

MARCH 13 1979

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

Dear Mr. Proffitt:

The Commission today has issued the enclosed Show Cause Orders for Surry Power Station, Unit Nos. 1 and 2. The Show Cause Orders require that Unit 1 be shutdown within 48 hours from the time of receipt of the Order, Unit 2 remain shutdown, and that both units remain shutdown until further order from the Commission.

These Orders are issued because of potential piping deficiencies in safety related systems and requires you to show cause why reanalyses and any necessary modifications to facility piping systems indicated by such reanalyses should not be performed. The basis for this action is set forth in the Orders.

Sincerely,

Original Signed By

Harold R. Denton Director
Office of Nuclear Reactor Regulation

Enclosure
Orders

cc w/encl
See next page

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*SEE PREVIOUS YELLOW FOR CONCURRENCES

OFFICE	DOR:ORB1*	DOR:AD:S&P*	NRR OELD*	NRR	
SURNAME	ASchwencer:lb	RHVollmer	JScinto	HRDenton	
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JRBuchanan
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Docket Nos. 50-280
 and 50-281

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

Dear Mr. Proffitt:

The Commission today has issued the enclosed Show Cause Orders for Surry Power Station, Unit Nos. 1 and 2. The Show Cause Orders require that Unit 1 be shutdown within 48 hours from the time of receipt of the Order, Unit 2 remain shutdown, and that both units remain shutdown until further order from the Commission.

These Orders are issued because of potential piping deficiencies in safety related systems and require you to perform analyses and/or modifications prior to getting approval to restart either of the plants. The basis for this action is set forth in the Orders.

Sincerely,

Harold R. Denton, Director
 Office of Nuclear Reator Regulation

Enclosure:
 Orders

cc w/encl:
 See next page

OFFICE	DOR:ORB#1	DOR:S&P	OELD	NRR		
SURNAME	ASchwencer:1b	RHVo1lmer		HRDenton		
DATE	3/13/79	3/13/79	3/13/79	3/13/79		



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

March 13, 1979

Docket Nos. 50-280
and 50-281

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

Dear Mr. Proffitt:

The Commission today has issued the enclosed Show Cause Orders for Surry Power Station, Unit Nos. 1 and 2. The Show Cause Orders require that Unit 1 be shutdown within 48 hours from the time of receipt of the Order, Unit 2 remain shutdown, and that both units remain shutdown until further order from the Commission.

These Orders are issued because of potential piping deficiencies in safety related systems and requires you to show cause why reanalyses and any necessary modifications to facility piping systems indicated by such reanalyses should not be performed. The basis for this action is set forth in the Orders.

Sincerely,

A handwritten signature in cursive script, appearing to read "Harold R. Denton".

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosure:
Orders

cc w/encl:
See next page

March 13, 1979

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

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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

Director, Technical Assessment Division
Office of Radiation Programs (AW-459)
U. S. Environmental Protection Agency
Crystal Mall #2
Arlington, Virginia 20460

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

Donald J. Burke
USNRC, Region II
Office of Inspection and Enforcement
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

VIRGINIA ELECTRIC AND POWER COMPANY
(SURRY POWER STATION, UNIT 1)

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)

Docket No. 50-280

ORDER TO SHOW CAUSE

I.

The Virginia Electric and Power Company (the licensee) is the holder of Facility Operating License No. DPR-32 which authorizes operation of the Surry Power Station, Unit 1 (the facility) at power levels up to 2441 megawatts thermal (rated power). The facility, which is located at the Licensee's site in Surry County, Virginia, is a pressurized water reactor used for the commercial generation of electricity.

II.

In the course of evaluation of certain piping design deficiencies in connection with the Beaver Valley Power Station, Docket 50-334, significant discrepancies were observed between the original piping analysis computer code used to analyze earthquake loads by Stone and Webster, the architect-engineer for that facility, and a currently acceptable computer code developed for this purpose.

In the course of a meeting on March 8, 1979 to discuss these matters, the Beaver Valley Licensee informed the NRC staff that the difference in predicted piping stresses between the two computer codes is attributable to the fact that the piping analysis code used for a number of piping

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systems in that facility uses an algebraic summation of the loads predicted separately by the computer code for both the horizontal component and for the vertical component of seismic events. This incorrect treatment of such loads was not recognized at that time. Such loads should not be algebraically added (with predicted loads in the negative direction offsetting predicted loads in the positive direction) unless far more complex time-history analyses are performed. Rather, to properly account for the effects of earthquakes, as required by General Design Criterion 2 for systems important to safety, such loads should be combined absolutely or, as is the case in the newer codes, using techniques such as the square root of the sum of the squares. This conforms to current industry practice.

The inappropriate analytical treatment of load combinations discussed above becomes significant for piping runs in which the horizontal seismic component can have both horizontal and vertical components on piping systems, and the vertical seismic component also has both horizontal and vertical components. It is in these runs that the predicted earthquake loads may differ significantly.

Although the greatest differences in predicted loads would tend to be limited to localized stresses in pipe supports and restraints or in weld attachments to pipes, there could be a substantial number of areas of high stress in piping, as well as a number of areas in which there is potential for damage to adjacent restraints or supports, which could

have significant adverse effects on the ability of the piping system to withstand seismic events.

The NRC staff communicated with Stone and Webster, who was also the architect-engineer for the Surry facility, to ascertain whether the conditions identified for Beaver Valley were also applicable to Surry. We were informed that since the same revision of the same computer code had been used for both Beaver Valley and Surry, a similar problem may be anticipated. The NRC informed the Licensee of these facts by phone on Friday, March 9 and on Sunday, March 11, 1979.

In order to ascertain the specific systems at Beaver Valley that could be potentially affected by this error, members of the NRC staff on March 10, 11 and 12 went to the offices of Stone and Webster, the architect-engineer of both Beaver Valley and Surry to review detailed designs and computations for some of the piping systems of principal potential concern. Concurrently, on March 9, 1979 the Beaver Valley Licensee suspended power operation of that facility. Based on this more detailed review, the NRC staff has concluded that until full reanalysis of all potentially affected piping systems important to safety has been completed with a piping analysis computer code which does not contain the algebraic summation error, the potential for serious adverse effects at the Surry facility exists in the event of an earthquake and could be sufficiently widespread that the basic defense in depth provided by redundant safety systems may be compromised.

In view of the safety significance of this matter as discussed above, the Director of the Office of Nuclear Reactor Regulation has concluded that the public health and safety requires that an orderly suspension of operation of the facility should be effected immediately and that, in order to provide adequate protection of public health and safety the facility operation should be suspended: (1) until such time as the piping systems for all affected safety systems have been reanalyzed for earthquake events to demonstrate conformance with General Design Criterion 2 using a piping analysis computer code which does not contain the error discussed above, and (2) if such reanalysis indicates that there are components which deviate from applicable ASME Code requirements, until such deviations are rectified.

III.

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 HEREBY ORDERED THAT the Licensee show cause, in the manner hereinafter provided,

- (1) Why the Licensee should not reanalyze the facility piping systems for seismic loads on all potentially affected safety systems using an appropriate piping analysis computer code which does not combine loads algebraically;

- (2) Why the Licensee should not make any modifications to the facility piping systems indicated by such reanalysis to be necessary; and
- (3) Why facility operation should not be suspended pending such reanalysis and completion of any required modifications.

In view of the importance to safety of this matter, as described herein, the Director of the Office of Nuclear Reactor Regulation has determined that the public health and safety or interest require that this action be effective immediately, pending further Order of the Commission. Accordingly, within 48 hours of the receipt of this Order, the facility shall be placed in cold shutdown condition, and shall remain in such mode until further Order of the Commission.

The Licensee may, within twenty days of the date of this Order, file a written answer to this Order under oath or affirmation. Within the same time, the Licensee or any interested person may request a hearing. If a hearing is requested, the Commission will issue an Order designating the time and place for hearing. Upon failure of the Licensee to file an answer within the time specified, the Director, Office of Nuclear Reactor Regulation will, without further notice, issue an order suspending further activities under Operating License DPR-32.

In the event a hearing is requested, the issues to be considered at such hearing shall be:

Whether operation under Facility License No. DPR-32 should be suspended until (1) the piping systems for all affected safety systems are reanalyzed for earthquake events using an appropriate piping analysis computer code which does not combine seismic loads algebraically, and until (2) any modifications required to restore the system to conformance with applicable ASME Code requirements are completed.

FOR THE NUCLEAR REGULATORY COMMISSION



Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 13th day of March, 1979.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

VIRGINIA ELECTRIC AND POWER COMPANY
(SURRY POWER STATION, UNIT 2)

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)
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Docket No. 50-281

ORDER TO SHOW CAUSE

I.

The Virginia Electric and Power Company (the licensee) is the holder of Facility Operating License No. DPR-37 which authorizes operation of the Surry Power Station, Unit 2 (the facility) at power levels up to 2441 megawatts thermal (rated power). The facility, which is located at the Licensee's site in Surry County, Virginia, is a pressurized water reactor used for the commercial generation of electricity. The facility is presently shut down for steam generator repairs.

II.

In the course of evaluation of certain piping design deficiencies in connection with the Beaver Valley Power Station, Docket 50-334, significant discrepancies were observed between the original piping analysis computer code used to analyze earthquake loads by Stone and Webster, the architect-engineer for that facility, and a currently acceptable computer code developed for this purpose.

In the course of a meeting on March 8, 1979 to discuss these matters, the Beaver Valley Licensee informed the NRC staff that the difference in predicted piping stresses between the two computer codes is attributable to the fact that the piping analysis code used for a number of piping

systems in that facility uses an algebraic summation of the loads predicted separately by the computer code for both the horizontal component and for the vertical component of seismic events. This incorrect treatment of such loads was not recognized at that time. Such loads should not be algebraically added (with predicted loads in the negative direction offsetting predicted loads in the positive direction) unless far more complex time-history analyses are performed. Rather, to properly account for the effects of earthquakes, as required by General Design Criterion 2 for systems important to safety, such loads should be combined absolutely or, as is the case in the newer codes, using techniques such as the square root of the sum of the squares. This conforms to current industry practice.

The inappropriate analytical treatment of load combinations discussed above becomes significant for piping runs in which the horizontal seismic component can have both horizontal and vertical components on piping systems, and the vertical seismic component also has both horizontal and vertical components. It is in these runs that the predicted earthquake loads may differ significantly.

Although the greatest differences in predicted loads would tend to be limited to localized stresses in pipe supports and restraints or in weld attachments to pipes, there could be a substantial number of areas of high stress in piping, as well as a number of areas in which there is potential for damage to adjacent restraints or supports, which could

have significant adverse effects on the ability of the piping system to withstand seismic events.

The NRC staff communicated with Stone and Webster, who was also the architect-engineer for the Surry facility, to ascertain whether the conditions identified for Beaver Valley were also applicable to Surry. We were informed that since the same revision of the same computer code had been used for both Beaver Valley and Surry, a similar problem may be anticipated. The NRC informed the Licensee of these facts by phone on Friday, March 9 and on Sunday, March 11, 1979.

In order to ascertain the specific systems at Beaver Valley that could be potentially affected by this error, members of the NRC staff on March 10, 11 and 12 went to the offices of Stone and Webster, the architect-engineer of both Beaver Valley and Surry to review detailed designs and computations for some of the piping systems of principal potential concern. Concurrently, on March 9, 1979 the Beaver Valley Licensee suspended power operation of that facility. Based on this more detailed review, the NRC staff has concluded that until full reanalysis of all potentially affected piping systems important to safety has been completed with a piping analysis computer code which does not contain the algebraic summation error, the potential for serious adverse effects at the Surry facility exists in the event of an earthquake and could be sufficiently widespread that the basic defense in depth provided by redundant safety systems may be compromised.

In view of the safety significance of this matter as discussed above, the Director of the Office of Nuclear Reactor Regulation has concluded that the public health and safety requires that the present suspension of operation of the facility should be continued: (1) until such time as the piping systems for all affected safety systems have been reanalyzed for earthquake events to demonstrate conformance with General Design Criterion 2 using a piping analysis computer code which does not contain the error discussed above, and (2) if such reanalysis indicates that there are components which deviate from applicable ASME Code requirements, until such deviations are rectified.

III.

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 HEREBY ORDERED THAT the Licensee show cause, in the manner hereinafter provided,

- (1) Why the Licensee should not reanalyze the facility piping systems for seismic loads on all potentially affected safety systems using an appropriate piping analysis computer code which does not combine loads algebraically;

- (2) Why the Licensee should not make any modifications to the facility piping systems indicated by such reanalysis to be necessary; and
- (3) Why facility operation should not be suspended pending such reanalysis and completion of any required modifications.

In view of the importance to safety of this matter, as described herein, the Director of the Office of Nuclear Reactor Regulation has determined that the public health and safety or interest require that this action be effective immediately, pending further Order of the Commission. Accordingly, the facility shall remain shutdown until further Order of the Commission.

The Licensee may, within twenty days of the date of this Order, file a written answer to this Order under oath or affirmation. Within the same time, the Licensee or any interested person may request a hearing. If a hearing is requested, the Commission will issue an Order designating the time and place for hearing. Upon failure of the Licensee to file an answer within the time specified, the Director, Office of Nuclear Reactor Regulation will, without further notice, issue an order suspending further activities under Operating License DPR-37.

In the event a hearing is requested, the issues to be considered at such hearing shall be:

Whether operation under Facility License No. DPR-37 should be suspended until (1) the piping systems for all affected safety systems are reanalyzed for earthquake events using an appropriate piping analysis computer code which does not combine seismic loads algebraically, and until (2) any modifications required to restore the system to conformance with applicable ASME Code requirements are completed.

FOR THE NUCLEAR REGULATORY COMMISSION



Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 13th day of March, 1979.