NUREG-0954
Supplement No. 6

# Safety Evaluation Report

related to the operation of
Catawba Nuclear Station,
Units 1 and 2

Docket Nos. 50-413 and 50-414

Duke Power Company, et al.

**U.S. Nuclear Regulatory Commission**

**Office of Nuclear Reactor Regulation**

May 1986

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ABSTRACT

This report supplements the Safety Evaluation Report (NUREG-0954) issued in February 1983 by the Office of Nuclear Reactor Regulation of the U.S. Nuclear Regulatory Commission with respect to the application filed by Duke Power Company, North Carolina Muncipal Power Agency Number 1, North Carolina Membership Corporation, Saluda River Electric Cooperative, Inc., and Piedmont Municipal Power Agency, as applicants and owners, for licenses to operate the Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, respectively). The facility is located in York County, South Carolina, approximately 9.6 km (6 mi) north of Rock Hill and adjacent to Lake Wylie. This supplement provides additional information supporting the license for operation above 5% power and power ascension to full-power operation for Unit 2.

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APPENDICES

## ABBREVIATIONS

| | |
|---|---|
| CFR | Code of Federal Regulations |
| ECCS | emergency core cooling system |
| EPRI | Electric Power Research Institute |
| ERG | Emergency Response Guideline |
| GDC | General Design Criteri(on)(a) |
| GM | General Motors |
| IEEE | Institute of Electrical and Electronics Engineers |
| LOCA | loss-of-coolant accident |
| NRC | U.S. Nuclear Regulatory Commission |
| SER | Safety Evaluation Report |
| SIM | Service Information Memo (TDI) |
| SSER | Supplement to the Safety Evaluation Report |
| SNL | Sandia National Laboratory |
| TDI | Transamerica Delaval, Inc. |
| WOG | Westinghouse Owners Group |

# 1 INTRODUCTION AND DISCUSSION

## 1.1 Introduction

On February 10, 1983, the Nuclear Regulatory Commission staff (NRC staff or staff) issued a Safety Evaluation Report (NUREG-0954) regarding the application by Duke Power Company, North Carolina Municipal Power Agency Number 1, North Carolina Electric Membership Corporation, Saluda River Electric Cooperative, Inc., and Piedmont Municipal Power Agency (collectively referred to as the licensee or Duke) for licenses to operate the Catawba Nuclear Station, Units 1 and 2. Since that time, five supplements to the Safety Evaluation Report (SER) have been issued (SSER 1, April 1983; SSER 2, June 1984; SSER 3, July 1984; SSER 4, December 1984, and SSER 5, February 1986). This report is Supplement 6 to that SER. On January 17, 1985, a full-power license was issued for Unit 1, and on February 24, 1986, a low-power license was issed for Unit 2.

This sixth SER supplement provides additional information supporting the issuance of a full-power operating license for the Catawba Nuclear Station, Unit 2. Each of the following sections of this supplement is numbered the same as the SER section that is being updated, and the discussions are supplementary to and not in lieu of the discussion in the SER, unless otherwise noted.

Appendix A continues the chronology of the staff's principal actions related to the review of the application. Appendix B lists references used during the course of the review.* Appendix D is a list of principal contributors to this report.

The Project Manager is Dr. Kahtan N. Jabbour. Dr. Jabbour may be contacted by calling (301) 492-7367 or by writing to the following address:

Dr. Kahtan N. Jabbour
Division of PWR Licensing-A
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

## 1.7 Summary of Outstanding Issues

This sixth supplement does not change the status of the outstanding issues identified in SSER 5.

## 1.8 Confirmatory Issues

The current status of each confirmatory issue is tabulated in SSER 5.

## 1.9 License Conditions

The current status of license conditions is as tabulated in SSER 5 except for the following changes:

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*Availability of all material cited is described on the inside front cover of this report.

| Issue | Status | Section |
|---|---|---|
| (1) Turbine system maintenance program | Deleted (SSER 6) | 3.5.1.3 |
| (46) Main steam line break using a revised heat transfer model | Deleted (SSER 6) | 6.2.1(b) |
| (49) Main steam line break outside containment | Deleted (SSER 6) | 3.11.5 |

# 3 DESIGN CRITERIA - STRUCTURE, COMPONENTS, EQUIPMENT, AND SYSTEMS

## 3.5 Missile Protection

### 3.5.1 Missile Selection and Description

#### 3.5.1.3 Turbine Missiles

By letter dated April 24, 1986, the licensee has submitted a turbine system maintenance and inspection program based on the recommendations of the turbine manufacturer. This submittal is in response to license conditions 9 and 7 of Facility Operating Licenses NPF-35 and -48, respectively. This program is currently under staff review. Therefore, by the licensee's submittal, license condition 1 in the SER and SER supplements can be deleted. Also, a license condition on this issue for Catawba Unit 2 full-power license, is no longer required. The staff expects to complete its review before the end of the first refueling outage for Catawba Unit 2.

## 3.11 Environmental Qualification of Electric Equipment Important to Safety and Safety-Related Mechanical Equipment

### 3.11.1 Introduction

Equipment which is used to perform a necessary safety function must be demonstrated to be capable of maintaining functional operability under all service conditions postulated to occur during its installed life for the time it is required to operate. This requirement, which is embodied in General Design Criteria (GDC) 1 and 4 of Appendix A to 10 CFR 50 and Sections III, XI, and XVII of Appendix B to 10 CFR 50, is applicable to equipment located inside as well as outside containment. More detailed requirements and guidance relating to the methods and procedures for demonstrating this capability for electrical equipment have been set forth in 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants"; NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," which supplements IEEE Standard 323; and various NRC regulatory guides and industry standards.

### 3.11.2 Background

NUREG-0588 was issued in December 1979 to promote a more orderly and systematic implementation of equipment qualification programs by industry and to provide guidance to the NRC staff for its use in ongoing licensing reviews. The positions contained in that report provide guidance on (1) how to establish environmental service conditions, (2) how to select methods which are considered appropriate for qualifying equipment in different areas of the plant, and (3) other areas such as margin, aging, and documentation for each item of safety-related electrical equipment and to identify the degree to which their qualification programs complied with the staff positions discussed in NUREG-0588.

IE Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment," issued January 14, 1980, and its supplements dated February 29, September 30, and October 24, 1980, established environmental qualification requirements for operating reactors. This bulletin and its supplements were provided to operating license (OL) licensees for consideration in their review.

A final rule on environmental qualification of electrical equipment important to safety for nuclear power plants became effective on February 22, 1983. This rule, 10 CFR 50.49, specifies the requirements to be met for demonstrating the environmental qualification of electrical equipment important to safety located in a harsh environment. In accordance with 10 CFR 50.49, electrical equipment for Catawba Nuclear Station may be qualified in accordance with the acceptance criteria specified in Category II of NUREG-0588.

In order to document the degree to which the environmental qualification program complies with the NRC's environmental qualification requirements and criteria, the licensee provided equipment qualification information by letters dated November 5, 1985, and April 16 and 30, 1986.

3.11.2.1 Purpose

The purpose of this SER is to evaluate the adequacy of the Catawba Station, Unit 2, environmental qualification program for safety-related mechanical equipment and electrical equipment important to safety as defined in 10 CFR 50.49.

3.11.2.2 Scope

The scope of this report is limited to an evaluation of the safety-related mechanical equipment and electrical equipment important to safety at Catawba Station, Unit 2, that is different from equipment at Unit 1 and which must function in order to mitigate the consequences of a design-basis accident, inside or outside containment, while subjected to the hostile environment associated with these accidents.

Safety-related mechanical equipment and electrical equipment important to safety at Catawba Station, Unit 2, that is identical to equipment at Unit 1 were addressed in SER Supplement Nos. 3, 4, and 5, and found to be adequate.

3.11.3 Staff Evaluation

By letters dated November 5, 1985, and April 16, 1986, the licensee identified the following four items of electrical equipment as specific Unit 2 equipment that is different from Unit 1 equipment.

| Equipment item | Manufacturer | Model number |
|---|---|---|
| Flow transmitter | Rosemount | 1153HD5PB |
| Flow transmitter | Rosemount | 1153DB6PB |
| Level transmitter | Rosemount | N53HD4PB |
| Solenoid valve | ASCO | NP8316E36E/E34E |

The licensee also identified three electrical enclosures that are Unit 1 specific (i.e., there is no Unit 2 counterpart).

For environmental qualification of mechanical equipment, by letter dated April 30, 1986, the licensee stated that although applications and quantities may vary, there is no mechanical equipment unique to Unit 2. Environmental qualification documentation on file for this equipment is applicable to both Units 1 and 2. The staff finds this acceptable.

3.11.4 Conclusions

The staff has reviewed the summary information provided by the licensee for the Catawba Unit 2 program for environmental qualification of electrical equipment important to safety and safety-related mechanical equipment. As noted above, this review is limited to equipment in Catawba Unit 2 that is within the scope of 10 CFR 50.49 and safety-related mechanical equipment that is different from equipment in Catawba Unit 1. The purpose of the review was to assess the qualification status of such equipment and to determine the adequacy of the qualification program.

On the basis of its review and evaluation of the information provided by the licensee, the staff concludes that the licensee has demonstrated compliance with the requirements of 10 CFR 50.49, the relevant parts of GDC 1 and 4 of Appendix A to 10 CFR 50, and Sections III, XI, and XVII of Appendix B to 10 CFR 50, and the criteria specified in NUREG-0588.

3.11.5 Main Steam Line Break Outside Containment

In Supplement 5 to the Catawba Safety Evaluation Report, the staff stated that its review of the main steam line break analysis in support of doghouse equipment qualification, although incomplete, was sufficient to conclude that initial startup and operation of Catawba Unit 2 may proceed. The staff's review of the updated version of the LOFTRAN computer code, which was ongoing at the time Supplement 5 was issued, has progressed sufficiently to provide assurance that the code acceptably calculates the mass and energy release from a postulated main steam line break event.

By letter from Westinghouse dated April 21, 1986, the licensee has provided the additional generic information discussed in its November 15, 1985, letter. A preliminary review of the information provided confirms the conclusions made in Supplement 5 that initial startup and operation of Catawba Unit 2 may proceed. Since the consequences of the main steam line break accident are worse at zero power and end-of-cycle conditions, the staff finds operation of Catawba Unit 2 at up to full power to be acceptable. Therefore, the staff concludes that license condition 49 in SSER 5 should not be made a part of the Unit 2 full-power license; thus license condition 12 in the low-power license (NPF-48) for Catawba Unit 2 can be deleted.

# 6 ENGINEERED SAFETY FEATURES

## 6.2 Containment Systems

### 6.2.1 Containment Functional Design

(b) Main Steam Line Break (MSLB) Inside Containment

In Section 6.2.1 of SSER 4, confirmatory issue 12 concerning the MSLB inside containment was changed to license condition 46, which was incorporated in Catawba Unit 1 Facility Operating License NPF-35 as license condition 17. This license condition required that certain technical information and revised containment analyses for MSLB accidents be submitted prior to startup following the first refueling outage. By letter dated December 17, 1985, the licensee informed the staff that the requested test program had been completed, and referenced the results submitted to the NRC by letters of November 27, 1985, from the Westinghouse Electric Corporation. A preliminary review of the submittals (WCAP-10986P and WCAP-10988P) indicates that the licensee has submitted the requested information as required by the license condition. In addition, the licensee has indicated that the revised MSLB analyses, using the proposed drain flow heat transfer model, result in a bulk-average containment temperature below the FSAR equipment qualification temperature of 327°F. The staff, therefore, concludes that license condition 46 in SSER 5 (i.e., license condition 17 in NPF-35) has been met and that operation of Catawba Unit 2 at full power is acceptable. It should be noted, however, that the staff has not yet completed its review of the licensee's submittals and the staff will continue its review in order to confirm the validity and accuracy of the models and assumptions employed in the revised MSLB analyses.

### 6.2.5 Combustible Gas Control System

In Supplement No. 5 to the SER, the staff committed to address whether the three technical issues related to degraded-core-accident hydrogen control in license condition 14 for Catawba Unit 1 Operating License NPF-35 (license condition 10 in SER and supplements) had been satisfactorily resolved before a full-power operating license was issued for Unit 2.

License condition 14 (hydrogen control measures) in Catawba Unit 1 Operating License NPF-35 requires that upgraded analyses and tests be provided on the following issues and submitted for staff review and approval:

(1) thermal response of the containment atmosphere and essential equipment for a spectrum of accident sequences using revised heat transfer models

(2) effects of upper compartment burns on the operation and survival of air return fans and ice condenser doors

(3) operability of the glow plug in a spray environment typical of that expected in the upper compartment of the containment

A detailed discussion of these matters was provided in Supplement No. 5 to the SER.

With regard to the issue of glow plug operability in a spray environment (item 3), the staff has reviewed the work completed to date by Sandia National Laboratory (SNL) and concludes that there is adequate assurance of reliable ignition in the upper compartment of the containment from 12 shielded igniters. As part of the NRC hydrogen research program, SNL tested General Motors (GM) glow plug igniters to determine if spray impingement and/or gas flows would adversely cool igniters; i.e., igniter surface temperatures decrease such that reliable ignition of lean hydrogen air mixtures cannot be achieved. In two tests, a GM glow plug with spray shield, operated at 14 volts, was subjected to a spray flux of 0.92 gpm/$ft^2$ with a crossflow gas velocity of approximately 19 ft/sec. The glow plug was able to reliably ignite 6% hydrogen air mixtures. Noncombustion tests (without hydrogen present) generally indicate that an unshielded glow plug igniter can achieve ignition temperatures for spray fluxes up to approximately 0.95 gpm/$ft^2$. By comparison, the uniform spray flux across the Catawba containment diameter is approximately 0.65 gpm/$ft^2$. Additional noncombustion testing indicated the igniter would maintain an adequate surface temperature for ignition for gas velocities up to approximately 23 ft/sec. Estimates of gas velocities in the Catawba upper compartment vary with a peak vertical velocity of approximately 30 ft/sec and a peak horizontal gas velocity of 10 ft/sec. However, large regions of the upper compartment are predicted to have gas velocities of 5 to 10 ft/sec. Although acknowledging that prediction of gas velocity gradients is imprecise, it is the staff's judgment that the flow analyses and tests described above, coupled with the fact that 12 shielded igniters are mounted at diverse locations throughout the upper compartment, indicate that the igniters will function to prevent the hazardous accumulation of hydrogen in the upper compartment. Therefore, the staff considers the issue of glow plug operability in a spray environment to be satisfactorily resolved for the McGuire and Catawba nuclear stations.

The licensee has submitted additional information on items 1 and 2 of the license condition by letters dated March 25, 1986, and April 2, 1986; also a meeting was held on April 8, 1986, between the licensee and staff to discuss these matters.

It was the staff's conclusion in the April 8, 1986, meeting that items 1 and 2 identified above have not been satisfactorily resolved and that additional efforts are needed to close these items. In that regard, the licensee has proposed by letter dated April 25, 1986, an extensive program for resolving the remaining technical issues related to degraded-core-accident hydrogen control. The licensee's program would evaluate the containment atmosphere response to hydrogen combustion for a spectrum of accident sequences to determine the thermal effects on essential equipment and the differential pressure effects on the air return fans and ice condenser doors. The licensee's program schedule contains intermediate milestones for completion of elements of the program and allows for staff interaction to ensure concurrence on task descriptions and acceptance criteria. The licensee's proposed schedule to complete all activities is December 1987.

The staff has reviewed the program proposed by the licensee which includes a plan for resolving concerns on air return fans and ice condenser doors and a

plan for resolving concerns on equipment survivability. The plan for resolving concerns on fans and doors consists of two parts as follows:

(1) Evaluation of the response of the containment and its associated systems to the accident sequences involving upper compartment burns, and a determination of the differential pressure across the fans and doors as a function of time. The specific method of performing this analysis, and the major assumptions and parameters to be used, will be identical to those used in the analysis of equipment survivability.

(2) Using the results from the first part of the plan, determination of the response of the fans and doors to upper compartment hydrogen burning and evaluation of the effects on subsequent performance.

The plan for resolving concerns on equipment survivability consists of three parts as follows:

(1) Evaluation of the hydrogen and steam releases to containment for an appropriate selection of accident sequences which lead to large releases of hydrogen into containment.

(2) Using the results of the first part of the plan as input, evaluation of the response of the containment and its associated systems to the accident sequences, and a determination of the pressure and temperature in containment as a function of time.

(3) Using the results from the first two parts of the plan, determination of the response of equipment in containment to hydrogen burning and evaluation of its survivability. The steps in this part of the plan include selection of equipment to be analyzed, determination of the appropriate models for the analysis, comparison of results from the analysis with equipment qualification test data and hydrogen burn survivability tests performed under the sponsorship of NRC and the Electric Power Research Institute (EPRI), and assessment of the margin associated with the equipment response.

It is the staff's view that the program proposed by the licensee is acceptable insofar as major elements or tasks have been properly identified, thus providing a framework for coordinating future efforts. The staff intends to continue discussions with the licensee to achieve concurrence on specific program details. A particular item worth noting relates to the demonstration of air return fan operability in the event of an upper compartment burn. Currently the licensee has indicated a preference for analytically evaluating the consequences of differential pressures across the fan and its effects on overspeeding the fans. It is the staff's judgment that tests, rather than analytical evaluations, may be necessary for disposition of this matter; however, a conclusion on this matter can be deferred until after containment analysis predicting the loading condition is performed.

As discussed in SER Supplement No. 5, the recently adopted provisions in 10 CFR 50.44(c)(3)(iv) - (vii) apply to Catawba Units 1 and 2. 10 CFR 50.44(c)(3)(vii)(B) requires that each applicant for an operating license, as of February 25, 1985, must provide a schedule for complying with the requirement of

10 CFR 50.44 prior to operation of the reactor in excess of 5% of rated power. However, as 10 CFR 50.44(c)(3)(vii)(B) states, completed final analyses are not necessary for a staff determination that a plant is safe to operate at full power provided that prior to operation an applicant has provided preliminary analyses which the staff has determined provides a satisfactory basis for a decision to support interim operation at full power until the final analyses have been completed. 10 CFR 50.44(c)(3)(vii)(B) further states that: "Preliminary analyses are not necessary for a staff determination that a plant is safe to operate at full power if the staff has determined for similar plants, referenced in this notice of rulemaking, that similar systems provide a satisfactory basis for a decision to support operation at full power until the preliminary analyses have been completed." The McGuire and Sequoyah plants are referenced in the notice of issuance of the rule (50 FR 3502).

On the basis of this reference and the staff's statement in SER Supplement No. 4 that the hydrogen mitigation systems at the McGuire and the Catawba stations are virtually identical, and the licensee's proposed program and accompanying schedule for resolving the remaining issues, the staff concludes that this does provide a satisfactory basis to support interim operation of Catawba Units 1 and 2 at full power until the final analyses have been completed.

# 8 ELECTRIC POWER SYSTEMS

## 8.3 Onsite Emergency Power Systems

### 8.3.1 AC Power Systems

By letter dated April 16, 1986, the licensee provided information as needed to comply with license condition 13 items 8 and 9, of the Catawba Unit 2 Facility Operating License (NPF-48) which corresponds to license condition 43 in SER Supplements 4 and 5. The staff has reviewed the subject submittal and concludes that license condition 13, items 8 and 9, have been fully and satisfactorily complied with.

With respect to item 8 of license condition 13, the staff has reached the following specific findings on the basis of information provided by the licensee:

(1) The microstructure of the 2A and 2B engine bases consists of normal Class 40 gray iron. The microstructure exhibits flake-type graphite with Class A random orientation and no evidence of Widmanstaetten graphite.

(2) The indication found on a rocker arm capscrew from engine 2B is a fabrication-induced defect which would not have been detrimental to the strength of the capscrew.

(3) The worn thrust bearing, found on one of the engine 2B turbochargers was caused by inadequate lubrication as a result of a misinstalled check valve in the oil sump tank and some tubing configuration discrepancies (previously described as tubing with an undersized internal diameter in licensee's letter dated December 23, 1985). A review of the licensee's records indicated that these problems were unique to the engine 2B turbochargers.

(4) Rotor float (i.e., axial clearance) measurements have been performed for both engine 2A turbochargers. These measurements met the Transamerica Delaval, Inc. (TDI)/Elliot specifications. On this basis and on the basis of item 3 above, the staff concludes that a visual inspection of the 2A turbocharger thrust bearings is not necessary.

(5) The Catawba turbochargers were manufactured incorporating the modifications covered by TDI Service Information Memo (SIM) 300 concerning staking of the nozzle ring core plugs.

With respect to item 9 of license condition 13, the staff has reached the following conclusions:

(1) The two failures of the No. 7 main bearing from engine 2B are attributable to lube oil contamination acting in conjunction with bearing misalignment. Lube oil contamination from shot blast cleaning of the lube oil piping and sump tank following a flood in May 1984 and bearing misalignment both

appear to be important causal factors behind the failure of two No. 7 main bearings in engine 2B during the autumn of 1985. The staff believes that the lube oil contamination was the dominant mechanism leading to the first failure and bearing misalignment was the dominant mechanism for the second failure.

(2) The licensee has implemented appropriate action to remove contaminants from the engine. In addition, as stated in SER Supplement No. 5, the staff believes that new bearing installation procedures implemented for bearing No. 7 minimize the potential for bearing misalignment caused by a minor dimensional or physical anomaly which may possibly exist but which has not been found, or for bearing misalignment caused by improper installation.

(3) The 100-hour confirmatory endurance test which has been completed successfully offered no evidence of abnormal scoring, wear, or other distress of the No. 7 bearing. The results of this test indicate that the corrective actions taken by the licensee will be effective in precluding the rapid and/or highly premature bearing failures of the kind that occurred previously. Followup inspections to be performed at the first refueling outage will provide additional confidence regarding the effectiveness of these measures.

Based on its review and evaluation of the information provided by the licensee, the staff concludes that the adequate resolution of items 8 and 9, as discussed above, provides a satisfactory basis to support operation of Catawba Unit 2 at full power.

# 13 CONDUCT OF OPERATIONS

## 13.5 Plant Procedures

### 13.5.2 Operating and Maintenance Procedures

In Catawba Safety Evaluation Report (SER) Supplement No. 4, the staff discussed the licensee's provision of additional clarification and justification for addition of a "feed-and-bleed" technique to the referenced Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs) in the Catawba ERG implementation for recovery from a loss-of-coolant accident (LOCA) outside containment. By letter dated October 29, 1985, the licensee discussed the potential beneficial effects which might be derived by use of this optional strategy. At the same time, the licensee proposed guidance to limit its use and ensure against possible negative effects. The most important limitation on the use of the feed-and-bleed recovery strategy, other than the beyond-design-basis scenarios, is the requirement for adequate inventory in the emergency core cooling system (ECCS) sump, to ensure an ECCS recirculation suction source. This requirement addresses concerns about accelerated loss of reactor coolant inventory while providing the possibility for increasing available cooling inventory by containment ice melt.

Because of the potentially beneficial effects of the proposed addition to the Catawba ERGs and because of the assurance against undesirable effects provided by the limitations on use of the technique, the staff finds the proposed feed-and-bleed option acceptable for implementation at Catawba. The staff also finds that the licensee has satisfied the commitment in its October 17, 1984, letter which was discussed in SER Supplement No. 4, Section 13.5.2.

## 14 INITIAL TEST PROGRAM

SER Supplement No. 5 required the licensee to provide additional information to support its deletion of measurement of bus loads from the 125-volt dc vital instrumentation and control power test for Catawba Unit 2. The licensee provided this information by letter dated March 19, 1986.

The letter stated that the licensee considered the measurement of the actual loads on the Unit 2 vital buses unnecessary for the following reasons.

(1) The loads were calculated for both units using the same methodology.

(2) The calculated loads on the Unit 2 buses were very similar to those on Unit 1.

(3) The actual loads measured on the Unit 1 buses were significantly below the calculated loads, thus demonstrating the conservatism of the calculational method.

The March 19, 1986, submittal included a tabulation of the loads calculated for both Units 1 and 2 and provided copies of test data showing the measured loads on Unit 1. On the basis of these data, the staff finds that there is a significant margin between the calculated loads and the actual loads measured on Unit 1. The staff concludes that this margin is adequate to account for any minor equipment differences between the two units. Therefore, the licensee method for testing the 125-volt dc vital buses on Unit 2 (e.g., without measuring the actual loads on the buses) is acceptable.

APPENDIX A

CONTINUATION OF CHRONOLOGY

| | |
|---|---|
| February 21, 1986 | Letter to licensee forwarding proposed Final Draft Technical Specifications page changes and requesting recertification. |
| February 24, 1986 | Letter to licensee forwarding Operating License NPF-48 authorizing Unit 2 to operate at power levels not in excess of 5%. |
| February 24, 1986 | Letter to licensee forwarding Amendment No. 6 to NPF-35. Amendment modifies Technical Specifications by making editorial and format changes to establish a single document that is common for Units 1 and 2. |
| March 3, 1986 | Letter from licensee forwarding revisions to Pump and Valve Inservice Testing Program. |
| March 5, 1986 | Letter to licensee forwarding reports on probabilistic risk assessment (PRA) insights. |
| March 5, 1986 | Letter to licensee forwarding Supplement No. 5 to SER. |
| March 6, 1986 | Letter to licensee requesting additional information regarding the elimination of arbitrary intermediate pipe breaks for the pressurizer surge lines and main feedwater systems. |
| March 13, 1986 | Letter from licensee concerning initial startup test program. |
| March 19, 1986 | Letter from licensee concerning vital instrumentation and control power test. |
| March 24, 1986 | Letter from licensee concerning elimination of arbitrary intermediate pipe breaks for the pressurizer surge lines and main feedwater system. |
| March 25, 1986 | Letter from licensee concerning safety parameter display systems. |
| March 25, 1986 | Letter from licensee concerning Regulatory Guide 1.97, Revision 2. |

| | |
|---|---|
| March 25, 1986 | Letter from licensee forwarding Revision 13 to "An Analysis of Hydrogen Control Measures at McGuire Nuclear Station." |
| April 2, 1986 | Letter from licensee forwarding Revision 14 to "An Analysis of Hydrogen Control Measures at McGuire Nuclear Station." |
| April 8, 1986 | Meeting with licensee to discuss hydrogen control measures, standby shutdown facility testing, and nuclear service water system testing. |
| April 16, 1986 | Letter from licensee forwarding revision to NUREG-0588 equipment qualification summary sheet. |
| April 16, 1986 | Letter from licensee concerning Transamerica Delaval (TDI) diesel engine requirements. |
| April 24, 1986 | Letter to licensee forwarding Amendment 7 to NPF-35. Amendment changes Technical Specifications to extend, on a one-time basis, by a maximum of 5 months, those 18-month surveillances associated with the engineered safety features which can only be conducted with Unit 1 in cold shutdown or refueling. |
| April 24, 1986 | Letter from licensee concerning turbine system maintenance program |
| April 25, 1986 | Letter from licensee concerning hydrogen control measures and schedule for resolving these outstanding issues. |
| April 30, 1986 | Letter from licensee concerning environmental qualification of mechanical equipment in both units. |
| May 2, 1986 | Summary of April 8, 1986, meeting issued. |

APPENDIX B

BIBLIOGRAPHY

U.S. Nuclear Regulatory Commission, NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," December 1979.

---, Office of Inspection and Enforcement (IE) Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment," January 14, 1980. Supplements: February 29, 1980; September 30, 1980; and October 24, 1980.

Westinghouse Electric Corporation, letter from E. P. Rahe, Jr., to C. O. Thomas, NRC, Subject: "Topical Reports WCAP-10986 and WCAP-10987, 'Ice Condenser Drain Test Results, Data Analysis and Development of Drain Models for the LOTIC-III Ice Condenser Containment Code'," November 27, 1985.

---, letter from E. P. Rahe, Jr., to C. O. Thomas, NRC, Subject: "Topical Reports WCAP-10988 and WCAP-10989, 'COBRA-NC, Analysis of Main Steam Line Break in the Catawba Unit 1 Ice Condenser Containment'," November 27, 1985.

---, letter from E. P. Rahe, Jr., to H. L. Thompson, NRC, Subject: "Response to Request for Additional Information on WCAP-9226(P) and WCAP-9227 (NP), 'Reactor Core Response to Excessive Secondary Steam Releases'," April 21, 1986.

APPENDIX D

PRINCIPAL CONTRIBUTORS

NRC STAFF

| Name | Title | Branch (Division) |
|---|---|---|
| W. Brooks | Nuclear Engineer | Reactor Systems (PWR-A) |
| B. Clayton | Section Leader | Facility Operations (PWR-A) |
| M. Duncan | Licensing Assistant | PWR Project Directorate #4 |
| Y. Huang | Mechanical Engineer | Engineering (PWR-A) |
| S. MacKay | Senior Nuclear Engineer | Human Factors Issues (DHFT) |
| F. Murphy | Reactor Systems Engineer | BWR Assessment (ORAS) |
| E. Sullivan | Section Leader | Engineering (PWR-A) |
| C. Tinkler | Mechanical Engineer | Plant Systems (PWR-A) |
| H. Walker | Mechanical Engineer | Electrical, Instrumentation, and Control Systems (PWR-A) |

APPENDIX N

ERRATA

SER Supplement

| Page | Section | Change |
|---|---|---|
| 3-7 | 3.11.4.1.1 | Line 3: Change "1985" to "1984". |
| 7-2 | 7.5.2.1 | Line 9: Change "of" to "or". |
| 15-6 | D. | Move last 4 lines on this page to position above footnote rule. |
| 18-4 | 18.3.3 | Line 2 from bottom: Change "McGuire" to "Catawba". |

NRC FORM 335 (2-84) NRCM 1102, 3201, 3202

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# BIBLIOGRAPHIC DATA SHEET

SEE INSTRUCTIONS ON THE REVERSE

1. REPORT NUMBER (Assigned by TIDC, add Vol. No., if any)

NUREG-0954
Supplement No. 6

2. TITLE AND SUBTITLE

Safety Evaluation Report related to the operation of Catawba Nuclear Station, Units 1 and 2

3. LEAVE BLANK

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Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

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Pertains to Docket Nos. 50-413 and 50-414

13. ABSTRACT (200 words or less)

This report supplements the Safety Evaluation Report (NUREG-0954) issued in February 1983 by the Office of Nuclear Reactor Regulation of the U.S. Nuclear Regulatory Commission with respect to the application filed by Duke Power Company, North Carolina Municipal Power Agency Number 1, North Carolina Membership Corporation, Saluda River Electric Cooperative, Inc., and Piedmont Municipal Power Agency, as applicants and owners, for licenses to operate the Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, respectively). The facility is located in York County, South Carolina, approximately 9.6 km (6 mi) north of Rock Hill and adjacent to Lake Wylie. This supplement provides additional information supporting the license for operation above 5% power and power ascension to full-power operation for Unit 2.

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