procedures

A written procedure to ensure strict compliance with cleanliness requirements for nuclear steam supply and safety related systems. Station Nuclear Safety and Operating Committee approval is required for generic flushing procedures and design change controlling procedures.

3.4 Electrical Checks

Checks performed as part of design change package to ensure that an instrument or electrical control loop is complete and correctly connected. These checks shall include, but not be limited to, breaker tests, insulation tests, and motor control center tests to ensure the integrity of the control circuit or equipment.

3.5 Mechanical Checks

A set of checks performed for the purpose of verifying that a piece of mechanical equipment (pump, compressor, blower, etc.) is ready for initial startup. These checks shall include, but not be limited to, alignment, coupling, manufacturers' recommended lubrication, packing gland adjustment, etc., as applicable for the equipment being readied for startup.

3.6 Hydrostatic Test

Pressure testing to meet the applicable erection code and to ensure system integrity. The Station Nuclear Safety and Operating Committee approval is required for these generic procedures.

3.7 Calibration

Quantitative adjustments of instruments and control devices, including characterization of analog signals, quantitative setting on all control and monitoring loop elements and verification of response characteristics.

It also applies to those calibration checks which verify quantitative accuracy and functional integrity of the devices or instrument loop previously calibrated by others, or to verify functional integrity of the devices or instruments which are not adjustable by normal means, such as thermocouples, conductivity cells, thermometers, etc.

3.8 Calibrated Loop Check

A set of tests performed for the purpose of verifying that an instrument loop is acceptable in terms of quantitative agreements proper inter-relationship, and expected responsiveness of several loop elements. This set of tests is performed with all loop components in place, individually calibrated and documented, and devices energized by applying simulated inputs and measuring or observing loop performance.

3.9 Functional Loop Check

A set of tests performed for the purpose of verifying that a control and/or telemetering loop is acceptable in terms of functional integrity and interrelationship of the several loop elements. This set of tests is performed with all loop components in place, structurally complete, and energized, by applying simulated inputs and observing loop performance. Loop elements need not be individually calibrated.

3.10 VEPCO Electrical Check-Out

VEPCO electricians, for 480 V circuit breakers, will perform contact inspection, dashpot and mechanism inspection, set trip values with multi-amp tester, and megger insulation. For 4160V, they will perform contact and mechanism inspection and check trip and close times with analyzer. Additionally, dielectric checks will be made on 4160V cables, doble tests and ratio 4160/480V transformers and doble test 4160V circuit breakers.

3.11 Preoperational Check-Out

Test of an individual item of equipment, subsystem or minor system to verify readiness for operations.

3.12 Operating Procedure(OP)

A station procedure developed by VEPCO and approved by the Station Nuclear Safety and Operating Committee for normal operation of equipment and systems.

3.13 Periodic Test Procedure (PT)

A station procedure developed by Vepco and approved by the Station Nuclear Safety and Operating Committee to meet Tech. Spec. or surveillance requirements for operability.

3.14 Special Test Procedure (ST)

A station procedure developed by Vepco and approved by the Station Nuclear Safety and Operating Committee to obtain data, associated equipment performance, or other technical data required for engineering or operational evaluation.

3.15 Functional System Operability Procedure (FSOP)

A procedure developed by the Startup Group to verify and document the functional operation of equipment and/or controls. It will verify and document the functional operation of critical controls. FSOP's are generally written to utilize existing logic diagrams.

3.16 Electrical, Instrument and Mechanical Maintenance Procedures And Maintenance Operability Procedure

These generic station procedures are referred to as EMP's, IMP's, MMP's and MOP's. These procedures are used by station personnel to checkout previously installed equipment that has undergone maintenance and to remove and replace safety related equipment in service.

3.17 Test Matrix

A matrix that indicates which TEP, TIP, TMP, and/or existing station procedure (OP, PT, ST, IMP, EMP, MMP or MOP) will be performed on an individual test loop, instrument, valve, device or component. The test matrix may also list tests required by Design Changes, Engineering Task Assignments (ETA), and Functional System Operability Procedures (FSOP).

4.0 PARTICIPATING ORGANIZATIONS AND RESPONSIBILITIES

4.1 Station Nuclear Safety and Operating Committee

Consisting of representatives from Surry Power Station as designated in the Vepco Nuclear Power Station Q.A. Manual. The Station Nuclear Safety and Operating Committee reviews and approves all test procedures. The committee reviews a summary of test results and approves release to the next phase of Startup Testing.

4.2 VEPCO Operating Staff

Consists of VEPCO employees engaged in the operation and maintenance of systems, subsystems, or portions of the station under the supervision of the station manager.

VEPCO Operating Staff will perform necessary and timely inspections and perform evaluations as necessary to effect a smooth release of systems for Preoperational testing.

VEPCO Operating Staff will conduct Preoperational and Startup testing and is responsible for the operation of the plant and the permanently installed plant process equipment connected to an energized power source.

4.3 Westinghouse Electric Corporation (W)

The term Westinghouse or W shall be limited to equipment and services furnished as part of or under the contract for the nuclear steam supply and turbine generator systems.

4.4 NUS Corporation (NUS)

The term NUS shall be limited to equipment and services furnished as a part of or under the contract between Vepco and NUS Corporation. NUS shall furnish engineering services where required by Vepco.

4.5 Stone & Webster Engineering Corporation - Engineering Department (S&W-BOSTON)

S & W shall furnish engineering services where required by VEPCO.

4.6 Daniel Construction Company (Daniel)

Daniel shall furnish construction services as required by Vepco.

4.7 Vepco Project Engineers

This group of engineers is responsible to resolve component and system deficiencies discovered during the construction and the Preoperational Test phase.

4.8 Quality Control

Consists of Quality Control related functions as defined in approved design change packages and test procedures.

4.8.1 Vepco MPP Q.C.

This group is responsible for quality control for all construction work as defined in the Vepco Multiple Power Projects Surry Quality Assurance Program.

4.8.2 Vepco Station Q.C.

This group is responsible for quality control during the Preoperational Test phase and Startup Test phase. The level and extent of Q.C. coverage is defined in the individual procedure.

4.9 Startup Group

The Startup Group is responsible for the development and implementation of the Integrated Startup Test program. It consists of S & W Advisory Engineers under the direction of the S & W Lead Advisory Engineer and designated VEPCO operators under the direction of the designated VEPCO Shift Supervisor each responsible to the Station Superintendent of Operations.

The S & W Lead Advisory Engineer is responsible for the implementation of the Integrated Startup Test program described herein and as outlined in station directives and applicable regulatory guides. In conjunction with the VEPCO Shift Supervisor, he will provide the technical direction and expertise to ensure the timely completion of the required testing. He will also be responsible for the development and management of the necessary documentation to support the Integrated Startup Test program.

The designated VEPCO Shift Supervisor is responsible for the execution of the Integrated Startup Test program. He will provide coordination with the operation staff for the safe operation and the interfacing of existing plant systems to support the Integrated Startup Test program. In conjunction with the Lead Advisory Engineer, he will direct the assigned personnel and provide operational guidance to ensure the timely completion of the required testing.

The Startup Group is responsible for conducting the test and checks under their jurisdiction. The group will ensure that all required test procedures and test matrices are developed and are available for use. The Startup Group is responsible for assuring all tests in the Integrated Startup Test program are performed in accordance with approved test procedures and for reviewing and approving all test data through the Preoperational Test Phase. The group is responsible that all design change test procedures and test matrices are written and approved to support Preoperational and Startup testing.

4.10 VEPCO Construction Staff

The construction program functions under the direction of the Resident Engineer construction. The Resident Engineer construction will be responsible for all rework associated with the Steam Generator Replacement Project (SGRP) and other design change modifications.

4.11 Superintendent of Operations

The overall responsibility for the direction and management of the Integrated Startup Test program is under the control of the Station Superintendent of Operations.

4.12 Superintendent Projects (Startup Co-ordinator)

The Superintendent Projects reports to the Station Manager. One of his responsibilities is Startup Co-ordinator for the Unit 1 outage. In performance of this duty, he will report directly to the Superintendent of Operations. He will have responsibility for insuring timely completion of technical reviews and tracting of release documentation for systems.

4.13 Superintendent of Technical Services

The Superintendent of Technical Services will provide the required engineering review and analysis of the Integrated Startup Test Program. He will be responsible for the development, safety analysis, engineering review and analysis of the selected Preoperational tests and the major Startup tests.

5.0 CONSTRUCTION PHASE

The construction phase for new and modified systems is the responsibility of the Resident Engineer Construction. All activities of the construction phase shall be performed in accordance with specifications and design change packages and other approved procedures, as applicable.

As the construction phase of the Design Change Package is completed, the responsible system construction engineer will walkdown the release and insure that all work has been completed and the system is ready for initial operation and preoperational testing. Any items that are found to be incomplete shall be documented on a deficiency list. Those deficiencies that limit preoperational testing will be resolved prior to system release.

The system is presented to the Startup Group for preoperational testing via a System Release form (Attachment 8.1) and a Deficiency Punch List (Attachment 8.2). The Startup Group either "accepts" or "rejects" the system release based on the deficiency list. A rejected system release is returned to the Resident Engineer Construction for completion of preoperational testing limiting deficiencies.

6.0 PREOPERATIONAL TEST PHASE

6.1 General

When a system or subsystem is sufficiently complete and other related systems have progressed far enough so it can perform its assigned function, the Startup Group, accepts the released system for preoperational testing.

Prior to signing the system release form (Attachment 8.1), the Startup Group will make a thorough review of all the attached documents and a member of the Startup Group will walkdown the system to insure that there is no outstanding item that will affect safe operation of equipment or system. If any items are found to be unsatisfactory the required acceptance signatures will then be withheld by the Startup Group until these items are resolved.

The Preoperational Test Phase for modified, new and existing systems is the responsibility of the Startup Group and will be accomplished by Vepco operations staff supplemented by construction craft personnel.

As the system releases for new and modified systems are accepted by the Startup Group, the required preoperational testing will begin. During this phase, field changes will be generated to resolve problems discovered during testing and operations.

System release forms (Attachment 8.1) or System Walkdown release forms (Attachment 8.3) will be generated by the Startup Group for all remaining systems affected by construction or maintenance work. The existing systems not associated with design changes can be classified as follows: remained in service, affected by maintenance, or in area of design change construction. (See Attachment 8.4) The extent and level of testing assigned by the Startup Group to testing of these systems will be based on this classification.

Vepco I & C will calibrate instruments and controls as the precalibration tests are completed by the Startup Group.

Preoperational testing includes all designated tests procedures (TIP, TEP, and TMP) along with applicable station procedures (ST, PT, OP, MOP, EMP, IMP, MMP) and Design Change testing. (See Attachment 8.5).

The tests associated with this phase include: dynamic MOV checkout, uncoupled and coupled motor runs, uncoupled and coupled vibration tests, I & C functional checkout, AOV/AOD setup and checkout, I & C hydrostatic test, AOV/AOD dynamic checkout, air balancing, pump curve verification, flushing and FSOP'S.

6.2 Responsibilities

6.2.1 Construction Group

Responsible as noted on the Deficiency Punch List (Attachment 8.2) for correction of construction deficiencies.

6.2.2 Startup Group

The Startup Group is responsible for: ensuring the timely Preoperational testing of systems and components, documentation of discrepancies determined during testing; maintaining a status of all outstanding deficiencies for existing systems that did not require modification, providing technical direction in the preparation of systems and components to support planned Preoperational tests, assuring that all Electrical, Mechanical and Instrument tests are performed in accordance with established test procedures, (TEP, TIP and TMP's), reviewing and approving of all test data, writing additional detailed procedures as needed for

implementation of general procedures and obtaining resolutions for all deficiencies. The group will also be responsible for initial I & C and electrical setup of new equipment.

The Startup Group shall be responsible for determining if a system has reached a point where it can be presented to the Station for approval for unrestricted operation.

6.2.3 Vepco Station Quality Control

This group shall perform required inspections and audits to assure that the Preoperational Test phase is conducted in accordance with the approved procedures.

Vepco Station Q.C. shall ensure the requirements for system documentation of the Station Nuclear Safety and Operating Committee are met.

6.2.4 Vepco I & C and Electrical

These groups shall perform calibration and maintenance on equipment per system test matrices. All TIP and TEP data sheets will be completed and returned to the Startup Group.

6.3 Release For Startup Testing

Upon successful completion of all Preoperational tests, the Startup Group will review all system documentation and test data as required to verify the functional operability of the system. The Startup Group system engineer will walkdown the equipment to ensure the system is ready for unrestricted operations by the station.

Any items found to be incomplete but not limiting for unrestricted operation will be documented on the Deficiency Punch List (Attachment 8.2). The Startup Group will then sign the System Release form (Attachment 8.1). The System Release and the required documentation will then be turned over to the Superintendent of Operations for review and acceptance.

Prior to the Superintendent of Operations final review of the system, the Station Quality Control Department will review the documentation to insure that all documents are complete. Any deficient items will be turned back to the Startup Group for resolution. Upon completion of an acceptable audit, the Station Quality Control Department will sign the required signature block on the release. The Station Superintendent of Operations will then review the deficiency list to approve the items to be carried on the Master Deficiency List. Any items that are not acceptable will be returned to the Startup Group for resolution. When all deficient items are acceptable to the Station Superintendent of Operations, he will then sign the Transmittal accepting the Release for the Station allowing Unrestricted Operations of the system.

7.0 STARTUP TEST PHASE

7.1 General

When a system has completed Preoperational testing and is accepted by the station for unrestricted operations it is ready for Startup testing. Prior to initiation of the Startup Test phase the Station Nuclear Safety and Operating Committee will review the systems that are available for unrestricted operation to ensure safe operation and testing conditions.

The first event is fuel loading. The sequence for subsequent Startup testing is determined by the Startup Matrix and initial conditions and prerequisites of the station startup procedures.

The Startup Matrix is designed to control the testing evolution from fuel load to full power operations. It is structured on a plateau basis. All items identified on a lower plateau must be completed prior to advancing to the next plateau. This sequencing may only be deviated from with prior approval of the Superintendent of Operations or his designee. The Station Nuclear Safety and Operating Committee will review all deviations in accordance with the Nuclear Power Station Quality Assurance Manual. The specific plateaus chosen are as follows:

Phase I - Fuel load
Phase II - prior to going above 140 ^{0}F (Refueling Shutdown)
Phase III - prior to going above 200 ^{0}F (Cold Shutdown)
Phase IV - prior to Containment Integrity
Phase V - prior to going above 350 ^{0}F/450 psig
Phase VI - prior to Criticality
Phase VII - prior to going above 10% Power
Phase VIII - prior to extended 100% power operation

The detailed tests within the phases will be available at the Surry Power Station for review. The Startup Matrix is a working document and may be revised as necessary to incorporate additional test requirements or reduce unnecessary requirements that may arise through the balance of the startup effort.

The Station Nuclear Safety and Operating Committee will review the status of systems and test results at major milestones throughout the Startup Test phase. At no time will the safety of the plant be totally dependent on the performance of untested structures, systems or components.

The comprehensive Startup Testing phase is to ensure that equipment and systems perform in accordance with design criteria. This phase includes test, adjustments, calibrations, and system operations necessary to ensure that criticality and subsequent power operation can be safely undertaken. These procedures will be normal station startup procedures, PT's, OP's supplemented as required by Special Tests and Design Change testing.

Preoperational tests are performed to verify as near as possible, the performance of the system under actual operating conditions. Where required, simulated signals or inputs are used to verify the full operating range of the system and to calibrate and align the systems and instruments at these conditions. During Startup testing, systems and instruments that are used for normal operations are verified and calibrated under actual operating conditions. Systems that are not used during normal plant operation, but must be in a state of readiness to perform safety functions, are checked under test conditions prior to unit startup.

7.2 Responsibilities

7.2.1 VEPCO Operating Staff

Virginia Electric and Power Company has the overall responsibility for development, supervision, performance, and documentation of all Startup Testing at the Surry Power Station. Test preparation and all test performance during Startup Testing are under control of VEPCO to ensure proper and effective emphasis is maintained on personnel and plant safety by all individuals participating in the testing program.

The Superintendent of Technical Services will be responsible for providing the safety analysis for all major tests and will provide engineering review and coverage to ensure the conduct of the major tests satisfies the necessary design and safety criteria.

7.2.2 Startup Release Points

The following milestones in the Startup Test phase of the Integrated Startup Test Program Schedule require Station Nuclear Safety and Operating Committee review and approval prior to implementation:

a. Fuel Loading
b. Hot Functional Testing
c. Criticality and Lower Power Physics Testing
d. Power Range Testing
e. Extended Full Power Operation

The Startup Group and Station Operations department will be responsible to present evidence that all required testing is successfully complete and proper documentation available.

8.0 ATTACHMENTS

8.1 System Release for Preoperational Testing and Unrestricted Operation.

8.2 Deficiency Punch List

8.3 System Walkdown Release for Unrestricted Operation

8.4 Unit #1 System Index

8.5 Preoperational Test Index

SURRY POWER STATION
UNIT NO. 1

SYSTEM RELEASE FOR PREOPERATIONAL TESTING AND UNRESTRICTED OPERATIONS
SYSTEM NO._____

DESCRIPTION OF EQUIPMENT:_____

_____

_____

THE ATTACHMENTS WITH THIS RELEASE ARE INTENDED TO INDICATE THE BOUNDARIES OF THIS RELEASE. FUTURE CHANGES THAT MAY BE MADE TO THIS SYSTEM ARE INTENDED TO BE CONSIDERED A PART OF THIS RELEASE IF WITHIN THESE ESTABLISHED BOUNDARIES.

ATTACHMENTS DEFINING BOUNDARIES:_____

_____

RELEASED FOR PREOPERATIONAL TESTING

_____ _____ _____ _____
Daniel's Proj. Mgr/Asst. Proj. Mgr. Date Vepco Resident Engineer Date

_____ _____
Vepco Q.C. (MPP) Date

Construction Deficiency List Attached_____

ACCEPTED FOR PREOPERATIONAL TESTING

_____ _____ _____ _____
Vepco Operations Superintendent Date Lead Advisory Engineer Date

RELEASED FOR UNRESTRICTED OPERATIONS

_____ _____ _____ _____
Vepco Operations Superintendent Date Lead Advisory Engineer Date

_____ _____
Vepco Q.C. (Station) Date

The Following Items Are Attached:
Test Matrix _____
Completed Pre-Op Tests _____
Vepco Deficiency Punch List _____

ACCEPTED FOR UNRESTRICTED OPERATIONS

_____ _____
Vepco Operations Superintendent Date

SYSTEM NO.______________
DATE__________________
PAGE________ OF________

VEPCO
DEFICIENCY PUNCH LIST

DEFICIENCY NO.	DESCRIPTION	RESPONSIBILITY	DATE RESOLVED

SURRY POWER STATION
UNIT 1

SYSTEM WALKDOWN RELEASE FOR UNRESTRICTED OPERATIONS

SYSTEM NO._____

DESCRIPTION OF EQUIPMENT:_____

_____

_____

_____

ATTACHMENTS DEFINING BOUNDARIES:_____

_____

_____

_____

SYSTEM WALKDOWN

_____ _____
Walkdown Performed By Date

Vepco Deficiency Punch List Attached_____

RELEASED FOR UNRESTRICTED OPERATIONS

_____ _____ _____ _____
Vepco Operations Superintendent Date Lead Advisory Engineer Date

_____ _____
Vepco Q.C. (Station) Date

ACCEPTED FOR UNRESTRICTED OPERATIONS

_____ _____
Vepco Operations Superintendent Date

UNIT #1 SYSTEM INDEX

System No.	System Description	Status
1-2-2-1	Circulation Water	1
1-2-2-2	Waterbox Vacuum Priming	2
1-2-2-3	Circulation & Service Water Radiation Monitors	4
1-2-3-1	Discharge Vacuum Priming	4
1-2-4-1	Screen Wash Pumps & Traveling Screens	3
1-2-5-1	Condenser Tube Cleaning	2
1-3-1-1	Main Steam	1
1-3-2-1	Extraction Steam	2
1-3-3-1	Auxiliary Steam	4
1-3-3-2	Auxiliary Boiler	3
1-3-3-3	Fuel Oil	4
1-4-1-1	Condensate Storage Tank	4
1-4-1-2	Main Condenser	1
1-4-1-3	Condensate	1
1-4-2-1	Low Pressure Heater Drains	2
1-4-2-2	Secondary Miscellaneous Drains	2
1-4-3-1	Condensate Polisher Ultrasonic Resin Cleaner	1
1-4-3-2	Condensate Polisher Waste Neutralization	1
1-4-3-3	Condensate Polisher Regeneration	1
1-4-3-4	Condensate Polisher Bypass	1
1-4-3-5	Condensate Polisher Vessel "A"	1
1-4-3-6	Condensate Polisher Vessel "B"	1
1-4-3-7	Condensate Polisher Vessel "C"	1
1-4-3-8	Condensate Polisher Vessel "D"	1
1-4-3-9	Condensate Polisher Vessel "E"	1
1-4-3-10	Condensate Polisher Vessel "F"	1
1-4-3-11	Condensate Polisher Vessel "G"	1
1-4-3-12	Condensate Polisher Panel	1
1-5-1-1	Condenser Air Removal	1
1-6-1-1	Feedwater	3
1-6-2-1	High Pressure Heater Drains	3
1-6-3-1	Steam Generator Blowdown	1
1-6-4-1	Auxiliary Feedwater	1
1-7-1-1	Radiation Monitors	1
1-7-2-1	CRD-MG Sets, Full & Part-Length Control Rods	3
1-7-3-1	Nuclear Instrumentation	4
1-7-4-1	Incore Instrumentation	4
1-7-5-1	Rod Position Indication	4
1-7-6-1	Solid State Protection	4
1-7-6-2	Safeguards Test Cabinets	4
1-7-6-3	Auxiliary Relay Cabinets	4
1-9-1-1	Component Cooling	2
1-9-2-1	Chilled Component Cooling	1

STATUS KEY (1) AFFECTED BY DESIGN CHANGE (2) IN AREA OF DESIGN CHANGE CONSTRUCTION
(3) AFFECTED BY MAINTENANCE (4) REMAINED IN SERVICE

System No.	System Description	Status
1-9-3-1	Chilled Water	1
1-9-4-1	Neutron Shield Tank Cooling	4
1-9-5-1	Service Water	1
1-9-5-2	Service Water to Recirculation Spray Hx	4
1-9-5-3	Service Water to Charging Pump Coolers	1
1-9-6-1	Bearing Cooling	4
1-12-1-1	Instrument Air	4
1-12-2-1	Service Air	4
1-12-3-1	Containment Instrument Air	1
1-13-1-1	Chemical Feed	1
1-13-1-2	Condensate Polisher Chemical Feed	1
1-13-2-2	Unit 1 Caustic Supply	1
1-13-2-3	Unit 1 Acid Supply	1
1-13-2-4	Unit 1 Dilution Water Heater	1
1-13-2-5	Unit 1 Flash Evaporator & Demin.	1
1-13-7-2	Blowdown Treatment	1
1-14-1-1	Nitrogen Supply	4
1-14-1-2	Hydrogen Supply	4
1-15-1-1	Fire Protection - Hose Reel Stations	1
1-15-1-2	Fire Protection - Sprinkler & Deluge	1
1-15-2-1	Fire Protection - CO_2 System	1
1-15-3-1	Fire Protection - Smoke Detectors	1
1-15-4-1	Fire Protection - Miscellaneous	1
1-16-1-1	Turbine Generator - Gland Steam	3
1-16-2-1	Turbine Generator - Lube Oil	3
1-16-3-1	Turbine Generator - Seal Oil	3
1-16-4-1	Turbine Generator - EHC Fluid & Controls	3
1-16-5-1	Turbine Generator - Supervisory Instrumentation	3
1-16-6-1	Main Turbine	3
1-16-7-1	Main Generator & Controls	3
1-16-8-1	Generator H_2 & CO_2	3
1-21-1-1	Secondary Plant Sampling	4
1-21-2-1	Primary Plant Sampling	1
1-22-1-1	Main and Station Service Transformers	4
1-22-2-1	Normal 4160V & 480V Busses	4
1-22-3-1	Emergency 4160V & 480V Busses	1
1-22-4-1	Emergency Diesels	1
1-22-5-1	Station Batteries & 120VDC Distribution	4
1-22-6-1	Vital Busses & 120VAC Distribution	4
1-22-7-1	Station Lighting	1
1-22-8-1	Heat Tracing (Safety Related)	1
1-22-8-2	Heat Tracing (Non-Safety Related)	4
1-22-9-1	Main Computer	4
1-22-10-1	Main Annunciator	4
1-22-11-1	Main Control Board	4
1-22-12-1	Secondary Plant Process Racks	4
1-22-13-1	Primary Plant Process Racks	4
1-23-5-1	Safeguards & Valve Pit Sumps	4
1-23-5-2	Containment Sumps	1
1-23-5-3	Turbine Building Sumps	4
1-24-1-1	CRD Cooling Fans	2

STATUS KEY (1) AFFECTED BY DESIGN CHANGE (2) IN AREA OF DESIGN CHANGE CONSTRUCTION
(3) AFFECTED BY MAINTENANCE (4) REMAINED IN SERVICE

System No.	System Description	Status
1-24-1-2	Containment Air Recirculation Fans	1
1-24-1-3	Containment Iodine Fans	2
1-24-1-4	Safeguards Supply & Exhaust Fans	1
1-24-2-1	Auxiliary Building Ventilation	1
1-24-3-1	Turbine Building Supply & Exhaust	4
1-24-4-1	Control Room & Relay Room Ventilation	4
1-24-5-1	Turbine Building Heating Steam	4
1-24-6-1	Containment Purge Ventilation	1
1-25-1-1	Reactor Coolant	1
1-26-1-1	Charging, Letdown, and High Head SI	1
1-26-2-1	Boric Acid Transfer & Blender	4
1-27-1-1	Low Head Safety Injection	1
1-27-1-2	Safety Injection Accumulators	2
1-27-2-1	Residual Heat Removal	2
1-27-3-1	Containment Vacuum	2
1-27-4-1	Refueling Water Storage Tank & Recirculation Pumps	1
1-27-4-2	Chemical Addition Tank	1
1-27-4-3	Containment Spray	1
1-27-6-1	Outside Recirculation Spray	1
1-27-6-2	Inside Recirculation Spray	1
1-27-6-3	Post DBA H_2 Recombiner	1
1-31-1-1	Primary Drains	1
1-31-2-1	Process Vents	2
1-33-1-1	Containment Leakage Monitor	1
1-34-1-1	Refueling Purification	4
1-34-1-2	Reactor Cavity	1
1-35-1-1	Containment Elevator	2
1-35-1-2	Containment Cranes	1
1-37-1-1	Fuel Transfer System	1
1-38-1-1	Steam Generator Recirculation & Transfer	1

STATUS KEY: (1) AFFECTED BY DESIGN CHANGE (2) IN AREA OF DESIGN CHANGE CONSTRUCTION
(3) AFFECTED BY MAINTENANCE (4) REMAINED IN SERVICE

PREOPERATIONAL TEST INDEX

TEP-1 INSULATION RESISTANCE MEASUREMENTS - ELECTRICAL EQUIPMENT

TEP-2 CONTROL CIRCUITRY CHECKOUT

TEP-3 LOW-VOLTAGE SWITCHGEAR

TEP-4 STATIC OPERATION OF MOTOR OPERATED VALVES

TEP-40 DYNAMIC OPERATION OF MOTOR OPERATED VALVES

TEP-5 480 MCC BREAKERS AND 480 SWITCHGEAR BREAKERS

TEP-7 AC ELECTRIC MOTOR UNCOUPLED MOTOR OPERATION

TEP-8 DC MOTORS AND CONTROLLERS MOTOR OPERATION

TEP-9 STATION COMPUTER

TEP-10 ANNUNCIATOR/GRAPHIC DISPLAY AND SEQUENCE OF EVENTS SYSTEM

TEP-11 MACHINERY VIBRATION ANALYSIS

TEP-12 ELECTRIC HEAT TRACING

TIP-1 INSTRUMENTS AND CONTROLS CIRCUIT INSTALLATION CHECKOUT

TIP-2 INSTRUMENTS AND CONTROLS MECHANICAL INSTALLATION CHECKOUT

TIP-3 INSTRUMENT AND CONTROLS FUNCTIONAL LOOP CHECKOUT

TIP-4 CHECKOUT PROCEDURE FOR AIR-OPERATED VALVES AND DAMPERS

TIP-40 DYNAMIC OPERATION OF AIR OPERATED VALVES AND DAMPERS

TIP-5 INSTRUMENT LEAK TEST

TMP-1 SPECIAL MAINTENANCE PROCEDURE FOR INSPECTION OF STUDS ON CONTAINMENT LINER

TMP-2 VENTILATION AIR BALANCING

TMP-3 CENTRIFUGAL PUMP HEAD CURVE VERIFICATION

TMP-4 RELIEF & SAFETY VALVE SETPOINT VERIFICATION

TMP-5 LEAKAGE TESTING OF DUCTWORK

TMP-6 WATER CLEANING OF PIPING

TMP-7 SYSTEM HYDROSTATIC/PNEUMATIC TESTING