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Docket No. 50-280

JUNE 23 1978

Virginia Electric & Power Company
 ATTN: Mr. W. L. Proffitt
 Senior Vice President - Power
 Post Office Box 26666
 Richmond, Virginia 23261

Gentlemen:

Enclosed is a signed original of an Order for Modification of License, dated JUNE 23 1978. This Order amends Facility Operating License No. DPR-32 permitting continued operation of Surry Unit No. 1 for six equivalent months of operation, beyond JUNE 23 1978 and relates to the steam generator repair program license provisions of the NRC Orders of May 6 and December 3, 1977. Appendix A-1 to the license, issued May 6, 1977, is being continued in order to implement the restrictions of Ordered License Condition 3.E.(4) regarding reactor coolant activity.

A copy of the related Safety Evaluation is also enclosed. The Order is being filed with the Office of the Federal Register for publication.

Sincerely,

ISI

A. Schwencer, Chief
 Operating Reactors Branch #1
 Division of Operating Reactors

Enclosures:

1. Order for Modification of License
2. Safety Evaluation

cc w/encl:
 See next page

see clips for changes

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket No. 50-280

June 23, 1978

Virginia Electric & Power Company
ATTN: Mr. W. L. Proffitt
Senior Vice President - Power
Post Office Box 26666
Richmond, Virginia 23261

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A copy of the related Safety Evaluation is also enclosed. The Order is being filed with the Office of the Federal Register for publication.

Sincerely,

A handwritten signature in cursive script, appearing to read "A. Schwencer".

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:

1. Order for Modification
of License
2. Safety Evaluation

cc w/encl:
See next page

June 23, 1978

cc: Mr. Michael W. Maupin
Hunton & Williams
Post Office Box 1535
Richmond, Virginia 23213

Swem Library
College of William & Mary
Williamsburg, Virginia 23185

Mr. Sherlock Holmes, Chairman
Board of Supervisors of Surry
County
Surry County Courthouse, Virginia 23683

Commonwealth of Virginia
Council on the Environment
903 Ninth Street Office Building
Richmond, Virginia 23219

Mr. James R. Wittine
Commonwealth of Virginia
State Corporation Commission
Post Office Box 1197
Richmond, Virginia 23209

Chief, Energy Systems
Analyses Branch (AW-459)
Office of Radiation Programs
U.S. Environmental Protection Agency
Room 645, East Tower
401 M Street, SW
Washington, D.C. 20460

U.S. Environmental Protection Agency
Region III Office
ATTN: EIS COORDINATOR
Curtis Building - 6th Floor
6th and Walnut Streets
Philadelphia, Pennsylvania 19106

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
VIRGINIA ELECTRIC AND POWER COMPANY
Surry Power Station, Unit No. 1

} Docket No. 50-280
}

ORDER FOR MODIFICATION OF LICENSE

I.

Virginia Electric and Power Company (the licensee), is the holder of Facility Operating License No. DPR-32 which authorizes the operation of the nuclear power reactor known as Surry Power Station, Unit No. 1 (the facility) at steady state reactor power levels not in excess of 2441 thermal megawatts (rated power). The reactor is a pressurized water reactor (PWR) located at the licensee's site in Surry County, Virginia.

II.

On February 8, 1977, the NRC staff issued an Order for Modification of License No. DPR-32 which addressed operation of Surry Power Station Unit No. 1 under conditions in which steam generator tubes have been plugged as a result of the tube denting caused by corrosion of the tube support plate in the annular spaces between tube and the tube support plate. Subsequently on February 11, 1977, the NRC staff issued a Safety Evaluation supporting the Order. In order to perform an inspection of the steam generators, the February 8, 1977 Order limited operation to 60 equivalent days of operation.* On May 6, 1977,

* Equivalent operation is defined as operation with the reactor coolant at or above 350°F.

a subsequent Order was issued with an accompanying Safety Evaluation providing for an additional six months of equivalent operation, after the staff evaluated the results of an inspection and repair program. On November 30, 1977, the licensee submitted the results of the inspection and repair program required by the May 6, 1977 Order. On December 3, 1977, an Order was issued to permit continued operation of Unit No. 1 for six equivalent months beyond December 3, 1977. During the cycle 5 refueling outage, steam generator tube inspections were performed and the results submitted on May 30, 1978. The NRC staff has evaluated the results of the inspection and repair program and has assessed whether continued operation of the facility would be safe. This evaluation is set forth in the staff's concurrently issued Safety Evaluation relating to steam generator tube integrity.

We have reviewed the licensee's May 30, 1978 inspection program submittal. The plugging pattern used is based on criteria that reasonably predict areas of increased strain. To assure early detection and repair of leaks in tubes that have not been plugged, the licensee proposed in his May 30, 1978 submittal to continue the operating limitations of the May 6 and December 3, 1977 Orders applicable to this facility. With the plugging that has been performed and these operating limitations, the assessment of accidents in our May 6 and December 3, 1977 Safety Evaluations remain valid. As described in those Safety Evaluations

continued operation under these limitations will provide reasonable assurance that the public health and safety will not be endangered. The NRC staff believes that under the circumstances, the limitations proposed by the licensee are appropriate and should be confirmed by NRC order.

III.

Copies of the following documents are available for public inspection in the Commission's Public Document Room, 1717 H Street, NW., Washington, D.C. 20555, and at the Swem Library, College of William and Mary, Williamsburg, Virginia, (1) licensee's submittal of May 30, 1978, (2) Safety Evaluations dated February 11, May 6, and December 3, 1977, (3) Orders for Modification of License dated February 8, May 6 and December 3, 1977, (4) this Order for Modification of License, In the Matter of Virginia Electric and Power Company, Surry Power Station, Unit No. 1, Docket No. 50-280, and (5) the Commission's concurrently issued Safety Evaluation supporting this Order.*

IV.

Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations in 10 CFR Parts 2 and 50, IT IS ORDERED THAT Facility Operating License No. DPR-32 is hereby amended by replacing in its entirety existing paragraph 3.E. of the license with the following:

* A copy of items (2), (3), (4) and (5) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of Operating Reactors.

E. Steam Generator Inspection

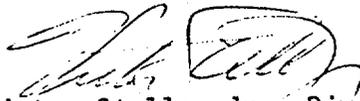
- (1) Unit No. 1 shall be brought to the cold shutdown condition in order to perform an inspection of the steam generators within six equivalent months of operation from the date of this Order. Nuclear Regulatory Commission approval shall be obtained before resuming power operation following this inspection. Equivalent operation is defined as operation with the reactor coolant at or above 350°F.

- (2) Leakage from the reactor coolant system to the secondary system through the steam generator tubes shall be limited to 0.3 gpm per steam generator, as described in the NRC Safety Evaluation of May 6, 1977. With any steam generator tube leakage greater than this limit the reactor shall be brought to the cold shutdown condition within 24 hours. Nuclear Regulatory Commission approval shall be obtained before resuming reactor operation.

- (3) Reactor operation will be terminated if reactor coolant leakage which is attributable to two or more steam generator tubes occurs during a 20 day period. Nuclear Regulatory Commission approval shall be obtained before resuming reactor operation.

- (4) The concentration of radioiodine in the reactor coolant shall be limited to 1 μ Ci/gram during normal operation and to 10 μ Ci/gram during power transients as defined in Appendix A-1 to the Technical Specifications of the license. Appendix A-1 was issued with the May 6, 1977 Order and shall remain in effect for six equivalent months of operation from the date of this Order.

FOR THE NUCLEAR REGULATORY COMMISSION



Victor Stello, Jr., Director
Division of Operating Reactors
Office of Nuclear Reactor Regulation

Dated in Bethesda, Maryland
this 23rd day of June 1978.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING ORDER FOR MODIFICATION OF LICENSE

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION UNIT NO. 1

DOCKET NO. 50-280

Introduction

By letter dated May 30, 1978, Virginia Electric and Power Company (VEPCO) submitted the results of the steam generator tube inspection performed at Surry Unit No. 1 during the April-May 1978 refueling outage. That letter also included the plugging criteria implemented for the three steam generators. Based on these inspection results, the implemented plugging patterns and the previously submitted ECCS analysis, VEPCO concluded that Unit No. 1 can be returned to operation for another six (6) equivalent months.

Surry Unit No. 1 has been operating under a December 3, 1977 NRC Order for Modification of Facility Operating License No. DPR-32. That Order required VEPCO to inspect the steam generators on or before the Order's expiration date and to obtain NRC approval prior to resuming power operation.

Discussion

Inspection Program

The steam generator tube inspection performed during this shutdown included programs to assess the conditions associated with denting and "wastage" problems. Tube gauging was done in all three steam generators to assess the extent and pattern of tube denting. On the hot leg side, all tubes near the tube lane which were predicted to be bounded by the 15% hoop strain contour were gauged. Based on previous leaker history at Surry Unit No. 1 and at similar units, as well as previous gauging results, the gauging program also included wedge and patch plate regions. Additionally, when a restricted tube was found close to the inspection boundary, the inspection was expanded in that area. Gauging was also performed on cold leg tubes in all three steam generators. This was done in conjunction with the U-bend inspection program associated with the cold leg side.

An inspection for wastage was performed in accordance with Regulatory Guide 1.83. In excess of 12% of the tubes in each steam generator was inspected to identify tubes with significant detectable tube wall wastage or thinning.

Handhole inspections of the visible tube support plates using photographs were performed in all three steam generators in order to assess the support plate conditions.

No leaking tubes were observed in any steam generator during this inspection. Also, no tube leaks were detected over the last five months of operation.

Gauging results indicate that any tube near the tubelane which restricted the 0.650" probe was within the 15% hoop strain contour boundary. In addition, tubes restricting either the 0.610" or 0.540" probes were within the 17.5% hoop strain contour boundary. In the tubelane region there are no tubes in any of the three steam generators that restricted the 0.540" eddy current probe. Activity was noted in wedge and patch plate areas consistent with previous experience at other units. All indicated cold leg tube restrictions fell within the strain contour maps for the cold leg side. The implementation of the plugging criteria discussed below combined with previous plugging for various causes, resulted in a total of approximately 21.4% of the tubes being plugged.

The Regulatory Guide 1.83 inspection determined that a total of 8 tubes exceeded the 40% plugging limit; 2 in steam generator A, none in B, and 6 in C. All these tubes have been plugged.

The handhole inspections revealed that the conditions of the visible support plates had not changed since previous inspections and no new phenomena were observed.

Plugging Criteria

The plugging criteria implemented by the licensee are essentially the same as those used at other units with similarly degraded steam generators. As in the previously accepted plugging criteria; e.g., those discussed in the SER attached to the Order of December 3, 1977, on Surry Unit No. 1, VEPCO has performed preventive plugging based on the projected growth of the critical tube hoop strain contours predicted by the finite element analysis. This same approach has been used to establish the extent of preventive plugging necessary for continued operation of Surry Unit No. 2 and Turkey Point Unit Nos. 3 and 4.

The progression of strain contours over the intended operating period is used to preventively plug beyond a tube which does not allow passage of a 0.540" probe. The progression of the 17.5% strain contour has been used to define the extent of preventive plugging necessary. This is identical to the criteria applied to Surry Unit No. 2 following the March 1978 inspection program as discussed in our SER dated April 7, 1978 on that unit.

Evaluation

Surry Unit No. 1 is one of the six lead PWR facilities that have suffered moderate to extensive tube denting and that have been under close monitoring by the NRC staff following the September 15, 1976 tube failure at Surry Unit No. 2. The tube inspection program just completed during the latest refueling outage is the fourth such program for this unit. A discussion on the technical background and safety evaluation of the denting related phenomenon was presented in an SER dated February 11, 1977 in support of the NRC Order for Modification of Facility Operating License No. DPR-32 dated February 8, 1977, and in an SER attached to a later NRC Order affecting Surry Unit No. 1 dated May 6, 1977. The background information contained in the February 11, 1977 and May 6, 1977 SERs remains valid and is incorporated in this Safety Evaluation by reference. The information discussed above represents an update on the condition of steam generators at Surry Unit No. 1.

The steam generator inspection was performed in accordance with a program that is consistent with previously implemented programs at Surry Unit No. 1 and other units. Therefore, we consider this inspection is adequate in the establishment of the condition of steam generators at Surry Unit No. 1.

The gauging portion of the inspection program performed at Surry Unit No. 1 was essentially the same as for programs performed at Surry Unit No. 2 and Turkey Point Unit Nos. 3 and 4. As in the program performed at Surry Unit No. 2 during March 1978, the 15% tube hoop strain contour was used to define the gauging boundary. These programs have been developed over the course of time in consultation with the NRC staff and have been determined to be acceptable. The inspection of the Surry Unit No. 1 steam generators has demonstrated that the tube degradation to date follows the pattern experienced at Surry Unit No. 2 and Turkey Point Unit Nos. 3 and 4. Results of this inspection also indicated that not all tubes within the predicted 17.5% strain boundary restricted the 0.540 inch probe, which demonstrated quantitatively the conservatism in the tube plugging criteria. Furthermore, the results of the most recent inspection at Surry Unit No. 1 indicate that no unexpected degradation is occurring and no new phenomenon has been uncovered.

The preventive plugging pattern bounds those tubes which may be anticipated to attain the level of strain which could lead to stress corrosion cracking during the next period of operation. The preventive plugging conducted by VEPCO during the current outage justifies operation of the Surry Unit No. 1 steam generators for an additional six (6) equivalent months.

Environmental Consideration

We have determined that the Order to which this SER is attached does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the Order involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR 51.5(d)(4), that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this Order.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) Surry Unit No. 1 may be operated for an additional six (6) equivalent months under the restrictions delineated in the Order to which this SER is attached. By the end of this period the facility shall be shut down, the steam generators reprobbed to determine the extent and pattern of additional tube denting and the results of this gauging program submitted to the NRC staff for review and evaluation prior to the resumption of power operation, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this Order will not be inimical to the common defense and security or to the health and safety of the public.

Date: June 23, 1978