VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 30, 1991

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Serial No. 89-572E
NL/RPC R1
Docket Nos. 50-280
50-281
50-338
50-339
License Nos. DPR-32
DPR-37
NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
NORTH ANNA POWER STATION UNITS 1 AND 2
SUPPLEMENTAL RESPONSE TO GENERIC LETTER 89-13
SERVICE WATER SYSTEM PROBLEMS
AFFECTING SAFETY-RELATED EQUIPMENT

Generic Letter 89-13 provided recommended actions to address various problems with service water systems which have, in the past, led to system degradation or failure. Virginia Electric and Power Company letter (Serial No. 90-572) dated January 29, 1990, described the program that would be implemented to ensure that the service water (SW) systems at Surry and North Anna Power Stations will be in compliance with appropriate regulations, specifications, and licensing basis documentation. This program was supplemented for Surry by letter (Serial No. 89-572B) dated January 18, 1991, and letter (Serial No. 91-087) dated March 14, 1991.

During a meeting with NRC management on February 6, 1991, additional planned activities pursuant to Generic Letter 89-13 were presented in response to the Recirculation Spray Heat Exchanger (RSHX) macrofouling issue at Surry. In response to one of our commitments from the February 6 meeting, a summary description of activities being conducted at Surry and North Anna is enclosed in Attachments 1 and 2, respectively. As modified by actual RSHX SW-side flow testing and commitments for future flow testing identified in our March 14, 1991, letter, Attachment 3 contains our basis for not directly testing the heat transfer capability of the RSHXs at either station.

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A detailed revision of our initial January 29, 1990, response incorporating the subsequent supplements and the additions integrated into this summary description will be separately forwarded. Should you have any further questions, please contact us.

Very truly yours,

J. P. O'Hanlon

for W. L. Stewart
Senior Vice President - Nuclear

Attachments

1. Generic Letter 89-13 Activities - Surry Power Station
2. Generic Letter 89-13 Activities - North Anna Power Station
3. RSHX Heat Transfer Verification Basis

cc: U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N. W.
Suite 2900
Atlanta, Georgia 30323

Mr. M. Branch
NRC Senior Resident Inspector
Surry Power Station

Mr. M. S. Lesser
NRC Senior Resident Inspector
North Anna Power Station

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by J. P. O'Hanlon who is Vice President - Nuclear Services, for W. L. Stewart who is Senior Vice President - Nuclear, of Virginia Electric and Power Company. He is duly authorized to execute and file the foregoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 30TH day of April, 1991.

My Commission Expires: May 31, 1994.

Vicki L. Hull
Notary Public

(SEAL)

ATTACHMENT 1

GENERIC LETTER 89-13 ACTIVITIES
SURRY POWER STATION

DESCRIPTION OF PROGRAM CHANGES

SURRY POWER STATION

The enclosed matrix summarizes the overall program for Generic Letter 89-13. Changes or additions to our initial January 29, 1990, response to Generic Letter 89-13 for Surry Power Station were precipitated from the Recirculation Spray Heat Exchanger (RSHX) operability concerns documented in our letter (Serial No. 91-087) dated March 14, 1991. Inclusion of the following items into the Generic Letter 89-13 program is in confirmation of the associated commitments made by that letter:

- Chemical treatment to control hydroid growth in the 48" SW headers to the RSHXs.

- SW monitoring and sampling for temperature, salinity, pH, conductivity, dissolved oxygen, chlorine, and ammonia.

- Unit 2 Recirculation Spray SW subsystem flow test with post test inspection of the flow tested SW subsystem. "As-found" inspection on the other Unit 2 Recirculation Spray SW subsystem. Similar testing and inspection for Unit 1 during its 1992 refueling outage.

- An ecosystem study to support a long-term biological control strategy.

GENERIC LETTER 89-13 ACTIVITIES
SURRY POWER STATION - UNITS 1 AND 2

COMPONENT STRUCTURE (NAME)	MARK NO.	ACTIVITIES	NOTES	FREQ.
Low Level Intake Structure	Screenwells 1D 2A 2B	Biofouling Surveillance • Visual Inspection for macrofouling • Emergency Service Water pump performance test	Identify organisms present extent and location of fouling	Initially annual* Monthly
		Inspection & Maintenance •Visual Inspection for sediment and corrosion	Identify extent and location of sediment and corrosion. Verify condition of ESW Pump suction bell and housing	Initially annual*
High Level Intake Structure	Screenwells 1A,B,C,D	Biofouling Surveillance •Visual Inspection	Identify extent and location of each organism present	Each refueling
	2A,B,C,D	Inspection & Maintenance •Visual Inspection	Visual Inspection of one Screenwell per unit (minimum)	Each refueling
SW Inlet Piping	Various RSHX Supply CR Chiller Supply	Biofouling Surveillance Inspections & Maintenance •Periodic flushing or inspection of infrequently used cooling loops	Flow Testing or Visual Inspection	*
		Biofouling Control	Surry-Study ecosystem and feasibility of system chemical treatment and other alternatives. Study to include SW monitoring and sampling.	

*Frequency will be determined using test/inspection data gained from initial testing/inspections.

COMPONENT STRUCTURE (NAME)	MARK NO.	ACTIVITIES	NOTES	FREQ.
Recirculation Spray Heat Exchanger	1-RS-E-1A 1-RS-E-1B 1-RS-E-1C 1-RS-E-1D 2-RS-E-1A 2-RS-E-1B 2-RS-E-1C 2-RS-E-1D	Biofouling Surveillance and Control on inlet piping	No Biofouling Surveillance for HX's. HX's in dry layup-inspect if inadvertently wetted Chemically treated wet layup from MOV-103A thru D to 36"	Continuous control
		Inspection & Maintenance	Inlet header piping.	Each refueling*
		Flow testing	SW side No heat transfer test Hx's in dry layup and no available heat load.	Unit 1 1992 refueling*
Component Cooling Heat Exchanger	1-CC-E-1A 1-CC-E-1B 1-CC-E-1C 1-CC-E-1D	Biofouling Surveillance •Operability verification (flow vs. dP test)	For detection of tubesheet macrofouling	Weekly
		Inspection and maintenance	As required by operability verification	
		Heat transfer testing		*

*Frequency will be determined using test/inspection data gained from initial testing/inspections.

COMPONENT STRUCTURE (NAME)	MARK NO.	ACTIVITIES	NOTES	FREQ.
CR Chillers	1-VS-E-4A 1-VS-E-4B 1-VS-E-4C	Biofouling Surveillance & Control •Operability Verification (incl. flow vs. dP check)		3 times/week
		Inspection and Maintenance •Condenser tube cleaning		As req'd
		Heat transfer test		*
		Periodic inspection of supply piping.		Each refueling*
Charging Pump Lube oil coolers	1-CH-E-5A 1-CH-E-5B 1-CH-E-5C 2-CH-E-5A 2-CH-E-5B 2-CH-E-5C	Bearing temperature monitoring	Heat transfer testing not practical	Continuous
		Inspection and Maintenance		As req'd
Charging Pump Intermediate Seal Coolers	1-SW-E-1A 1-SW-E-1B 2-SW-E-1A 2-SW-E-1B	Inspection and Maintenance	Heat transfer testing not practical	
ESW Pump Diesel coolers	N/A	Temperature monitoring	Heat transfer testing not practical	
		Maintenance	Strainer cleaned	Monthly
ESW Pumps Right angle gear oil coolers	N/A		Heat transfer testing not practical	
		Maintenance	Strainer cleaned	Monthly

*Frequency will be determined using test/inspection data gained from initial testing/inspections.

ATTACHMENT 2

GENERIC LETTER 89-13 ACTIVITIES
NORTH ANNA POWER STATION

GENERIC LETTER 89-13 ACTIVITIES
NORTH ANNA POWER STATION - UNITS 1 AND 2

COMPONENT STRUCTURE (NAME)	MARK NO.	ACTIVITIES	NOTES	FREQ.
Auxiliary SW Pumps Intake	N/A	Biofouling Surveillance •Visual Inspections	Discharge lines will be inspected if SW system shows evidence of flow blockage	Each Refueling
SW Reservoir	N/A	Biofouling Control •Chemical treatment (SW Reservoir only)		Daily
RSHX Lines	Various	Flow test	Indication of flow blockage	Every Refueling Outage or 18 months
Spent Fuel Pit Coolers		Inspection of (1) CCHX for Biofouling will ensure absence of macrofouling in this portion of SW System	SW is backup cooling source for these coolers. SFP HX lines are not inspected. CCHX provides proxy for inspection.	One CCHX Hx, Every Refueling

*Frequency will be determined using test data gained from initial testing.

COMPONENT STRUCTURE (NAME)	MARK NO.	ACTIVITIES	NOTES	FREQ.
Recirculation Spray Heat Exchanger (RSHX)	1-RS-E-1A 1-RS-E-1B 1-RS-E-1C 1-RS-E-1D 2-RS-E-1A 2-RS-E-1B 2-RS-E-1C 2-RS-E-1D	Flow test	No heat transfer test or inspection Dry Lay-up and no available heat load	Every Refueling outage
Component Cooling Heat Exchanger (CCHX)	1-CC-E-1A 1-CC-E-1B 2-CC-E-1A 2-CC-E-1B	Heat transfer test Inspection and Maintenance		* Initial inspections annually*
CR Chiller	1/2-HV-E-4A 1/2-HV-E-4B 1/2-HV-E-4C	Flow test Heat transfer test Inspection and Maintenance		Quarterly Section XI Test * Annually*
Charging Pump Lube oil cooler	NA	Inspection and Maintenance Section XI Check Valve Flow Tests		Annually Quarterly
Charging Pump Gear Box Cooler	NA	Inspection and Maintenance Section XI Check Valve Flow Tests		Annually Quarterly
Charging Pump Seal Coolers	NA	Inspection and Maintenance Section XI Check Valve Flow Tests		Annually Quarterly

*Frequency will be determined using test/inspection data gained from initial testing/inspections.

ATTACHMENT 3

RSHX HEAT TRANSFER VERIFICATION BASIS

RECIRCULATION SPRAY HEAT EXCHANGERS

The Recirculation Spray Heat Exchangers will not be subjected to initial or periodic heat transfer testing. These heat exchangers have been the subject of extensive technical evaluations of potential heat transfer capability degradation resulting from fouling. Service water flow testing is conducted to verify system design flow capability which, combined with maintaining dry lay-up, assures design heat transfer capability.

NORTH ANNA POWER STATION

The four North Anna Recirculation Spray Heat Exchangers (RSHX) per unit are designed for dry lay-up conditions with a 0.0 value for inside and outside tube fouling factors. The original design specification (reference NAS-0160) requires that each RSHX have the capability of transferring the required heat load with service water inlet temperature at 95°F. Extensive inspections and engineering analysis have been performed to validate previous operation with wet lay-up conditions. Those evaluations concluded that the design basis of the recirculation spray (RS) system is maintained with a RSHX fouling factor of less than or equal to 0.0005. Therefore, the ability of these heat exchangers to achieve design basis performance requirements is dependent upon maintaining them in a dry lay-up condition. Plant modifications and procedural changes have been implemented to ensure that the tube side (service water) of the RSHX's remains dry. These include installation of drain connections downstream of the service water supply header admission valves (1/2-SW-MOV-101's/201's) and upstream of the return header isolation valves (1/2-SW-MOV-105's/205's). Also, the individual RSHX inlet isolation valves (1/2-SW-MOV-103's/203's) and outlet isolation valves (1/2-SW-MOV-104's/204's) are maintained closed. The surveillance program has shown these measures to be effective at preventing service water in-leakage to the RSHX's.

SURRY POWER STATION

The four Surry Recirculation Spray Heat Exchangers (RSHX) per unit are designed to remove design basis heat loads from the Recirculation Spray (RS) system with the service water inlet temperature at 95°F. The RSHX's were replaced during the 1989 refueling outages for each unit. The new RSHX design fouling factors of 0.0005 inside and 0.0 outside are for tubes maintained in an air environment (i.e. dry lay-up) and do not allow margin for fouling by standing service water (wet lay-up). Therefore, the ability of these heat exchangers to achieve design basis performance requirements is dependent upon maintaining them in a dry lay-up condition. Plant modifications and procedural changes have been implemented to ensure that the tube side (service water) of the RSHX remain dry. First, the RSHX service water isolation valves (1-SW-MOV-103's, 104's and 105's and 2-SW-MOV-203's, 204's, and 205's) are maintained in a normally closed position. Also, procedural changes have been made for the circulating water system to prevent backflow into the RSHX service water discharge lines, to limit the flow of service water into the RSHX inlet piping during stroke testing of the service water admission valves (1/2-SW-MOV-103's/203's), and to require periodic inspections of the RSHX for service water in-leakage. The surveillance program has shown these measures to be effective at preventing service water in-leakage to the RSHX's.

SURRY AND NORTH ANNA POWER STATIONS

HEAT TRANSFER TESTING

Throughout the Nuclear Power Industry there are significant design variations in those systems whose function is the transfer of the accident heat load from containment to the ultimate heat sink. These design variations are such that it is feasible to conduct heat transfer testing on some of these systems and impossible to conduct this testing on other system designs unless major system design modifications are performed. The RS system

design at Surry and North Anna is unlike those nuclear stations which can be easily tested in that there is no design capability to flow the RS side of the RSHX. Extensive piping and valve modifications would be required at Surry and North Anna to provide this test capability.

There are sound technical reasons which support the conclusion that it is not necessary to conduct heat transfer testing of the RSHX's apart from the major modifications required to conduct such testing:

- The Virginia Power RSHX's are laid-up dry and maintained in that condition. This preserves the design basis fouling factors and prevents macrofouling from initiating. Periodic inspections confirm the dry lay-up condition of these heat exchangers. The design of easily tested systems typically has their "RSHX's" in a wet lay-up condition and certain stations have had documented situations of significant silt build up on the service water side. A heat exchanger in a wet lay-up condition is much more subject to degradation than a heat exchanger maintained in a dry lay-up condition.

- The Virginia Power RSHX's have been rigorously and conservatively analyzed to assure that the heat transfer characteristics used in accident analyses are correct for heat exchangers of this type laid up in a dry condition. The assumptions and methodology used in evaluating the heat transfer characteristics of these heat exchangers have been the subject of several presentations to NRC management personnel over recent years.

- The heat transfer characteristics of the Surry CCHX's are very similar to those of the Surry and North Anna

RSHX's in the areas of design, construction and heat loads. The heat transfer testing of the CCHX's at Surry will provide a basis to validate the analytical techniques used in evaluating the heat transfer capabilities of the RSHX's. Once these techniques are verified on the CCHX's, the heat transfer capability of the RSHX's will be confirmed.

In summary there are many design and operational differences in the nuclear stations which feature "RS" systems with easily tested RSHX's and the Virginia Power system design. These differences make testing the Virginia Power RSHX's impossible without major design modifications. Analysis of the Surry and North Anna RSHX's indicates that maintaining them in dry lay-up is sufficient to provide assurance of meeting design basis performance requirements.