



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001  
December 22, 2010

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Virginia Electric and Power Company  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2, ISSUANCE OF AMENDMENTS REGARDING THE USE OF OPTIMIZED ZIRLO™ FUEL ROD CLADDING (TAC NOS. ME3343 AND ME3344)

Dear Mr. Heacock:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 271 to Renewed Facility Operating License No. DPR-32 and Amendment No. 270 to Renewed Facility Operating License No. DPR-37 for the Surry Power Station, Unit Nos. 1 and 2, respectively. The amendments change the Technical Specifications (TSs) in response to your application dated February 10, 2010 (Agencywide Documents and Management System (ADAMS) Accession No. ML100470738).

These amendments revise TS 5.2.1, "Fuel Assemblies," to add Optimized ZIRLO as an acceptable fuel rod cladding material. In addition, the amendments propose adding the Westinghouse topical report for Optimized ZIRLO to the analytical methods used to determine the core operating limits listed in TS 6.2.C.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

A handwritten signature in cursive script that reads "Karen Cotton".

Karen Cotton, Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-280 and 50-281

Enclosures:

1. Amendment No. 271 to DPR-32
2. Amendment No. 270 to DPR-37
3. Safety Evaluation

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-280

SURRY POWER STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 271  
Renewed License No. DPR-32

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated February 10, 2010, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

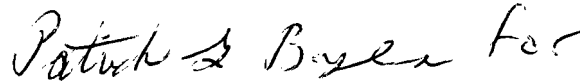
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Renewed Facility Operating License No. DPR-32 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 271 , are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Gloria Kulesa, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. DPR-32  
and the Technical Specifications

Date of Issuance: December 22, 2010



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-281

SURRY POWER STATION, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 270  
Renewed License No. DPR-37

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated February 10, 2010, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Renewed Facility Operating License No. DPR-37 is hereby amended to read as follows:

(B) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 270 , are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Gloria Kulesa, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes License No. DPR-37  
and the Technical Specifications

Date of Issuance: December 22, 2010

ATTACHMENT

TO LICENSE AMENDMENT NO. 271

RENEWED FACILITY OPERATING LICENSE NO. DPR-32

DOCKET NO. 50-280

AND

TO LICENSE AMENDMENT NO. 270

RENEWED FACILITY OPERATING LICENSE NO. DPR-37

DOCKET NO. 50-281

Replace the following pages of the Licenses and the Appendix A Technical Specifications (TSs) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages

License

License No. DPR-32, page 3

License No. DPR-37, page 3

TSs

TS 5.0-1

TS 6.2-2

Insert Pages

License

License No. DPR-32, page 3

License No. DPR-37, page 3

TSs

TS 5.0-1

TS 6.2-2

3. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations: 10 CFR Part 20, Section 30.34 of 10 CFR Part 30, Section 40.41 of 10 CFR Part 40, Sections 50.54 and 50.59 of 10 CFR Part 50, and Section 70.32 of 10 CFR Part 70; and is subject to all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

A. Maximum Power Level

The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2546 megawatts (thermal).

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 271 are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. Reports

The licensee shall make certain reports in accordance with the requirements of the Technical Specifications.

D. Records

The licensee shall keep facility operating records in accordance with the requirements of the Technical Specifications.

E. Deleted by Amendment 65

F. Deleted by Amendment 71

G. Deleted by Amendment 227

H. Deleted by Amendment 227

I. Fire Protection

The licensee shall implement and maintain in effect the provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report and as approved in the SER dated September 19, 1979, (and Supplements dated May 29, 1980, October 9, 1980, December 18, 1980, February 13, 1981, December 4, 1981, April 27, 1982, November 18, 1982, January 17, 1984, February 25, 1988, and

- E. Pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.
3. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations: 10 CFR Part 20, Section 30.34 of 10 CFR Part 30, Section 40.41 of 10 CFR Part 40, Sections 50.54 and 50.59 of 10 CFR Part 50, and Section 70.32 of 10 CFR Part 70; and is subject to all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:
- A. Maximum Power Level  
The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2546 megawatts (thermal).
  - B. Technical Specifications  
The Technical Specifications contained in Appendix A, as revised through Amendment No. 270, are hereby incorporated in this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.
  - C. Reports  
The licensee shall make certain reports in accordance with the requirements of the Technical Specifications.
  - D. Records  
The licensee shall keep facility operating records in accordance with the requirements of the Technical Specifications.
  - E. Deleted by Amendment 54
  - F. Deleted by Amendment 59 and Amendment 65
  - G. Deleted by Amendment 227
  - H. Deleted by Amendment 227



## 5.0 DESIGN FEATURES

### 5.1 SITE LOCATION

The Surry Power Station is located in Surry County, Virginia, on property owned by Virginia Electric and Power Company on a point of land called Gravel Neck which juts into the James River. It is approximately 46 miles SE of Richmond, Virginia, 17 miles NW of Newport News, Virginia, and 25 miles NW of Norfolk, Virginia.

### 5.2 REACTOR CORE

#### 5.2.1 Fuel Assemblies

The reactor shall contain 157 fuel assemblies. Each assembly shall consist of a matrix of Zircaloy, ZIRLO, or Optimized ZIRLO fuel rods with an initial composition of natural or slightly enriched uranium dioxide ( $UO_2$ ) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core locations.

#### 5.2.2 Control Rod Assemblies

The reactor core shall contain 48 control rod assemblies. The control material shall be silver indium cadmium, as approved by the NRC.

The analytical methods used to determine the core operating limits identified above shall be those previously reviewed and approved by the NRC, and identified below. The CORE OPERATING LIMITS REPORT will contain the complete identification for each of the TS referenced topical reports used to prepare the CORE OPERATING LIMITS REPORT (i.e., report number, title, revision, date, and any supplements). The core operating limits shall be determined so that applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met. The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided for information for each reload cycle to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

#### REFERENCES

1. VEP-FRD-42-A, "Reload Nuclear Design Methodology"
2. WCAP-16009-P-A, "Realistic Large Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," (Westinghouse Proprietary).
3. WCAP-10054-P-A, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," (W Proprietary)
4. WCAP-10079-P-A, "NOTRUMP, A Nodal Transient Small Break and General Network Code," (W Proprietary)
5. WCAP-12610-P-A, "VANTAGE+ Fuel Assembly Report," (Westinghouse Proprietary)
6. VEP-NE-2-A, "Statistical DNBR Evaluation Methodology"
7. VEP-NE-3-A, "Qualification of the WRB-1 CHF Correlation in the Virginia Power COBRA Code"
8. DOM-NAF-2-A, "Reactor Core Thermal-Hydraulics Using the VIPRE-D Computer Code," including Appendix B, "Qualification of the Westinghouse WRB-1 CHF Correlation in the Dominion VIPRE-D Computer Code."
9. WCAP-8745-P-A, "Design Bases for Thermal Overpower Delta-T and Thermal Overtemperature Delta-T Trip Function."
10. WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO," (Westinghouse Proprietary)



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 271 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-32

AND

AMENDMENT NO. 270 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-280 AND 50-281

1.0 INTRODUCTION

By letter dated February 10, 2010,<sup>1</sup> Virginia Electric and Power Company (VEPCO, the licensee) submitted a request for changes to the Surry Power Station, Unit Nos. 1 and 2 (SURRY), Technical Specifications (TSs). The requested changes would revise TS 5.2.1, "Fuel Assemblies," to add Optimized ZIRLO™ as an acceptable fuel rod cladding material.

2.0 REGULATORY EVALUATION

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR), 50.90, "Application for Amendment of License or Construction Permit," allow a licensee to amend or change the original license applications. 10 CFR 50.92, "Issuance of Amendment," specifies that the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff will be guided by the considerations which govern the issuance of initial licenses to the extent applicable and appropriate in determining whether an amendment will be issued to the applicant. The licensee requests a license amendment to add Optimized ZIRLO™ as an acceptable fuel rod cladding material in the TS.

By letter dated June 10, 2005, the NRC staff issued a Safety Evaluation (SE) approving Addendum 1 to Westinghouse TR WCAP-12610-P-A and CENPD-404-P-A, "Optimized ZIRLO™ (Addendum 1 SE)<sup>2</sup>, wherein the NRC staff approved the use of Optimized ZIRLO™ as a fuel cladding material. The NRC staff approved the use of Optimized ZIRLO™ as a fuel cladding material based on: (1) similarities with standard ZIRLO™, (2) demonstrated material

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1 Agencywide Documents Access and Management System (ADAMS) Accession No. ML100470738

2 June 10, 2005, ADAMS Accession No. ML051670408

performance, and (3) a commitment to provide irradiated data and validate fuel performance models ahead of burnups achieved in batch application. The NRC staff's SE for Optimized ZIRLO™ includes 10 conditions and limitations for its use.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Conditions and Limitations

On June 10, 2005, the NRC staff issued a SE for Addendum 1 to Topical Report (TR) WCAP-12610-P-A and CENPD-404-P-A for Optimized ZIRLO™. In the SE, the NRC staff concluded that:

Based upon demonstrated material performance in Addendum 1 and in response to RAIs [Request for Additional Information] and the irradiated database, the NRC staff has approved Optimized ZIRLO™ for full batch implementation.

Also in the SE conclusion, the NRC staff stated:

The NRC staff reviewed the effects of Optimized ZIRLO™ using the appropriate fuel design requirements of [Standard Review Plan] SRP 4.2 and 10 CFR Part 50, Appendix A, General Design Criteria and found that the TR provided reasonable assurance that under both normal and accident conditions, Westinghouse and CE fuel assembly designs implementing Optimized ZIRLO™ fuel cladding would be able to safely operate and comply with NRC regulations.

The NRC staff's SE also stated that licensees referencing Addendum 1 to the TR to implement Optimized ZIRLO™ must ensure compliance with ten issues as specified in the SE. VEPCO has documented its compliance with these 10 conditions and limitations in its license amendment request (LAR) (Reference 1) and has committed to ensuring compliance with them for future fuel reloads. The NRC staff has reviewed VEPCO's response to each of the 10 SE conditions and limitations and finds each to be acceptable.

Conditions 6 and 7 of the TR SE require validating in-reactor performance and fuel performance models based on Lead Test Assembly (LTA) data that must be completed prior to their initial batch loading and prior to the startup of subsequent cycles. Condition 6 requires the licensee to ensure that Westinghouse provide the NRC staff with letter(s) containing Optimized ZIRLO™ LTA data on visual observations, measurements of oxidation of LTA fuel rods, comparison of profilometry data with predictions, fuel rod length, and fuel assembly length. In addition, Condition 6 requires the licensee to ensure that Westinghouse provide data to confirm applicability with currently approved fuel performance models.

VEPCO noted that Westinghouse has provided four references related to test data and models (References 4, 5, 6 and 7 of the LAR) and has provided the following statement in response to Condition 6:

LTA measured data and favorable results from visual examinations of once and twice-burned LTAs confirm, for at least two cycles of operation, that the current fuel performance models are applicable for Optimized ZIRLO™ fuel rods.

Westinghouse will continue to provide additional data from the Optimized ZIRLO™ LTA programs to the NRC after new data for higher burnup/fluence become available. Dominion [VEPCO] will confirm that as higher burnups/fluences are achieved for Optimized ZIRLO™ clad fuel rods that the requirements of this condition will be met as it applies to Surry Units 1 and 2.

One of the main objectives of the ongoing Westinghouse creep program, per Condition 7, is to demonstrate that the Optimized ZIRLO™ creep is the same as Standard ZIRLO™, and that the creep in tension is similar to creep in compression. In order to comply with Condition 7, Westinghouse undertook a creep/growth test assembly program at the Vogtle Electric Generating Plant (Vogtle). Condition 7 of the TR stipulates that licensees ensure that Westinghouse provide the NRC staff with a report containing growth and creep data summaries from Vogtle and, using the Vogtle data, confirm the applicability with currently approved fuel performance models.

In response to Condition 7, VEPCO stated that:

Westinghouse has submitted several letters to the NRC to provide information related to test data and models (References 3 through 6 [of the LAR]). Currently, the data from two cycles of operation have been evaluated and the fuel rod creep models from fuel rod design codes have been used to predict the growth and creep performance of the Vogtle samples. This information was provided to the NRC in Reference 6. Because reload batches of fuel with Optimized ZIRLO cladding have already been introduced at Arkansas Nuclear One Unit 2 and Waterford 3, and implementation of Optimized ZIRLO fuel rod cladding at Surry Units 1 and 2 is not planned before 2011, sufficient data should be available that this Condition will not be an issue for Surry fuel. Nevertheless, Dominion [VEPCO] will confirm that the requirements of this Condition are met as it applies to Surry Units 1 and 2 fuel.

In summary, the data from two cycles of operation has been evaluated by Westinghouse (References 5 and 6 of the LAR) and the fuel rod creep models from the fuel rod design codes have been used to predict the growth and creep performance of the samples. This information was provided to the NRC in the most recent report (Reference 6 of the LAR) at the end of calendar year 2008.

Based upon the information provided, the NRC staff finds that VEPCO's response, as discussed above, meets the requirements of all SE Conditions and is acceptable for Surry. Therefore, the NRC staff concludes that the Optimized ZIRLO™ fuel design is acceptable for use in Surry to a peak rod average burnup limit of 62 GWD/MTU.

### 3.2 TS Revisions

#### 3.2.1 Section 5.2.1 Fuel Assemblies

The licensee proposes to add Optimized ZIRLO™ as an acceptable fuel rod cladding material. The new sentences are stated as follows:

"... Each assembly shall consist of a matrix of Zircaloy, ZIRLO, or Optimized ZIRLO fuel rods ..."

Based on the approved Optimized ZIRLO fuel, the NRC staff concludes that this revision is acceptable for Surry.

### 3.2.2 Section 6.2.C Core Operating Limits Report (COLR)

The licensee proposes to add the approved Westinghouse TR, Addendum 1-A to WCAP-126 10-P-A and CENPD-404-P-A, "Optimized ZIRLO™," to the list of references in COLR. Based on the approved reports, the NRC staff concludes that this revision is acceptable for Surry.

### 3.3 Conclusion

The NRC staff has reviewed the licensee's license amendment request for TS revisions. Based on the evaluation, the staff concludes that the Optimized ZIRLO™ fuel design is acceptable to a peak rod average burnup limit of 62 GWD/MTU and the TS revisions are acceptable for Surry Units 1 and 2.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Virginia State official was notified of the proposed issuance of the amendments. The State official had no comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (75 FR 52781, August 27, 2010). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: SWu, NRR/DSS

Date: December 22, 2010

December 22, 2010

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Virginia Electric and Power Company  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION, UNIT NOS. 1 AND 2, ISSUANCE OF AMENDMENTS REGARDING THE USE OF OPTIMIZED ZIRLO™ FUEL ROD CLADDING (TAC NOS. ME3343 AND ME3344)

Dear Mr. Heacock:

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These amendments revise TS 5.2.1, "Fuel Assemblies," to add Optimized ZIRLO as an acceptable fuel rod cladding material. In addition, the amendments propose adding the Westinghouse topical report for Optimized ZIRLO to the analytical methods used to determine the core operating limits listed in TS 6.2.C.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Karen Cotton, Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-280 and 50-281

Enclosures:

1. Amendment No. 271 to DPR-32
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