SURRY POWER STATION

RESTART ACTION PLAN

OCTOBER 19, 1988

MAJOR MILESTONES

DESCRIPTION OF ISSUE

APPROACH TO RESOLUTION

SUMMARY OF MAJOR MILESTONES

1. SSFI

   a. Canal Inventory (excluding ESW pumps)

      * Submit summary report including interim compensatory measures - 11/14/88.

      * Submit Technical Specification change request to raise minimum canal level - 11/18/88.

      * Implement modifications and testing - 11/26/88.

      * Disposition associated station deviations - 11/26/88.

      * Revise station procedures and provide appropriate operator training - 11/26/88.

   b. Canal Inventory (ESW pumps)

      * Upgrade battery - 11/12/88.

      * Submit summary report including interim compensatory measures - 11/14/88.

      * Refurbish and test pumps - 12/1/88.

      * Disposition associated station deviations - 12/1/88.

      * Submit Technical Specification change request to require 3 operable ESW pumps when one unit is on RHR - 11/18/88.

      * Revise station procedures and provide appropriate operator training - 11/26/88.

   c. Heat Exchanger Performance

      * Conduct performance tests, clean or replace as necessary and implement monitoring program for CR & ESRR room A/C chiller condensers, charging pump lube oil coolers and intermediate seal coolers.

        Unit 1 - 11/16/88.

        Unit 2 - 11/26/88.

      * Inspect and clear as necessary Unit 1 recirculation spray heat exchangers - 11/1/88.

      * Revise station procedures and provide appropriate operator training - 11/26/88.

2. SECONDARY PIPE THINNING

* Complete NDE inspection and pipe replacement.

  Unit 1 - 11/11/88.

  Unit 2 - 11/30/88.

3. EMERGENCY DIESEL GENERATORS

* EDG response special test - 10/30/88.
* Install and test load sequencing modifications.

  Unit 1 - 11/17/88.

  Unit 2 - 11/28/88.

* Disposition associated station deviations - 11/25/88.
* Submit Summary Report - 11/25/88.

4. CONTROL ROOM AND EMERGENCY RELAY ROOM AIR CONDITIONING

* Ventilation special test - complete.
* Submit summary report including compensatory measures - 10/30/88.
* Implement compensatory measures - 11/12/88.
* Disposition station deviation - 11/12/88.
* Implement long term equipment upgrade - second quarter 1990.

ACTION PLAN
CANAL INVENTORY
(EXCLUDES E.S.W. SYSTEM)
SURRY POWER STATION

I. Description of Issues

II. Approach to Resolution

CANAL INVENTORY ISSUES

I. DESCRIPTION OF ISSUES

On September 9, 1988, a Deviation Report was filed relative to Intake Canal Inventory. Issues A.1, B.1, B.2 and C were identified in the initial Deviation Report. The other issues were discovered by Virginia Power reviews subsequent to the SSFI.

A. Intake Canal Level Drawdown During a Design Basis Accident Due to Single Failure

1. LOCA and LOOP With Emergency S.W. Pump Failure

   The first postulated event is a loss of coolant accident in one unit with a concurrent loss of offsite power. The scenario assumes all four RSHX's and pumps actuate per the Engineered Safeguards design and only one diesel-driven emergency service water pump operates (Technical Specification 3.14.A.4 requires two emergency service water pumps operable for a unit to be above 350F/450 psig or critical; in the scenario, one of these pumps is assumed to fail). The emergency service water pump has a design capacity of 15,000 gpm. The recirculation spray system will draw approximately 36,000 gpm. Thus a canal drawdown of 21,000 gpm could result.

2. LOCA and LOOP With Nonaccident Units Emergency Diesel Generator Failure

   The second postulated event is a loss of coolant accident in one unit with a concurrent loss of offsite power to the Station. This scenario assumes a failure of the emergency diesel generator on the nonaccident unit with the other two emergency diesel generators aligned to the accident unit. In this case, no power is available to close the Circulating Water valves on the nonaccident unit resulting in a canal drawdown of 550,000 gpm.

3. LOCA & LOOP or Low Canal Level With a Failure of Either a CW, BC, CC or SW Supply Valve Isolation

   The third postulated event also starts on a loss of coolant accident in one unit with a concurrent loss of offsite power to the station <u>or</u> a low canal level. This scenario assumes a power feed failure <u>or</u> mechanical failure to close any one of the MOV-SW-101,102, 201 or 202 service water supply valves. Alternately, with no failure of equipment, the J-bus valves on the nonaccident unit will not be powered by the swing diesel. These valves do not have a redundant MOV downstream such that a single failure of a valve will leave the line open and reducing canal inventory.

B. Non-Safety Grade Condenser and Service Water Isolation Signals

1. Low intake canal level (18'-0") detection by non-safety related Unit 1 and Unit 2 sensors with no provision for single failure closes both Unit 1 and Unit 2 Circulating Water main condenser inlet and outlet valves via the non-safety related turbine trip circuitry.

2. CLS HI-HI signal combined with loss of two Reserve Station Service Transformers sensed by non-safety related relays with no provision for single failure, closes only the Circulating Water main condenser inlet and outlet valves for the unit with the accident.

3. The MOV-SW-101's, 102's, 201's and 202's respond to the same signals as noted above. These valves serve to isolate the Bearing Cooling, Component Cooling and other Service Water subsystems.

C. Potential for Inadequate Emergency Service Water Supply During a Design Basis Accident with Cooldown or RHR Operation on the Non-Accident Unit

As discussed in A. above, Technical Specification 3.14.A.4 requires operability of two emergency service water pumps. In the event of a DBA with a loss of offsite power, if cooldown is required on the non-accident unit, or if that unit's Residual Heat Removal (RHR) system is operating, three emergency service water pumps should be operable as stated in UFSAR Section 9.9.1.2. Thus the current Technical Specification does not account for a single failure.

D. Potential for the Circulating Water Pump Discharge Lines to Siphon Back to the James River on a Loss of Power to the Circulating Water Pumps

The Circulating Water pumps, lines, vacuum breakers and flapper valves are all non-safety grade equipment at the Low Level Intake Structure location. Failure of the vacuum breakers and flapper valves must be assumed and a reverse siphon may be established once there is a power loss to the Circulating Water pumps. The existing design includes a passive vacuum breaker element in that the discharge piping is uncovered starting at canal levels of approximately 19 feet. By the time intake canal level drops to 18 feet sufficient air flow is established to break the vacuum.

This scenario becomes a problem only when canal inventory must be maintained at elevations above 18 feet. If the resolution to the problems stated in A through C above or if by independent assessment canal level would be required to be held greater than eighteen feet, then this problem must be addressed.

E. Circulating Water Valves Not Required to Operate During an Appendix R Event

The current Appendix R analysis allows for failure of the CW valves followed by Operator action. The failure of the valves should allow

Charging Pump Service Water pumps and Chiller Pumps to keep their suction throughout the event. The analysis appears to be suspect, however, in that breaking condenser vacuum under full flow conditions and maintaining NPSH to the aforementioned pumps is not adequately addressed. Canal inventory, therefore, would not be assured in support of this Appendix R event.

F. Non-Seismic, Non-Isolable Suction Piping to the Service Water Pumps

A bondstrand suction pipe originates in each units' "D" Circulating Water inlet manway. The pipe is not seismically supported nor is it isolable by any upstream Circulating Water or Service Water MOV's. Failure of the line during a seismic event would cause both local flooding of the Turbine Building and a measurable drawdown on Intake Canal inventory. Because the line is non-isolable, these conditions would persist.

II. APPROACH TO RESOLUTION

A. Intake Canal Level Drawdown During a Design Basis Accident Due to Single Failure

1. LOCA, LOOP and ESW Pump Failure

   This issue was raised in 1970 by the NRC during the FSAR reviews (see question and answer 9.17).

   Resolution of this problem requires specific operator actions.

   a. Within one hour of the initiation of the event, the operable emergency service water pump (ESWP) is placed in service.

   b. Two of the four RSHX's on the accident unit are secured and the service water isolation valves are verified closed. This is conservatively assumed to occur 2 hours after initiation of the event.

   c. Within 24 hours of initiation of the event, the operator takes action to either:

      i. secure one of the two remaining RSHX's, or

      ii. return the ESWP which was out for maintenance to service, or

      iii. restore offsite power and start a Circulating Water Pump to provide makeup to the intake canal.

   With the above actions, the intake canal level will stay above 16 feet, which is enough to assure a minimum SW flow to the remaining 2 RSHX's of 6,000 gpm at all times.

   These actions have been proposed as changes to the relevant Station procedures.

2. LOCA, LOOP and Failure of the Diesel on the Non-Accident Unit

   Resolution of this problem will require a means for powering the Circulating Water valves to account for a failed diesel during the DBA. This repowering will be addressed in a Design Change Package.

3. LOCA & LOOP or Low Level with Failure of a Service Water Valve to Close

   Resolution to this problem requires direct operator action based on loss of canal level. Sufficient time should exist to validate this approach but must be verified by calculation and/or test. Canal level could also be dropping based on closed but leaking Circulating Water valves or considering LOOP/LOCA on the nonaccident unit, a failure of a CW valve is possible. Emergency procedures will be revised and operators will be trained to identify and respond to any of these means for loss of canal inventory.

B. Non-Safety Related Condenser and Service Water Isolation

The resolution to this problem will be to upgrade the canal level circuitry. Setpoint level actuation to the turbine trip circuits and Circulation and Service Water MOV's of both units plus Control Room indication and annunciation will be upgraded. The automatic actuation of valves and turbine trip will be by new safety grade level switches and relay logic. The level switches will use materials suitable for service in the Intake Canal. Level indication will be through an upgraded bubbler system until a safety grade level transmitter can be qualified for service in the Intake Canal. The CLS HI-HI combined with a loss of 2 RSST's circuitry is preemptive for canal level. This circuitry will also be reviewed. All changes to the circuitry will be addressed in a Design Change Package.

C. Potential for Inadequate Emergency Service Water During a Design Basis Accident with Cooldown or RHR Operation on the Non-Accident Unit

The resolution to this problem is to require three diesel driven emergency service water pumps to be operable prior to placing the residual heat removal system (RHRS) in service for a unit. The basis of this action is to provide adequate emergency service water flow to maintain canal level in the event of a DBA in one unit and a requirement to operate the RHRS in the nonaccident unit, assuming a single failure of one ESWP. Since the capacity of an ESWP exceeds the service water requirements of the RHR system (about 9,000 gpm), the requirements for a DBA will be met even with the RHRS operating in the nonaccident unit.

A 14 day Allowed Outage Time for a single ESWP in conjunction with the above operational restriction is acceptable based on the low probability of a LOCA concurrent with a LOOP and failure of one of the other two ESWP's.

In order to incorporate these requirements, a Technical Specification change will be made as follows:

Require 3 ESWP's when RHR is in operation; provide for 14 day allowed outage time on one of three ESWP's..

D. Potential for the Circulation Water Pump Discharge Lines to Siphon Back to the James River on a Loss of Power to the Circulating Water Pumps

The resolution to this problem will be to provide a passive vacuum breaker on the discharge lines to preclude siphoning back to the river. This will be required if canal level must be maintained above 18 feet. Hence, the first step is to determine the need to control canal level above 18 feet. If so, a Design Change Package will address the vacuum breakers and the requirements for vacuum priming the lines.

E. <u>Circulating Water Valves not Required to Operate During an Appendix R Event</u>

The resolution to this problem will be to validate the original calculation as follows:

a. Provide air operated, fail open, redundant vacuum breakers on each CW inlet waterbox which could be actuated manually from outside the Turbine Building fire zone and thus insure drawdown would stop at the bottom row of condenser tubes (approximate elevation 12 feet).

b. NPSH requirements of the Charging Pump Service Water Pumps and the MER #3 Chiller Pumps will be confirmed for elevations of approximately 12 feet.

A Design Change will be required to install the vacuum breakers. Operator actions will need to be incorporated into the Fire Contingency Action (FCA) procedures to attempt alternate means of controlling inventory (CW valves closed, CW pumps on, etc.) prior to actuating the vacuum breakers.

F. <u>Non-Seismic, Non-Isolable Suction Piping to the Service Water Pumps</u>

The resolution to this problem will be to eliminate this line as a suction source to the SW-P-100A and B pumps. An alternate source of water exists already which comes from downstream of the MOV-SW-102 and 202 valves. These will be addressed in a Design Change Package.

ACTION PLAN - CANAL INVENTORY

OPERABILITY OF EMERGENCY SERVICE WATER PUMPS (1-SW-P-1A, B, C)

SURRY POWER STATION

I. Description of Issues

II. Approach to Resolution

CANAL INVENTORY

OPERABILITY OF EMERGENCY SERVICE WATER PUMPS (1-SW-P-1A, B, C)

I. DESCRIPTION OF ISSUES

The following problem areas have been identified which raise questions about the operability and reliability of the ESW pumps:

A. Diesel Starting Battery Problems

1. No seismic qualification documentation.
2. Incorrect classification (NSR and non-1E).
3. Inadequate testing to verify operability under all conditions.
4. No sizing calculation or test data is available to verify operability under all possible room ambient conditions and with continuous running load.

B. Battery Charger Not Safety Related or Seismically Qualified

Failure of the charger by short-circuiting could discharge the batteries and prevent a diesel start.

C. Pump Surveillance Testing Does Not Verify the Required Flow

Based on Calculation ME-180, 15,000 GPM is required from the pump to maintain sufficient canal inventory after an accident. Existing surveillance test assumes only 12,000 GPM is required from the pumps. The current "benchmark" test method for pump flow is not appropriate for short term operability demonstration or long term IWP testing.

D. Ambient Temperature Effects on Diesel Engines

Failure of the electric space heaters in the room could expose the diesels to temperatures of less than 40°F. At temperatures below approximately 45°F starting aids may be required. Temperatures of up to 185°F are possible in the summer with 3 pumps (2 diesels/1 motor) operating.

E. Replenishment of Diesel Lube/Fuel Oil During Operation

Lube oil consumption rates published by the manufacturer would result in the diesel running out of lube oil in approximately 88 hours. The pumps could be needed for longer periods after an accident. No procedure exists for checking oil levels during operation.

F. Seismic Support of Diesel Exhaust and Small Bore Piping

Seismic calculations were not available for the diesel exhausts and small bore piping associated with the pumps. Preliminary analysis of the diesel exhausts shows that DBE pipe stress levels are acceptable, however nozzle loading has not been verified as acceptable by the manufacturer. Small bore piping has been modified during the life of the plant and needs to be reviewed.

G. ESW Pumps Have No Control Room Indication for Clutch Position

Without indication of clutch position in the Control Room, the diesel could be started uncoupled from the pump.

H. Preventative Maintenance and Operation of the Diesels, Pumps and Batteries is not in Accordance with Vendor Instructions

Maintenance and operations procedures in some cases do not take into consideration the equipment manufacturers' recommendations (i.e., warm-up and shutdown of the diesels, electrolyte testing of batteries).

I. Low Level Intake Equipment Status Indication in Control Room

No safety related indication of ESW Pump status is available in the control room. Additionally, no safety related remote control circuitry is available.

J. Pump Suction Strainer Clogging

What is the potential for the pump suction strainers to clog?

K. ESW Pump Room Ventilation Louvers

Do louvers actuate as required for diesel operation/loss of power? Louver wiring details are not available. Operability of the louvers should be demonstrated.

L. Wiring of Diesel Controls

ESK-11L and diesel vendor drawings apparently do not match. Wiring of the diesel control system is uncertain. Running loads on the batteries need to be identified.

M. Pump Operability at Low Tides

At what river level does an otherwise healthy pump become inoperable? What about a pump in an "alert" status? Are there adequate operating procedures for inventory control on extreme low river levels?

N. Appropriate Q-List Documentation

Are the ESW Pumps and associated equipment correctly identified on the Q-List?

O. Calibration of Diesel Controls/Pump Indicators

Are sensors on the diesels and indicators for the pumps required to be calibrated as safety-related instruments?

II. APPROACH TO RESOLUTION

The general approach to each of the defined problem areas are as follows:

A. Starting Battery Problems

1. Evaluate whether batteries can be seismically qualified through Seismic Qualification Utility Group (SQUG) criteria. Replace if impractical.

2. Determine the appropriate safety classification for the batteries and evaluate whether the existing batteries can be upgraded, if necessary. Should the batteries be classified 1E? Replace if necessary.

3. Review PT and maintenance procedures for compliance with battery manufacturers' and industry recommendations for battery testing.

4. Determine the capacity requirements for starting a cold diesel by test or from vendor information. Determine the effects of maximum possible room temperature on battery requirements. Evaluate the ability of the existing batteries to meet these requirements. Evaluate the addition of alternators to the diesels. Replace the batteries and/or add alternators if necessary.

B. Battery Charger Qualifications

Add fuses and/or diodes at the batteries to prevent loss of battery charge on failure of the charger.

C. Pump Surveillance Testing

Perform Preventative and Corrective Maintenance on and inspection of the ESW Pumps. Perform a fully instrumented long-duration test of one pump (i.e., 48 hours) to verify operability. During the test, river level, discharge pressure, flow, vibration, battery starting and running currents and voltages, ambient temperature, room temperature, coolant temperature, lube oil consumption, fuel oil consumption and other parameters as required should be measured. The battery chargers should be disconnected prior to performing the test. The diesel may need to be stopped and started every 16 hours to measure lube oil consumption. Install temporary instrumentation prior to restart for the flow verification test and normal PT's. Long-term instrumentation is to be provided as part of the ISI Instrumentation Upgrade Project. Review results of the tests versus calculations for minimum required flow based on resolution of canal inventory issues.

D. Ambient Temperature Effects on Diesel Engines

Determine minimum and maximum possible temperatures in the pump room. Determine effects of these temperatures on diesel start and steady state operation. Long-term - Evaluate reliable means of maintaining a minimum 55F temperature in the room. Alternately, evaluate the addition of a safety-related pump room low temperature alarms in the

Control Room. Prior to restart, a qualified individual will be assigned to monitor the pump room at low ambient temperatures. Change operating procedures to prevent 3-pump operation at high ambient temperatures (i.e., 140°F).

E. Replenishment of Lube/Fuel Oil During Operation

Modify operating procedures to require periodic replenishment of lube oil on an operating diesel. The frequency is to be determined by testing in Item C above. Evaluate the required frequency for filling the fuel oil tank during continuous pump operation.

F. Seismic Support of Diesel Exhaust and Small Bore Piping

Replace the diesel exhaust supports. Perform walkdowns of the small bore piping associated with the pumps to verify adequacy of supports and upgrade supports as necessary.

G. Clutch Position Indication

Long Term - Determine what administrative controls or modifications are necessary to ensure that the clutch lever is locked in place (indication is not necessary). Prior to restart, evaluate changes to Maintenance/Operating procedures to ensure administrative control is adequate.

H. Maintenance and Operation not per Vendors' Recommendation

Review the PM's and operating procedures for the diesels, pumps, batteries and related equipment to ensure that manufacturers' recommendations are followed or provide documented technical justification as to why they are not necessary.

I. Status Indication in Control Room

Long Term - Determine what safety-related Low Level Intake control functions and indications should be available in the Control Room. Develop the means for providing both safety-related indication and control. Prior to restart, a qualified individual will be assigned during operation to monitor the ESW pumping equipment status until modifications are complete.

J. Pump Suction Strainer Clogging

Evaluate the performance of the pump suction strainers. Evaluate the potential for clogging versus the potential for damage to the pump by debris. Remove or resize the strainer elements if necessary.

K. ESW Pump Room Ventilation Louvers

Long Term - Prepare as-built drawings of the louver control circuit to ensure that they will operate as required. Prior to restart, verify by test that the louvers fail open on a loss of power.

L. Wiring of Diesel Controls

Long Term - Prepare as-built drawings of the wiring for the ESW pump diesels. Correct ESK-11L and vendor drawings as necessary.

M. Pump Operability at Very Low Tides

Determine at what river level the pumps become inoperable. Ensure that operating procedures recognize this possibility and contain specific direction for inventory control. Determine if reliable river level instrumentation is required.

N. Q-List Documentation

Ensure that the Q-List clearly and correctly identifies the safety classification of all equipment associated with the ESW pumps.

O. Calibration of Instrumentation

Ensure that appropriate instrumentation and controls in the ESW system are maintained and calibrated as safety-related. This includes diesel engine controls.

ACTION PLAN

PERFORMANCE OF HEAT EXCHANGERS IN SW SYSTEM

SURRY POWER STATION

I. DESCRIPTION OF ISSUES

II. APPROACH TO RESOLUTION

PERFORMANCE OF HEAT EXCHANGERS IN SW SYSTEM

I. DESCRIPTION OF ISSUES

The following questions have been raised concerning the performance of the heat exchangers served by the Service Water system:

A. Recirculation Spray Heat Exchangers

Recirculation Spray heat exchangers' design assumes no margin for fouling. The presence of mud, biofouling and shellfish in the SW piping upstream of the RHSX's raises doubts on their performance at design requirements. Additionally, although designed to be layed up dry, they have the potential to be wetted based on past experience.

B. Charging Pump Lube Oil and Intermediate Seal Coolers and Control Room Chillers

The Charging Pump Lube Oil and Intermediate Seal Coolers and the Control Room Chiller heat exchangers are not performance tested to verify design performance or provide data for assessing a reduction in heat transfer capacity due to fouling.

C. Component Cooling Water Heat Exchangers

Currently, cleaning of the Component Cooling Heat Exchangers is performed only after degradation in performance is noted by Operations (i.e., the component cooling water delta T is diminished). This method of detecting when cleaning is required results in operating a heat exchanger until its performance capability may fall below its design requirements. Although performance testing of these heat exchangers was not designated by the NRC as a restart issue, their performance is important to the performance of other safety-related heat exchangers.

II. APPROACH TO RESOLUTION

A. Recirculation Spray Heat Exchangers

Recirculation Spray must be handled differently than other heat exchangers since they are designed to be layed up dry and maintaining low fouling factors is essential. A periodic inspection program for the RS heat exchangers, and cleaning of the exchangers and piping is required. (Short Term) Leakage past motor operated SW butterfly valves (SW-104 & 105) was the source of the recent unexpected service water intrusion into the Unit 1 RS heat exchangers. For both units, the valves will be examined to reduce future leakage. In addition the procedures for testing the SW MOV's will be modified and operator methods for throttling the condenser water box flows will be changed. The heat exchangers will also be verified to be dry monthly and after each valve testing sequence. Any incursion will be evaluated to determine appropriate cleaning requirements.

B. Charging Pump Lube Oil and Intermediate Seal Coolers and Control Room Chillers

1. Prior to restart, heat exchanger testing will be conducted by instrumenting the CH Pump Lube Oil and Intermediate Seal Coolers and Control Room Chillers and collecting the appropriate data. This will be done in order to establish a baseline performance of these heat exchangers. Guidelines will be established to determine when heat exchangers are to be removed from service for cleaning or replacement.

2. (Long Term) - A program for periodic performance testing will be developed and any necessary modifications to add permanent instrumentation will be implemented to provide the information necessary to make the decision to remove a heat exchanger from service for cleaning or replacement.

C. Component Cooling Heat Exchangers

1. Activities similar to those described in B1 above will be performed on the Component Cooling Heat Exchangers shortly after Unit 1 start-up.

2. (Long Term) - A program for periodic performance testing as described in B2 above will include the Component Cooling Heat Exchangers.

ACTION PLAN

SECONDARY PIPE THINNING

SURRY POWER STATION

I. Description of Issues

II. Approach to Resolution

EROSION/CORROSION

I. DESCRIPTION OF ISSUES

On December 9, 1986, the condensate line to the suction of the "A" Main Feedwater Pump on Surry Unit 2 ruptured. The piping component failed as a result of single phase erosion/corrosion. The component and others determined to be worn were replaced and a monitoring program established.

During the Surry Unit 2 1988 refueling outage, higher than anticipated erosion/corrosion wear rates have been identified on certain components (including the previously failed/replaced components).

II. APPROACH TO RESOLUTION

1. The Program is a standardized method of identifying, inspecting, and tracking piping components which are susceptible to E/C phenomenon in both single and two phase piping systems in order to prevent wall thickness reductions below code allowable.

   Systems identified for inspection as potential problem areas are those steam or water systems which have controlled low oxygen levels, were constructed of carbon steel materials, and have an operating temperature greater than 195°F.

2. Perform a minimum of three inspections of each area in order to develop accurate wear rate data.

3. For those components installed in the 1987 forced outage which have wear rates higher than anticipated.

   a. Expand the inspection program to include additional components on Unit 1 to validate the wear rates.

   b. Inspect additional components on Unit 2 which were not inspected during the Unit 1 1988 refueling outage in similar areas as 3a.

   c. Perform metallurgical tests on several replacement components having higher than anticipated wear rates to determine root cause.

4. Evaluate methods of reducing wear rates due to erosion/corrosion such as:

   a. Using more resistant material in piping systems. For example, 2-1/4% chrome - 1% moly piping is being utilized as replacement piping in the first and second point extraction steam piping. Examine the affect that different chemical treatments used to maintain the secondary system water chemistry on E/C wear rates.

5. Utilize the EPRI computer code, CHEC, to evaluate inspection data and for selecting future inspection points.

ACTION PLAN

EMERGENCY DIESEL GENERATORS

SURRY POWER STATION

I. Description of Issues

II. Approach to Resolution

EMERGENCY DIESEL GENERATORS

I. DESCRIPTION OF ISSUES

Analysis has determined that the Surry Emergency Diesel Generators may be incapable of assuming the loads of the emergency buses if the loss of offsite power (LOOP) occurs at a time other than coincident with the design basis accident. This problem can be traced to the absence of a load sequencing logic to shed and reload the emergency buses in increments consistent with the capabilities of the generators.

II. APPROACH TO RESOLUTION

The following steps are being taken to resolve this problem:

A. The engineering analysis which discovered the deficiency was independently reviewed by the original A/E. The review did not determine that any methodology or procedure had been overlooked or misapplied.

B. The design basis for the sizing and loading of the emergency diesel generators was reviewed. A LOOP non-coincident with an accident had not been considered in the original design; therefore, a load sequencing scheme had not been included in the electrical system design.

C. Design modifications will be performed so that the loads will be resequenced onto the emergency buses following the loss of offsite power. Auxiliary undervoltage and time delay relays will be installed to enhance the existing degraded voltage/loss of voltage logic schemes. Proper sequencing of the individual emergency bus loads will be determined by the particular event in progress.

D. The emergency diesel generators will be tested to determine the frequency and voltage response of the machines for transient load changes similar to those expected during accident conditions. The sequencing scheme time delays will be determined by using vendor information and characteristics demonstrated during the testing program. The test plan was developed in conjunction with Morrison-Knudsen, the diesel generator vendor representative.

E. Nuclear safety analysis will be performed for the effects of the imposed starting delays for the affected safety-related components.

F. The enhanced logic schemes will be tested following the implementation of the design change and the affected Station drawings, operating and test procedures will be modified as necessary.

G. A report that summarizes the test results and the modifications will be submitted to the NRC.

H. A technical report will be issued to consolidate the findings and conclusions for this task.

ACTION PLAN
CONTROL ROOM ENVELOPE AIR CONDITIONING SYSTEM
SURRY POWER STATION

I. Description of Issues

II. Approach to Resolution

CONTROL ROOM ENVELOPE AIR CONDITIONING SYSTEM

I. DESCRIPTION OF ISSUES

The control room envelope consists of the Units 1 and 2 main control room (MCR) and the Units 1 and 2 emergency switchgear and relay rooms (ESRR). These areas are cooled by a common air conditioning system consisting of two, 100 percent capacity air conditioning trains -- one operating full capacity train and one full capacity backup train.

On September 9, 1988, a Deviation Report was filed to identify a potential problem concerning the ability of the existing control room envelope air conditioning system to maintain acceptable ambient temperatures in the control room envelope during a design basis accident. It was previously recognized that a reduction in air conditioning capacity margin was apparent due to the addition of electrical equipment (heatloads) over the years and expected degradation of air conditioning system equipment performance due to age. In 1987, a project was initiated to replace the control envelope air conditioning equipment. During this project, design heatloads which were developed to establish capacity of the replacement equipment suggested that the existing air conditioning system capacity may not be adequate under extreme design conditions. Give the conservatism inherent in design heatload development methodology, adequacy of the existing air conditioning system was considered inderminate until actual heatloads and existing equipment performance could be properly assessed.

II. APPROACH TO RESOLUTION

To determine adequacy of the existing air conditioning system, an evaluation of actual heatloads and current air conditioning equipment performance is being conducted. Special Test ST-220, "Control Room Envelope Air Conditioning System Test," was developed for the purpose of obtaining heatload and system performance data while operating the system in the designed configuration i.e., single train operation (both the normal and backup trains are currently operated simultaneously). The test was performed and the data is being evaluated. As part of the evaluation, the heatload data will be extrapolated, by calculation, to maximum design conditions. The equipment performance data will be used to evaluate current equipment condition. This information will form the basis for determining if the capability of the existing air conditioning system is adequate.

If it is determined that the existing air conditioning system capacity is insufficient, appropriate interim measures will be undertaken to ensure that acceptable ambient conditions can be maintained until new, higher capacity equipment is installed. The extent of these measures vary depending on the results of the evaluation. The range of measures considered include corrective maintenance with a consequent increase in preventative maintenance, an enhancement of existing equipment performance, compensatory action to enable operation of backup train equipment subsequent to a single failure, or hardware modifications. A summary report will be prepared to document the conclusions drawn from the test and provide the justification for any compensatory measures.