



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

NRC FOR

OCT 10 1978

Docket No. 50-338
and 50-339

MEMORANDUM FOR: Distribution

FROM: A. W. Dromerick, Project Manager, Light Water Reactors
Branch No. 3, Division of Project Management

SUBJECT: PROJECT CRITIQUE FOR NORTH ANNA POWER STATION, UNITS
1 AND 2, RADIOLOGICAL OPERATING LICENSE REVIEW - VIRGINIA
ELECTRIC AND POWER COMPANY

In accordance with PM Operating Procedure 220, "Preparation of Project Critiques," dated June 5, 1977, the following critique has been prepared of the NRC staff's review of the Virginia Electric and Power Company's application for operating licenses for Units 1 and 2 of its North Anna Power Station. The application for operating licenses for both Units 1 and 2 was docketed on May 2, 1973. A fuel loading operating license for Unit 1 was issued on November 26, 1977, and Amendment No. 3 to the operating license authorizing full power operation was issued on April 1, 1978. The operating license for Unit 2 will be issued when construction is suitably complete and other necessary matters have been resolved.

The critique has been prepared for Phase 1 (FSAR Docketing Date through Issuance of Staff Positions) and Phase 2 (Issuance of Staff Positions through Issuance of final supplement to the Safety Evaluation). Phase 3 (Issuance of Final Supplement to the Safety Evaluation through Prospective Decision Date) is not applicable to this project because the project was completed with issuance of the full power operating license one day later than the issuance of the final Supplement (No. 9) to the Safety Evaluation Report.

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Phase 1

FSAR DOCKETED (MILESTONE 01-6) THROUGH ISSUANCE
OF FORMAL STAFF POSITIONS TO APPLICANT (MILESTONE 14)

Original Target Span	-	8.75 months
Actual Span	-	26.5 months
Slippage	-	18.25 months

Radiological Safety Review

The original schedule was based on the applicant's estimate of a fuel loading date for Unit 1 of April 1975. However, in Amendment 26 to the FSAR filed on March 22, 1974, the applicant changed the fuel loading date from April 1, 1975, to January 1, 1976. VEPCO advised us that this delay was due to welding defects discovered on supports for reactor coolant system components (steam generator and reactor coolant pump supports). In a letter dated November 27, 1974, VEPCO advised us that due to financial reasons the fuel loading date for Unit 1 would be further delayed from January 1, 1976, to August 1, 1976. In a letter dated May 22, 1974 we advised the applicant that the schedule will be revised to reflect the delay in the fuel loading date to August 1, 1976. An additional 2.25 month delay is attributed to the late submittal of staff positions as well as late responses from the applicant.

Radiological Safety Hearing (Phase I)

On November 1, 1973, a Board designated to rule on petitions for leave to intervene granted a petition filed by Mrs. Geraldine Arnold and on November 7, 1973, a Notice of Hearing was published in the Federal Register. On January 24, 1974, the Board admitted the State of Virginia as a participant pursuant to 10 CFR Section 2.715(c).

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Phase 2

FORMAL STAFF POSITIONS ISSUED TO APPLICANT (MILESTONE 14)
THROUGH FINAL SUPPLEMENT TO SAFETY EVALUATION ISSUED
(MILESTONE 28)/OPERATING LICENSE ISSUED (MILESTONE 42-1)

Original Target Span	-	14 months
Actual Span	-	32 months
Slippage	-	18 months

In a letter dated August 15, 1975, VEPCO advised us that due to work stoppage during renegotiation of eight separate labor contracts, the fuel loading date for Unit 1 was changed from August 1, 1976, to September 20, 1976. In a letter dated January 20, 1976, VEPCO advised us that the Unit 1 fuel loading date was further revised to be November 1976.

Approximately at that time, the applicant delayed their response regarding radiological technical specifications, reactor vessel support analysis, service water foundation conditions and emergency plans to December 29, 1975.

In March of 1976 the staff determined that the applicant's responses regarding containment systems, core performance, ECCS analysis mechanical engineering, and foundation engineering were inadequate. Therefore, to allow the applicant to submit adequate responses, the staff's review schedule was revised to indicate that the PDD would be two months later than the applicant's estimated fuel loading date of November 1976 (an additional delay by the applicant).

Since, at that time, it became likely that our licensing process would result in issuance of an operating license for Unit 1 some time after the plant was completed, we took several steps to define the situation and accelerate our safety review.

First we met with the applicant and impressed upon VEPCO the need for a firm date for completion of construction. VEPCO indicated very strongly that construction would be complete in November 1976, but agreed to complete an in-depth schedule reassessment to confirm the completion date. In a letter dated April 15, 1976, VEPCO informed us that the results of their detailed reassessment confirmed the predicted construction completion date of November 30, 1976. Therefore, this date was used for scheduling purposes.

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The second step the staff took was to convene a lengthy meeting in March 1976 with the applicant to candidly discuss the remaining outstanding issues in our safety review (over 60) and to urge VEPCO to submit outstanding information on these issues. The staff concurrently reviewed means available to expedite its resolution of those issues.

In April 1976 the LPM arranged internal meetings to further define the remaining outstanding technical matters and to discuss methods of expediting issuance of SER inputs to the Project Manager. As a result of these meetings, an intensive effort was made to resolve all outstanding items and a task force of some 12 LPMs was organized in an effort to complete the SER in accordance with the revised schedule (June 4, 1976).

The North Anna SER was issued on June 4, 1976, with 23 outstanding issues. On June 30, 1976, Supplement No. 1 which reduced the 23 outstanding issues to 17 was issued. An ACRS subcommittee meeting was held on July 7, 1976. However, a full Committee meeting was not scheduled in July because the subcommittee felt that there were too many outstanding issues. During the week of July 16, 1976, the applicant advised us that the fuel loading date was again, delayed from November 30, 1976, to December 31, 1976.

On August 2, 1976, we issued Supplement No. 2 to the North Anna SER. Supplement No. 2 reduced the number of outstanding issues to 12. A second ACRS subcommittee meeting was held on August 11, 1976, and a full committee meeting was held on August 12, 1976. At the August 12, 1976 full Committee meeting, we requested that the Committee consider writing an interim letter to allow the public hearing to get underway and because of the applicant's projected fuel loading date of December 31, 1976. The Committee stated that they could not write an interim letter because of the large number (12) of outstanding issues.

In August 1976 allegations were made concerning certain faulty construction practices at the North Anna Power Station Units 1 and 2. These allegations were related to such matters as cutting of rebar, the use of fake anchor bolts, improper storage of electrodes and welders performing welds outside the range of their qualification. The Office of Inspection and Enforcement (IE) initiated an investigation of these matters on August 13, 1976. The IE investigation consisted of the following four phases:

- (1) Phase 1 - investigation of specific allegations of faulty construction practices made by three individuals.
- (2) Phase 2 - a detailed inspection of certain safety related piping not directly implicated in the original allegations but which was potentially subject to similar problems.

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- (3) Phase 3 - detailed monitoring of the nondestructive preservice baseline inspections of selected welds in safety related piping by the licensee and his contractors.
- (4) Phase 4 - inspections of the performance of selected components in specific piping systems during the preoperational testing program.

The Office of Inspection & Enforcement investigation regarding Phases 1 and 2 was concluded on November 5, 1976 and a report was issued on December 6, 1976. As a result of this investigation the Office of Inspection & Enforcement determined that there were several items of non-compliance. On this basis we advised VEPCO in a letter dated February 4, 1977, that a civil penalty of \$31,900 was imposed because of these violations.

On September 15, 1976, Supplement No. 3 to the SER was issued with 11 outstanding items. Four of the outstanding issues listed in Supplement No. 2 were resolved in Supplement No. 3. However, three additional outstanding items were listed in Supplement No. 3. These concerned (1) reanalysis of emergency core cooling system, (2) reanalysis of stresses in spent fuel and (3) demonstration that a rupture in the header in the main steam supply system will not adversely affect the capability of a safe shutdown.

Two additional ACRS Subcommittee meetings were held on October 13, 1976; the first concerned the steam generator supports and the second considered all other matters pertinent to the North Anna Power Station Units 1 and 2. On October 14, 1976, a full Committee meeting was held. On the basis of this meeting, the Committee was able to write a partial letter (dated October 26, 1976). They indicated that they could not complete their review of North Anna until matters related to the Stafford Fault Zone and the IE investigation were resolved to their satisfaction. As noted previously, the IE investigation was concluded on November 5, 1976. During the week of November 1, 1976, VEPCO advised us that the fuel loading date for Unit 1 was delayed from December 31, 1976, to January 31, 1977.

Supplement No. 4 to the SER was issued on December 8, 1976. Supplement No. 4 contained the resolution of 4 of the 11 outstanding issues.

In Amendment 60 filed on December 22, 1976, to the FSAR, VEPCO advised us that the fuel loading date for Unit 1 had been changed due to construction delays from January 31, 1977, to May 26, 1977.

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On December 29, 1976, Supplement No. 5 to the SER was issued. Two issues were resolved. This supplement still contained 5 outstanding items. This supplement also contained our evaluation of the Stafford Fault Zone. We concluded that the Stafford Fault Zone was not capable within the meaning of Appendix A to 10 CFR Part 100.

On the basis that (1) our evaluation of the Stafford Fault Zone was complete and (2) IE completed their investigation of Phases 1 and 2 concerning the allegations, the ACRS agreed to hold a subcommittee and full Committee meeting on January 5, 1977 and January 6, 1977, respectively. As a result of these meetings, the ACRS completed its review of North Anna Power Station, Units 1 and 2 and issued a final letter on January 17, 1977.

On February 2, 1977, Supplement No. 6 to the SER was issued. In this supplement, we resolved one of the five remaining outstanding items.

In May 1977, Mrs. Allen, President of the North Anna Environmental Coalition, transmitted a letter to the ACRS in which she expressed concerns related to (1) overstressing of the Unit 2 service water piping, (2) ground water control system, and (3) characteristics of saprolites. As a result of this letter, the ACRS requested that we discuss this matter with them on June 10, 1977. Based on this discussion with the staff, the ACRS scheduled a subcommittee meeting. The ACRS subcommittee meeting was held on July 6, 1977.

In a letter to Lee V. Gossick, dated July 20, 1977, the ACRS advised the staff that on the basis of the information presented at the July 6, 1977 ACRS subcommittee meeting, the Committee concluded that there was no reason to alter its report of January 17, 1977, on the North Anna Power Station.

In Amendment 63 to the FSAR filed on July 8, 1977, VEPCO advised us that the estimated fuel loading date for Unit 1 was changed from May 26, 1977 to mid-August 1977.

In a letter dated July 28, 1977, VEPCO requested that the latest construction completion date be extended to December 31, 1977, because construction had been delayed due to (1) the completion of hot functional testing which necessitated repairs to the three reactor coolant loop cold leg isolation valves, replacement of the reactor coolant pump motor, completion of repairs to service water reservoir spray headers, addition of residual heat removal and refueling pool purification systems, and modifications to the steam generator support heating system; (2) completion of tie-ins for the bearing cooling system modifications were determined to be required prior to fuel loading; (3) structural steel nonconformities were identified in Unit No. 1 main steam valve house and repairs completed; (4) conduit separation deficiencies in the reactor containment cubicles were identified; (5) inspection, evaluation, and repair program to Category I piping systems in

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connection with an identified hanger base plate flexibility problem; and (6) modification to the main feedwater recirculation piping and reactor containment structural steel ventilation seals.

During the period between issuance of Supplement No. 6 (issued February 4, 1977) and Supplement No. 7 (issued August 18, 1977), we experienced extreme difficulty in resolving the outstanding issues because the applicant required additional time to provide the requested information. In fact, the outstanding issue concerning environmental qualification of electrical equipment and instrumentation remained outstanding at the time Supplement No. 7 was issued.

In early August 1977, VEPCO advised us of an additional item which had to be resolved prior to the issuance of an operating license for Unit 1. A reanalysis of the containment pressure behavior during a LOCA indicated that adequate NPSH may not exist for the recirculation spray pumps. The applicant proposed an interim solution to the NPSH problem. VEPCO also tested the recirculation spray pumps and low head safety injection pumps to determine the actual net positive suction head requirement for these pumps. The inspection of the low head safety injection pumps revealed that the upper shaft bearing was unacceptable. We required VEPCO to make the necessary modification to the pump unit and demonstrate the validity of the modifications through appropriate tests.

On November 11, 1977, IE advised us that Unit 1 was sufficiently complete to permit fuel loading. However, Unit 1 was not sufficiently complete to allow the unit to achieve criticality. There were 21 construction related items that were needed to be resolved prior to permitting Unit 1 to achieve criticality. Also, there were two outstanding significant safety issues which needed to be resolved before Unit 1 could be permitted to achieve initial criticality.

An operating license permitting only fuel loading of Unit 1 was issued on November 26, 1977 (see discussion concerning radiological safety hearing - Phase II).

Supplement No. 8 to the SER was issued on December 14, 1977 with two significant safety issues outstanding.

On January 26, 1978, an amendment to the operating license was issued. This amendment permitted Unit 1 to operate in a hot standby condition. At this time there were nine construction related items and two significant safety issues that needed resolution prior to permitting Unit 1 to achieve initial criticality. The two significant safety issues were (1) environmental qualification of certain safety related instrumentation and electrical equipment and (2) excessive bearing wear of low head safety injection pumps.

Supplement No. 9 to the SER was issued on March 31, 1978. This supplement resolved the two outstanding issues stated above. On April 1, 1978, an

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amendment to the operating license authorizing full power operation was issued. However, this amendment restricted the operation of Unit 1 to a hot standby condition until a construction related item was resolved.

On April 5, 1978, Unit 1 achieved initial criticality.

Radiological Safety Hearing (Phase II)

In Phase I, we stated that a Notice of Hearing was published on November 7, 1973 and that Mrs. Geraldine Arnold and the State of Virginia were admitted as participants.

In 1975, the staff, the applicant and intervenor Arnold agreed to a joint statement of issues. The issues were related to (1) emergency plan (2) radioactive effluent releases, (3) VEPCO's financial qualifications, (4) implementation of quality assurance program and (5) VEPCO's technical qualifications.

On March 26, 1976, Sun Shipbuilding & Dry Dock Company filed a petition for leave to intervene, raising as a concern the structural integrity of the steam generator and reactor coolant pump supports for the facility which had been manufactured by Sun Shipbuilding & Dry Dock Company. On June 9, 1976, Sun Ship was admitted as a party to the proceeding. VEPCO appealed Sun Ship's admission as a party, and on December 30, 1976, the Appeal Board ruled that, although Sun Ship did not meet judicial concepts of standing, it was equipped to make a significant contribution to the record and admitted it as a party as a matter of discretion.

A petition to intervene and a notification of intent to represent Mrs. Arnold were submitted by June Allen on June 16, 1976 and July 4, 1976, respectively. The Board issued an order which resolved Mrs. Allen's status and set up a schedule by which the parties could resolve the wording of contentions and complete discovery.

On November 9, 1976, the parties (except for Sun Ship) submitted an "Agreement on Statement of Issues" to the Board, in which the parties stipulated the statement of three contentions related to (1) emergency plan, (2) radioactive effluent releases and (3) VEPCO's financial qualifications raised by Mrs. Arnold. In this statement Mrs. Arnold withdrew two other contentions related to (1) implementation of quality assurance program and (2) VEPCO's technical qualifications. These contentions were previously raised by Mrs. Arnold. On November 15, 1976, the Board ordered a hearing to take evidence on the three stipulated contentions mentioned above, and the hearing was held November 30 through December 3, 1976.

On December 15, 1976, the Board adopted a somewhat modified version of the two contentions (implementation of quality assurance program and VEPCO's technical qualifications) previously raised and then dropped by Mrs. Arnold.

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The parties presented testimony on these two issues on May 31 through June 2, 1977.

On April 13, 1977, a conference call was held between the Board and the parties. During this call, the parties indicated that all of their differences relative to the Sun Ship contentions had been resolved except for one concern about the temperature at which certain steel in the steam generator supports should be maintained during plant operation. The parties (applicant, staff and Sun Ship) submitted affidavits discussing this matter.

In order to determine whether the Board should exercise the powers as defined in the extraordinary discretion section of the regulations to extend the hearing to other safety matters, the Board requested that the staff and VEPCO respond to certain portions of Mrs. Allen's and R. Pollard's limited appearance statements which were presented during the May 31 through June 2, 1977 hearing.

VEPCO submitted affidavits in response to Mrs. Allen's and Mr. Pollard's statements on July 5, 1977.

The staff submitted affidavits in response to Mrs. Allen's statement on August 5, 1977. The staff also submitted affidavits in response to Mr. Pollard's statement on September 2, 1977.

On October 10, 1977, intervenor Arnold moved to reopen the hearing based on new information relating to the Justice Department's investigation of "Alleged Material False Statements by Officers and Consultant of the Virginia Electric and Power Company." The staff opposed the motion to reopen on November 4, 1977.

On November 14, 1977, VEPCO filed a motion with the Board for a temporary license to load fuel in Unit 1.

The Board on October 21, 1977, submitted additional questions to the staff concerning Mr. Pollard's statement. On November 23, 1977, the staff submitted responses to the Board's question. In doing so, the staff supported issuance of an initial decision on contested matters including a limited initial decision authorizing fuel loading as requested by the applicant. The Board granted the applicant's motion for a fuel loading only license by Memorandum and Order dated November 26, 1977. On the same day, the staff issued an operating license which only permitted VEPCO to load fuel in Unit 1 and maintain it in a cold shutdown condition.

On December 13, 1977, the Board issued an Initial Decision which authorized the Director of Nuclear Reactor Regulation to issue operating licenses for North Anna Power Station, Units 1 and 2, for full-term and full-power operation.

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As a result of this Initial Decision, we were in the process of preparing an amendment to the fuel loading license to permit Unit 1 to operate at power but, with certain restrictions. This license amendment would have restricted operation to a hot standby condition until the construction items and the safety issues discussed above were resolved to the staff's satisfaction.

However, on December 15 and 16, 1977, VEPCO advised the staff of two reportable matters related to Unit 1. These matters concerned (1) error in fatigue analysis of three safety systems and (2) defective integrated circuit related to the reactor protection system. With respect to these items, we believed that VEPCO's timing of these communications to us of these new potential safety problems raised questions that may have had an impact on the conclusion reached by us in our testimony and proposed findings of fact and conclusions of law filed in the radiological safety hearing proceedings. Therefore, we filed a motion on December 16, 1977, to reopen the record. On December 20, 1977, the Board ordered that the radiological safety hearings be reopened on December 29, 1977, to discuss these matters. The hearing was reopened on that date.

As a result of the reopened hearing, the Board issued an Order on January 13, 1978, amending its Initial Decision to permit full power operation and restricted operation of Unit 1 to a hot standby condition until further Board Order. An amendment to the license authorizing Unit 1 to operate in a hot standby condition was issued on January 26, 1978. In the Board's Order of January 13, 1978, they also required that VEPCO revise their procedures and receive staff approval for evaluating reportable events and disseminating the information within VEPCO. After meeting with us on February 7, 1978, VEPCO sent revised procedures to the Board which were acceptable to us.

On February 27, 1978, the Board issued a Memorandum and Order in which it reaffirmed the findings made in its Initial Decision dated December 13, 1978, which authorized the Director of the Office of Nuclear Reactor Regulation to make findings in accordance with 50.57(a) and to issue operating licenses for Units 1 and 2 for full-power and full-term operation.

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