

October 25, 2000

Mr. Ronald DeGregorio  
Vice President Oyster Creek  
AmerGen Energy Company, LLC  
P.O. Box 388  
Forked River, NJ 08731

SUBJECT: OYSTER CREEK NUCLEAR GENERATING STATION - ISSUANCE OF  
AMENDMENT RE: EXCESS FLOW CHECK VALVES (TAC NO. MA8492)

Dear Mr. DeGregorio:

The Commission has issued the enclosed Amendment No. 216 to Facility Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station, in response to your application dated March 7, 2000, as supplemented on April 21, June 14, and September 15, 2000.

On the date of the March 7, 2000, application, GPU Nuclear, Inc. (GPUN) was the licensed operator for Oyster Creek. On August 8, 2000, GPUN's ownership interest in Oyster Creek was transferred to AmerGen Energy Company, LLC (AmerGen). By letter dated August 10, 2000, AmerGen requested that the U.S. Nuclear Regulatory Commission (NRC) continue to review and act upon all requests before the Commission which had been submitted by GPUN. Accordingly, the NRC staff has completed its review of the requested amendment.

The amendment revises the Technical Specifications to revise the surveillance requirements from once per refueling interval for each excess flow check valve (EFCV) to testing a representative sample of EFCVs once per 24 months.

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

Sincerely,

*/RA/*

Helen N. Pastis, Sr. Project Manager, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-219

Enclosures: 1. Amendment No. 216 to DPR-16  
2. Safety Evaluation

cc w/encls: See next page

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PD1-1 r/f H. Pastis OGC W. Beckner J. Rogge, RI

Accession No. ML003758385

\*SE dated 10/16/00 was provided and no major changes were made

\*\* See previous concurrence

OFFICE	PM:PD1-1	E	LA:PD1-1	E	OGC**	SC:PDI-1	DSSA*
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AMERGEN ENERGY COMPANY, LLC

AND

JERSEY CENTRAL POWER & LIGHT COMPANY

DOCKET NO. 50-219

OYSTER CREEK NUCLEAR GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 216  
License No. DPR-16

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by GPU Nuclear, Inc., et al., (the licensee), dated March 7, 2000, as supplemented on April 21, June 14, and September 15, 2000, as adopted by AmerGen Energy Company, LLC, pursuant to a letter dated August 10, 2000, 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 2.C.(2) of Facility Operating License No. DPR-16 is hereby amended to read as follows:

- (2) Technical Specifications

- The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 216, are hereby incorporated in the license. AmerGen Energy Company, LLC, shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Marsha Gamberoni, Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: October 25, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 216

FACILITY OPERATING LICENSE NO. DPR-16

DOCKET NO. 50-219

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

4.5-5

4.5-6

4.5-15

Insert

4.5-5

4.5-6

4.5-15

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 216

TO FACILITY OPERATING LICENSE NO. DPR-16

AMERGEN ENERGY COMPANY, LCC, AND

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

## 1.0 INTRODUCTION

By letter dated March 7, 2000, as supplemented on April 21, June 14, and September 15, 2000, the GPU Nuclear, Inc. (the licensee) submitted a request for changes to the Oyster Creek Nuclear Generating Station (Oyster Creek) Technical Specifications (TSs). The requested changes would revise the TSs to revise the surveillance requirements (SRs) from testing once per refueling interval for each excess flow check valve (EFCV) to testing a representative sample of EFCVs once per 24 months. The September 15, 2000, letter provided clarifying information within the scope of the original application and did not change the initial proposed no significant hazards consideration determination.

On the date of the March 7, 2000, application, GPU Nuclear, Inc. (GPUN) was the licensed operator for Oyster Creek. On August 8, 2000, GPUN's ownership interest in Oyster Creek was transferred to AmerGen Energy Company, LLC (AmerGen). By letter dated August 10, 2000, AmerGen requested that the U. S. Nuclear Regulatory Commission (NRC) continue to review and act upon all requests before the Commission which had been submitted by GPUN. Accordingly, the NRC staff has completed its review of the requested amendment.

## 2.0 EVALUATION

### 2.1 Discussion

The licensee for Oyster Creek submitted a TS change request for EFCVs surveillance testing. Currently, in accordance with the Oyster Creek TSs each EFCV is required to be functionally tested "every period between refueling outages." The proposed change is to relax the surveillance frequency by limiting the number of tests to a "representative sample" of EFCVs during each 24-month refueling outage. The basis for the request, as stated by the licensee, is a high degree of reliability shown by the EFCV and the low consequences of an EFCV failure.

The supporting analysis for the licensee's conclusion is based on General Electric Nuclear Energy Topical Report B21-00658-01, "Excess Flow Check Valve Testing Relaxation" dated November 1998 and a response to a request for additional information (RAI) dated January 8, 2000. The staff accepted the topical report by safety evaluation (SE) dated March 14, 2000. This report provided: (1) an estimate of steam release frequency (into the reactor building) due to a break in an instrument line concurrent with an EFCV failure to close and (2) an assessment of the radiological consequences of such a release.

## 2.2 Background

EFCVs are installed on boiling-water reactor (BWR) instrument lines to limit the release of fluid in the event of an instrument line break. Examples of EFCV installations include reactor pressure vessel level and pressure instrumentation, main steam line flow instrumentation, recirculation pump suction pressure, and reactor core isolation cooling steam line flow instrumentation. EFCVs are not required to close in response to a containment isolation signal and are not required to operate under post loss-of-coolant accident (LOCA) conditions. In the topical report, the Boiling Water Reactor Owners Group (BWROG) stated that EFCVs are not needed to mitigate the consequences of an accident because an instrument line break coincident with the design-basis LOCA would be of a sufficiently low probability to be outside of the design basis.

The Standard Technical Specifications (STSs) SRs currently require verification of the actuation (closing) capability of each reactor instrumentation line EFCV every 18 months (or 24 months depending on the plant refueling schedule). This is typical for most BWR plants. The proposed change by the licensee revises the surveillance frequency by allowing a "representative sample" of EFCVs to be tested every 24 months. The "representative sample" consists of approximately an equal number of EFCVs being tested each refueling outage such that each EFCV is tested at least every 10 years (nominal).

## 2.3 Evaluation

As stated by the licensee, the radiological consequences evaluation of an instrument line rupture at Oyster Creek do not credit the EFCVs or a separate flow restricting orifice for isolating the break. The EFCVs at Oyster Creek also include a flow restricting feature to limit reactor water flow in the event of an instrument line break but, as stated by the licensee, the accident analysis does not take credit for the flow restriction provided by the EFCVs. Thus, a failure of an EFCV is bounded by the previous analysis of an instrument line rupture. The analysis shows that the resulting offsite doses would be well below regulatory limits. Additionally, reliability data provided by the topical report and licensee document zero EFCV failures (failures to close) for Oyster Creek for over 465 valve years of operation. The licensee further stated that plant records demonstrate that there has never been a failure of an EFCV to isolate in the 30-year history of Oyster Creek.

The Oyster Creek TS change request pertains to the ability of the EFCVs to isolate for a given flow and the availability of the valves to open when required to maintain proper operation between the instrument and process. The TS surveillance requires the EFCVs to be tested every period between refueling outages (currently 24 months). TS Section 4.5K. will be revised to read, "The capability of a representative sample of instrument line flow check valves to

isolate shall be tested at least once per 24 months” to better reflect TS Definition 1.16 “Refueling Outage” duration and the revised EFCV surveillance criteria.

The term “representative sample,” with the accompanying explanation in the TS, is identical to the current usage in the STS, NUREG-1433, Revision 1. Specifically, NUREG-1433 uses the term “representative” in TS SR 3.8.6.3 in reference to battery cell testing, and “representative sample” in SR 3.1.4.2 for verification of control rod scram times. Therefore, the application of a “representative sample” for the EFCV testing SR, with its accompanying explanation in the TS, is consistent with STS usage.

Licensees make changes to their Bases without need for prior NRC review or approval. Nevertheless, the licensee has included in its submittal, for information, a revised Bases for EFCV surveillance. The revised Bases states:

The operability of the instrument line flow check valves are demonstrated to assure isolation capability for excess flow and to assure the operability of the instrument sensor when required. The representative sample consists of an approximately equal number of EFCV[s], such that each EFCV is tested at least every 10 years (nominal). In addition, the EFCVs in the sample are representative of the various plant configurations, models, sizes and operating environments. This ensures that any potentially common problem with a specific type or application of EFCV is detected at the earliest possible time. The nominal 10-year interval is based on other performance-based testing programs, such as Inservice Testing (snubbers) and Option B to 10 CFR 50, Appendix J. EFCV test failures will be evaluated to determine if additional testing in that test interval is warranted to ensure overall reliability is maintained. Operating experience has demonstrated that these components are highly reliable and that failures to isolate are very infrequent. Therefore, testing of a representative sample was concluded to be acceptable from a reliability standpoint.<sup>(9)</sup>

The staff noted that the topical report does not provide a specific failure feedback mechanism, but does state that a plant’s corrective action program must evaluate equipment failures and establish appropriate corrective actions. The BWROG responded to the staff RAI question concerning failure feedback by stating that each licensee who adopts the relaxed surveillance intervals recommended by the topical report should ensure that an appropriate feedback mechanism responsive to EFCV failures is in place.

The licensee stated that they will revise the 10 CFR 50.65 Maintenance Rule Performance Criteria for Oyster Creek to ensure EFCV performance remains consistent with the bases for the extended surveillance interval. The licensee has established a minimum performance acceptance criterion for Oyster Creek of less than or equal to 2 failures on a 24-month rolling average. The 2-year rolling average was chosen to be consistent with the current Oyster Creek Maintenance Rule Program and a 24-month refueling cycle. When the performance acceptance criterion is exceeded, a 10 CFR 50.65(a)(1) determination will be performed in accordance with station procedures. The staff considers the licensee’s program to account for potential changes in EFCV failure rates to be acceptable.

To estimate the release frequency initiated by an instrument line break, two factors are considered: (1) the instrument line break frequency downstream of the EFCV, and (2) the probability of the EFCV failing to close. The topical report calculated an instrument line break

frequency based on a WASH-1400 small pipe break failure rate of  $6.1\text{E-}12$  per hour/foot of line. The topical report assumed 100 feet for each instrument line which resulted in a frequency of  $5.34\text{E-}06$  breaks per year for a single instrument line.

The topical report provided an EFCV composite failure rate based on BWR plant data. The data represented 12,424.5 valve years of operation with a total of 11 failures noted. These failure rates are referenced as an "upper limit failure rate" in the topical report.

The topical report composite 24-month surveillance release frequency (release frequency equals a break in an instrument line concurrent with an EFCV failure to close) for one instrument line was found to be  $7.81\text{E-}09$  release/year. Increasing the surveillance interval to 10 years as proposed by the topical report increased the topical report composite release frequency for one instrument line to  $3.91\text{E-}08$  release/year.

In the review of the topical report, the staff noted the BWROG assumed the EFCV failure rate was constant over time. Additionally, the staff questioned the use of an instrument line break frequency based on WASH-1400 and not on more current data. The BWROG RAI response included an updated instrument line failure frequency of  $35.2\text{E-}06$  failures/year based on the Electric Power Research Institute's (EPRI) Technical Report No. 100380, "Pipe Failures in U.S. Commercial Nuclear Power Plants", July 1992. This value is 6.6 times greater than the WASH-1400 data. The BWROG response also assumed that the observed EFCV failures were five times the actual observed number (55 vs 11) listed in the topical report. The additional impacts of an increase in instrument line failure frequency and a five-fold increase in EFCV failures demonstrated that the topical report EFCV release frequency remained low with limited impact on release frequency.

Incorporating the EPRI instrument line failure frequency into the topical report instead of the WASH-1400 value results in a revised 24-month total plant composite release frequency of  $3.09\text{E-}06$  and a 10-year frequency of  $1.54\text{E-}05$  (based on 60 valves). The 10-year composite release frequency shows an increase of  $1.23\text{E-}05$  over the 24-month value.

Incorporating the Oyster Creek plant specific data including 60 EFCVs,  $4.07\text{E+}06$  hours operating time, zero EFCV failures (for zero failures - the Chi Squared value,  $X^2_{\alpha;2r+2}$  is 5.99 corresponding to  $2r+2$  degrees of freedom at a 0.95 confidence level with  $r$  equal to the number of failures) and the EPRI instrument line failure frequency results in a 24-month and a ten-year total plant release frequency estimates of  $1.36\text{E-}05$  release/year and  $6.81\text{E-}05$  release/year, respectively. The 10-year release frequency shows an increase of  $5.45\text{E-}05$  over the 24-month value. This represents the increase in total plant release frequency for a random break of any of the 60 instrument lines at Oyster Creek and a concurrent failure of the line's EFCV to close to isolate the break. The plant release frequencies compare favorably with the EPRI adjusted topical report total plant composite release frequencies. Additionally, if the topical report composite industry failure/operating times for the valves installed at Oyster Creek are used, the release frequencies are within the adjusted release frequencies of the topical report and staff SE. Based on the above, the staff considers the increase in estimated release frequency for a 10-year surveillance interval to be sufficiently low. This is based on the qualitative analysis that an instrument line break with a concurrent failure of an EFCV to close is not a significant contributor to core damage accidents. Based on the above, the estimated increase in the

10-year release frequency is not considered significant. Therefore, the Oyster Creek plant results are consistent with the topical report results and staff SE conclusions are therefore, acceptable.

The methodology used by the topical report for assessing the impact of an EFCV surveillance test interval increase to 10 years is consistent with industry practice, accounts for potentially unknown changes in EFCV failure rates, and is therefore, acceptable to the staff. The staff notes that the use of observed industry data for instrument line break and plant-specific EFCV failure data is adequate for assessing the proposed surveillance interval revisions. The Oyster Creek EFCV failure rates are consistent with the industry and with the results noted by the staff in the topical report. Based on the topical report results, the staff did not consider the estimated increase in release frequency to be significant.

The operational impact of an EFCV failing to close during the rupture of an instrument line connected to the reactor pressure vessel (RPV) boundary is based on environmental effects of a steam release in the vicinity of the instrument racks. The environmental impact of the failure of instrument lines connected to the RPV pressure boundary is the released steam into the reactor building. The topical report stated that the magnitude of release through an instrument line would be within the pressure control capacity of reactor building ventilation systems and that the integrity and functional performance of secondary containment following an instrument line break would be met. The licensee's analysis confirmed that an instrument line rupture outside primary containment will not result in failure of secondary containment integrity. The separation of instrument lines and equipment in the reactor building is expected to minimize the operational impact of an instrument line break on other equipment due to jet impingement. The licensee's analysis assumes plant shutdown and cooldown occur after the line break.

The radiological consequences for an instrument line break evaluated by the licensee do not credit the EFCVs for isolating the break. The evaluation assumed a discharge of reactor water through an instrument line during the detection and cooldown sequence. The assumptions of the accident analysis do not change as a result of the licensee's proposed EFCV surveillance intervals. As a result, a failure of an EFCV is bounded by the licensee's previous analysis and is consistent with the topical report results. The radiation dose consequences for an instrument line break are not impacted by the proposed change. Therefore, the NRC staff finds the proposed amendment will not involve a significant increase in the consequences of an accident previously evaluated.

#### 2.4 Review Conclusions

As demonstrated in BWROG Topical Report B21-00658-01, the impact of an increase in EFCV surveillance test interval to 10 years results in an instrument line release frequency considered by the staff to be sufficiently low, especially since the consequences of an EFCV failure are bounded by previous licensee analysis and therefore, are highly unlikely to lead to core damage. Additionally, the licensee's evaluation results including the plant-specific EFCV failure data and release frequency is consistent with the topical report composite results. The staff concludes that the release frequency associated with Oyster Creek request for relaxation of EFCV surveillance testing is sufficiently low and therefore, acceptable.

The consequences of steam release from the failure of the EFCVs is not significant, as shown by the topical report, and previous licensee analysis. Based on the acceptability of the methods

applied to estimate the release frequency, the licensee's relatively low release frequency estimate, the negligible consequence of a release in the reactor building, in conjunction with a highly unlikely impact on core damage, the staff concludes that the impact on risk associated with the Oyster Creek request for relaxation of EFCV surveillance testing is also sufficiently low and is acceptable.

The topical report established that each plant's corrective action program must evaluate equipment failures and establish appropriate corrective actions. These programs ensure that meaningful feedback data is acquired so that appropriate corrective action may be taken with regard to EFCV performance. The licensee provided input on EFCV performance criteria and the EFCV corrective action program. These were found acceptable by the staff.

Based on the above, the staff finds the relaxation of Oyster Creek EFCV surveillance frequency by allowing a representative sample of EFCVs to be tested every 24 months with all EFCVs being tested at least once every 10 years (nominal) to be acceptable.

### 3.0 STATE CONSULTATION

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

### 4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to surveillance requirements. The NRC staff has determined that the amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (65 FR 51354). Accordingly, the amendment meets 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 amendment.

### 5.0 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: C. Douth  
M. Hart

Date: October 25, 2000