



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

November 30, 2016

Mr. Bryan C. Hanson  
Senior Vice President  
Exelon Generation Company, LLC  
President and Chief Nuclear Officer  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 – ISSUANCE OF AMENDMENTS TO CHANGE TECHNICAL SPECIFICATION 3.8.1, "AC SOURCES – OPERATING," TO REVISE THE REQUIRED FUEL OIL DAY TANK VOLUME FOR EACH STANDBY DIESEL GENERATOR (CAC NOS. MF7158 AND MF7159)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 252 to Renewed Facility Operating License No. DPR-19 for Dresden Nuclear Power Station (DNPS), Unit 2, and Amendment No. 245 to Renewed Facility Operating License No. DPR-25 for DNPS, Unit 3. The amendments are in response to the Exelon Generation Company, LLC (EGC, the licensee) application dated December 14, 2015 (Agencywide Document Access and Management System (ADAMS) Accession No. ML15348A224), as supplemented by letter dated June 30, 2016 (ADAMS Accession No. ML16187A316).

The amendments modify a Technical Specification (TS) for DNPS, Units 2 and 3 by revising Surveillance Requirement (SR) 3.8.1.4 to increase the minimum required fuel oil in each standby diesel generator (EDG) day tank from the current requirement of greater than or equal to ( $\geq$ ) 205 gallons to  $\geq$  245 gallons. EGC recently characterized the existing SR as "non-conservative" when operating at extreme margins of the allowable operating conditions (i.e., 110 percent of EDG loading at 61.2 Hertz), which does not adequately support EDG operation for one hour of fuel. EGC has informed the NRC that although the current TS minimum required fuel oil volume does not support EDG operations at maximum conditions, administrative controls are in place to provide margins from the worst case fuel consumption rate. These controls will remain in place until the implementation of this proposed TS change.

The NRC staff has completed its review of the information provided by the licensee. A copy of the related safety evaluation is enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

B. Hanson

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If you have any questions concerning this licensing action, please contact me at 301-415-1129 or by e-mail at [Russell.Haskell@nrc.gov](mailto:Russell.Haskell@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'Russell S. Haskell II', written over a large, loopy oval shape.

Russell S. Haskell II, Project Manager  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosures:

1. Amendment No. 252 to DPR-19
2. Amendment No. 245 to DPR-25
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv



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

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-237

DRESDEN NUCLEAR POWER STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 252  
Renewed License No. DPR-19

1. The Nuclear Regulatory Commission (the Commission or NRC) has found that:
  - A. The application for amendment by the Exelon Generation Company, LLC (the licensee), dated December 14, 2015, as supplemented by letter dated June 30, 2016, 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 Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
  - B. The facility will operate in conformity with the application, as amended, 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 license 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 Renewed Facility Operating License No. DPR-19 is hereby amended to read as follows:

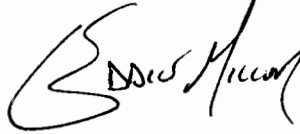
(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 252, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

Enclosure 1

3. This license amendment is effective as of the date of its issuance, and shall be implemented no later than 60 days from the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

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G. Edward Miller, Acting Chief  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications and Renewed Facility Operating License

Date of Issuance: November 30, 2016



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

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-249

DRESDEN NUCLEAR POWER STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 245  
Renewed License No. DPR-25

1. The Nuclear Regulatory Commission (the Commission or NRC) has found that:
  - A. The application for amendment by the Exelon Generation Company, LLC (the licensee), dated December 14, 2015, as supplemented by letter dated June 30, 2016, 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 Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
  - B. The facility will operate in conformity with the application, as amended, 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 license 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-25 is hereby amended to read as follows:

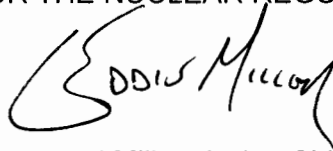
B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 245, are hereby incorporated in this renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

Enclosure 2

3. This license amendment is effective as of the date of its issuance, and shall be implemented no later than 60 days from the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "G. Edward Miller". The signature is stylized with a large, sweeping initial "G" and a long, horizontal stroke extending to the right.

G. Edward Miller, Acting Chief  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications and Renewed Facility Operating License

Date of Issuance: November 30, 2016

ATTACHMENT TO LICENSE AMENDMENT NOS. 252 AND 245

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

RENEWED FACILITY OPERATING LICENSE NOS. DPR-19 AND DPR-25

DOCKET NOS. 50-237 AND 50-249

Replace the following pages of the Renewed Facility Operating Licenses with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove

Page 3 (DPR-19)

Page 4 (DPR-25)

Insert

Page 3 (DPR-19)

Page 4 (DPR-25)

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove

Page 3.8.1-7

Insert

Page 3.8.1-7

- (2) Exelon Generation Company, LLC, pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time special nuclear materials as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Updated Final Safety Analysis Report, as supplemented and amended;
  - (3) Exelon Generation Company, LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
  - (4) Exelon Generation Company, LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
  - (5) Exelon Generation Company, LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct special nuclear materials as may be produced by the operation of the facility.
- C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:
- (1) Maximum Power Level  
  
The licensee is authorized to operate the facility at steady state reactor core power levels not in excess of 2957 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.
  - (2) Technical Specifications  
  
The Technical Specifications contained in Appendix A, as revised through Amendment No. 252, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.
  - (3) Operation in the coastdown mode is permitted to 40% power.



f. Surveillance Requirement 4.9.A.10 - Diesel Storage Tank Cleaning  
(Unit 3 and Unit 2/3 only)

Each of the above Surveillance Requirements shall be successfully demonstrated prior to entering into MODE 2 on the first plant startup following the fourteenth refueling outage (D3R14).

3. This renewed operating 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; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. Maximum Power Level

The licensee is authorized to operate the facility at steady state power levels not in excess of 2957 megawatts (thermal), except that the licensee shall not operate the facility at power levels in excess of five (5) megawatts (thermal), until satisfactory completion of modifications and final testing of the station output transformer, the auto-depressurization interlock, and the feedwater system, as described in the licensee's telegrams; dated February 26, 1971, have been verified in writing by the Commission.

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 245, are hereby incorporated into this renewed operating 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. Restrictions

Operation in the coastdown mode is permitted to 40% power.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.3 -----NOTES-----</p> <ol style="list-style-type: none"> <li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li> <li>2. Momentary transients outside the load range do not invalidate this test.</li> <li>3. This Surveillance shall be conducted on only one DG at a time.</li> <li>4. This SR shall be preceded by and immediately follow, without shutdown, a successful performance of SR 3.8.1.2 or SR 3.8.1.8.</li> <li>5. A single test of the common DG at the specified Frequency will satisfy the Surveillance for both units.</li> </ol> <p>-----</p> <p>Verify each DG is synchronized and loaded and operates for <math>\geq 60</math> minutes at a load <math>\geq 2340</math> kW and <math>\leq 2600</math> kW.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.4 Verify each day tank contains <math>\geq 245</math> gal of fuel oil and each bulk fuel storage tank contains <math>\geq 10,000</math> gal of fuel oil.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.8.1.5 Remove accumulated water from each day tank.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)



UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING PROPOSED REVISION TO TECHNICAL SPECIFICATION 3.8.1,

"AC SOURCES – OPERATING"

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

EXELON GENERATION COMPANY, LLC

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

By letter dated December 14, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15348A224), as supplemented by letter dated June 30, 2016 (ADAMS Accession No. ML16187A316), Exelon Generation Company, LLC (EGC, the licensee) requested NRC approval to modify the Technical Specifications (TSs) for Dresden Nuclear Power Station (DNPS), Units 2 and 3.

The proposed amendment would revise TS 3.8.1, "AC Sources – Operating," Surveillance Requirement (SR) 3.8.1.4 to increase the standby, or emergency diesel generator (EDG), fuel oil day tank SR minimum volume requirements.

The supplemental letter dated June 30, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* (FR) on March 1, 2016 (81 FR 10680).

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criterion (GDC) 17, "Electric power systems," requires, in part, that onsite and offsite electric power systems be provided with sufficient capacity and capability to permit functioning of structures, systems, and components (SSCs) important to safety.

As described in the DNPS Updated Final Safety Analysis Report (UFSAR) Section 3.1, DNPS is designed based on the draft proposed "General Design Criteria for Nuclear Power Plant Construction Permits" issued by the Atomic Energy Commission in July 1967. Section 3.1.2.2.8 of the DNPS UFSAR discusses to what extent the DNPS design meets the requirement of 10 CFR Part 50, Appendix A, GDC 17.

The DNPS UFSAR states:

An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety functions for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences, and (2) the core is cooled and containment integrity and other vital functions are maintained in the [e]vent of postulated accidents.

The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights-of-way) designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a LOCA to assure that core cooling, containment integrity and other vital safety functions are maintained.

Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.

10 CFR 50.36, "Technical Specifications," paragraph 50.36(c)(3) requires that TSs include SRs, which "are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

10 CFR 50.55a, "Codes and standards," provides, in part, that systems and components be designed, fabricated, erected, tested, and inspected to quality standards commensurate with the safety function to be performed. The regulations in 10 CFR 50.55a(h)(2) and (3) require that reactor protection and safety systems satisfy the criteria in the Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 603-1991, "Criteria for Safety Systems for Nuclear Power Generating Stations" (including a correction sheet dated January 30, 1995), or in IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations." The criteria in these IEEE standards require, in part, that: "Safety system equipment shall be designed, manufactured, inspected, installed, tested, operated, and maintained in accordance with a prescribed quality assurance program (ANSI/ASME NQA1-1989)."

Additional guidance used by the NRC staff to evaluate the licensee's application, included:

Regulatory Guide (RG) 1.137-2013 (Revision 2)<sup>1</sup>, "Fuel Oil Systems for Emergency Power Supplies" (ADAMS Accession No. ML12300A122), which describes updated methods that the NRC staff considers acceptable for use in complying with the Commission's regulatory requirements associated with emergency diesel generator fuel oil systems.

RG 1.137-2013 states:

[t]he regulatory framework the NRC has established for nuclear power plants consists of a number of regulations and supporting guidelines applicable to the diesel and diesel-fueled gas turbine generators and their components in the onsite electric power system. Title 10, of the *Code of Federal Regulations*, Part 50, "Domestic Licensing of Production and Utilization Facilities" (10 CFR Part 50), Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criteria (GDC) 17, "Electric Power Systems," requires, in part, that an onsite electric power system be provided to permit functioning of structures, systems, and components (SSCs) important to safety. GDC-17 also requires that the onsite electric power supplies shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. The onsite electrical power system includes standby power sources, distribution systems, and vital auxiliary supporting systems to supply power to SSCs important to safety. When a commercial nuclear power plant uses diesel fueled generators as part of their standby power source for the onsite electric power system, the diesel fueled generators and related components, including the fuel oil, are classified as safety-related equipment. The safety-related diesel fueled generators in the onsite electric power system are required to provide electric power to safety related SSCs in the event of a postulated accident and, as such, are commonly referred to as emergency diesel generators (EDGs).

Since the fuel oil (FO) for the EDGs is a safety-related component, it is subject to the quality control requirements identified in 10 CFR 50.55a, and must be tested and inspected to quality standards commensurate with the safety function to be performed. Sampling the diesel FO is one method of testing the safety-related component to verify that it is capable of performing its design function. RG 1.137-2013 (Revision 2) endorses, in part, the sampling plan in American National Standards Institute (ANSI), American Nuclear Society (ANS) (ANSI/ANS) Standard 59.51-1997, "Fuel Oil Systems for Safety-Related Emergency Diesel Generators," (reaffirmed in October 2007), and American Society for Testing and Materials (ASTM) D975-13, "Standard Specification for Diesel Fuel Oils" as acceptable methods of verifying the quality of the FO and FO systems used in these safety-related applications at nuclear power plants.

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<sup>1</sup> Regulatory Guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

### 3.0 TECHNICAL EVALUATION

#### 3.1 System Description

The EDG (or standby diesel generator) systems at DNPS produce alternating current (AC) power at a voltage and frequency compatible with normal bus requirements. DNPS Unit 2 and Unit 3 each have a dedicated EDG sized to carry the Emergency Core Cooling System (ECCS) power requirements on its respective unit or supply the necessary electrical power for a safe shutdown of the unit. A third EDG is shared by Units 2 and 3 (Unit 2/3 DG). The primary basis for using an EDG system is to provide an independent source of onsite electric power for the station auxiliaries. The EDG system is provided to guard against the contingency of the concurrent forced outage of all normal sources of power. Each DNPS EDG is rated for 2600 kilowatts (kW) at continuous operation. Each EDG has a 2000-hour, 10% overload rating of 2860 kW. Each EDG supplies electrical power to the various DNPS 4160 AC volt buses.

There are 3 separate safety-related and seismically qualified FO storage and transfer systems at DNPS, one for each EDG. Each storage and transfer system includes a 15,000-gallon underground diesel fuel oil storage tank and a 750-gallon FO day tank<sup>2</sup>. The day tank and the piping and equipment downstream of the day tank are classified as safety-related.

Fuel is transferred from the 15,000-gallon FO storage tank to the 750-gallon FO day tank with the diesel oil transfer pump. Transfer is accomplished automatically by level switches on each day tank. Each day tank contains sufficient FO to sustain EDG operation for 1 hour of operation, at rated load. Each day tank is configured such that the minimum normal operating level in the tank is above the low level alarm setpoint. The station's FO consumption test procedure includes a verification step to ensure that each day tank sight glass level indicates  $\geq 350$  gallons of volume upon receipt of the "LO ALARM" which is set above the minimum required 1 hour fuel storage level. The licensee's submittal states:

[a]ctual test results have shown that the fuel oil day tank level "LO ALARM" typically actuates with approximately 457 gallons of fuel oil in the associated day tank.

The licensee's test procedure ensures that each day tank volume is sufficient to provide a minimum of 1 hour of FO for operation of the associated EDG at 110 percent of rated load. The FO transfer system provides FO to the day tank for EDG operation beyond the one-hour supply of the day tank. The configuration of the system is such that the minimum normal operating level in the day tank is above the low level alarm setpoint. The low level alarm setpoint is maintained above the minimum required 1 hour fuel storage level. This ensures that the day tank provides a minimum 1 hour of fuel for operation of the diesel generator at 10% above rated load.

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<sup>2</sup> UFSAR Section 9.5.4 states there is a total onsite diesel fuel oil storage capacity of 47,250 gallons at DNPS.

### 3.2 Proposed Change to Technical Specification

The current TS SR 3.8.1.4 states:

Verify each day tank contains  $\geq 205$  gal of fuel oil and each bulk fuel storage tank contains  $\geq 10,000$  gal of fuel oil.

The licensee's submittal includes an engineering evaluation and a determination that the calculated EDG FO consumption rate is 211 gallons per hour (gph) at allowable voltage and frequency levels. The current TS SR 3.8.1.4 FO day tank volume requirement (which establishes the bases for this amendment request) of  $\geq 205$  gallons is, therefore, inadequate to provide one hour of EDG operation at 110 percent of full load at a maximum frequency of 61.2 Hertz (Hz). The licensee has characterized the current SR to be "non-conservative" and has proposed to increase the minimum FO volume SR in each DNPS FO day tank to be  $\geq 245$  gallons. The licensee states in its submittal that, although the TS minimum required FO volume is inadequate to support the above-specified operating conditions, administrative controls have been put into place to provide margins from the worst case consumption rate. These controls are in place until the proposed TS change takes effect.

### 3.3 NRC Evaluation of Proposed Technical Specification Change

#### 3.3.1 EDG Day Tank Surveillance Requirement Minimum Volume

The licensee stated that in accordance with SR 3.8.1.6, the diesel FO transfer pump is tested every two years for each of the three DNPS EDGs to verify each pump operates automatically to transfer FO from the storage tank to the day tank. During this surveillance, the licensee performs an EDG FO consumption test to verify that the actual consumption rate is below the values specified on the engine manufacturer's fuel consumption curve. Test results from 2008 to the present time, using Ultra Low Sulfur Diesel (ULSD) FO with an American Petroleum Institute (API) gravity of 32 – 34 (60°F) have shown the FO consumption rates for the Unit 2 and Unit 3 EDGs as 95 percent of the rate specified on the EDG manufacturer's FO consumption curve, and the shared Unit 2/3 EDG FO consumption rate as 97 percent of the EDG manufacturer's specified rate.

As discussed above, the licensee performed an engineering evaluation and concluded that, when the EDG is operating at the extreme margin of allowable operating conditions, the FO day tank current minimum FO volume is insufficient to support EDG operation for one hour. Based on the engineering evaluation, the licensee determined that, when the EDG output is determined to be 3035 kW (based on 2600 kW continuous rating x 1.1 overload factor x  $(61.2/60.0)^3$  over frequency factor) the corresponding FO consumption rate is 211 gallons per hour (gph) versus 205 gph.

The proposed revision to SR 3.8.1.4 would change the EDG day tank surveillance requirement minimum volume from  $\geq 205$  gallons to  $\geq 245$  gallons of FO. This is based on the above-discussed FO consumption rate of 211 gph plus an additional 16 percent, which is added as margin to address any variances in future FO changes, such as the use of biodiesel which has the potential to adversely affect EDG FO consumption rates.

By letter dated June 30, 2016, the licensee responded to the NRC staff's request for information associated with the FO consumption rate and EDG loading. The licensee's response provided information regarding the basis of the FO consumption rate of 211 gph corresponding to the EDG loading of 3035 kW. The licensee's calculated FO consumption rate was an extrapolation of the FO consumption versus kW curve provided in Figure 9.5-3 of the DNPS UFSAR. In the same letter, the licensee provided the staff with the EDG manufacturer-provided FO consumption versus kW curve.

#### 3.3.1.1 Conclusion

Based on its evaluation of the licensee's analysis, as discussed above, the NRC staff has determined that the licensee's analysis is accurate and consistent with the information provided in the DNPS UFSAR. Additionally, the NRC staff has determined that the licensee's evaluation to derive an FO consumption rate of 211 gph (based on maximum engine loading) and factoring in added margin to support any future fuel variances, is acceptable to support the proposed TS revision.

#### 3.3.2 Use of Biodiesel

By letter dated June 30, 2016, the licensee responded to the NRC staff's request for information related to whether the actual FO consumption rate, and the FO consumption rate curve provided by the manufacturer, takes into account the potential use of up to 5 percent biodiesel as is allowed by ASTM D975, since biodiesel FO has the potential to impact the FO consumption rate. The licensee included in its response that new FO receipts are tested in accordance with ASTM D7371-01, "Standard Test Method for Determination of Biodiesel (Fatty Acid Methyl Esters) Content in Diesel Fuel Oil Using Mid Infrared Spectroscopy (FTIR-ATR-PLS Method)," to verify that the biodiesel content in the FO is less than 0.1 percent. If sampling (new shipments or stored) identifies FO with a biodiesel content greater than 0.1%, the FO will be restored to within established acceptance criteria as part of the DNPS Chemistry Department procedures. The licensee stated in its submittal that DNPS strives to control the biodiesel content in the FO to below 0.1 percent to ensure that there are no appreciable effects on engine performance, power, or excessive FO consumption rates.

##### 3.3.2.1 Conclusion

The NRC staff has determined that maintaining biodiesel concentration levels in the DNPS EDG FO system to below 0.1 percent results in no appreciable effects on engine performance, as addressed above. Following the staff's review of licensee-furnished information regarding biodiesel chemistry controls, the staff found that the biodiesel concentrations in the FO at DNPS are being acceptably managed. Therefore, the staff has concluded that the licensee's management of biodiesel concentration levels in the FO at DNPS supports the proposed TS revision.

#### 3.3.3 Fuel Oil Gross Heat Values, API Gravity, and Fuel Oil Consumption Rate

The Clean Air Act mandated reductions in sulfur content of diesel fuels to 15 parts per million (ppm) sulfur. The refining industry phased in a change from Low Sulfur Diesel (S500, < 500 ppm) to ULSD FO (S15, < 15 ppm sulfur) from 2006 to 2014. The energy content (British thermal unit per pound (BTU/lb.)), or "Higher Heating Value" (HHV), of ULSD FO may be less



than low sulfur diesel FO, such that engines supplied using ULSD FO may have higher FO consumption rates to meet engine design requirements.

By letter dated June 30, 2016, the licensee responded to the NRC staff's request for information regarding how the use of ULSD FO is factored into the gross heat values in Table 1 of the licensee amendment request (LAR). The licensee stated that it has used ULSD FO for the DNPS Units 2 and 3 EDGs since 2007. Additionally, the licensee's response provided a graph plotting the FO test results for ULSD FO samples from across the Exelon nuclear fleet over a three year period. The graph denotes API gravity versus heat content (BTU/gallon). Also plotted on the graph, for comparison purposes, are the heating values of typical S500 diesel fuel published by the National Bureau of Standards (NBS)<sup>3</sup> in "Miscellaneous Publications of the Bureau of Standards, Nos. 91-107," Publication No. 97, "Thermal Properties of Petroleum Products," which exhibits heat value data of ULSD FO which correlates well with S500 FO of similar API gravity. ULSD is approximately 1 percent lower when compared to the heat values from NBS Publication No. 97. The heating values shown in Table 1 of the LAR are based solely on typical industry-published S500 FO data. Therefore, the gross heat values provided in the Table 1 of the LAR are assumed to be approximately 1 percent lower for ULSD FO.

The licensee also stated that the actual FO consumption rates for the DNPS EDGs are determined from surveillance testing and are based on the ULSD FO used at DNPS. The FO acceptance tests have shown that the FO received has API gravity values of 32 to 34 (at 60°F), which is in the DNPS acceptable range of greater than or equal to an API gravity of 27 and less than or equal to an API gravity of 39. The BTU/gallon information provided in Table 1 in the LAR is used to conservatively adjust the observed FO consumption rates, which are based on an API gravity of 32 to 39 due to the difference in the gross heat values.

The licensee used BTU/gallon heat values in Table 1 of the LAR to adjust the observed FO consumption rates to an API gravity value of 39. The NRC staff finds this to be acceptable because it results in built-in conservatism. The heat value for FO with an API gravity of 39 is less than the heat value for FO with an API gravity in the 32 to 34 range, which, as discussed above, is part of the licensee's acceptance criteria for FO at DNPS.

In the LAR, the licensee stated that, based on the DNPS shared Unit 2/3 EDG FO consumption rate test data, the FO consumption rate corresponding to an API gravity of 39 is equal to 100 percent of the fuel consumption rate specified on the engine manufacturer's FO consumption curve. The FO consumption rate test data conservatively cover the range of API gravity values allowed by the Dresden Diesel Fuel Oil Testing Program. The test data for shared Unit 2/3 EDG also bound the FO consumption test data for the Unit 2 and Unit 3 EDGs.

#### 3.3.3.1 Conclusion

The NRC staff has reviewed the licensee's evaluation of the gross heat values, gravity, and consumption rate, and finds the evaluation to be reasonable. The staff determined that the licensee's analysis of the gross heat value of ULSD FO was consistent with industry data. Since the licensee's FO receipt acceptance criteria at DNPS is based on an API gravity of 32 to 34 instead of an API gravity of 39 (which was used in the calculations to determine the fuel oil consumption rate), the staff found that the licensee factored in conservative margins which

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<sup>3</sup> The National Bureau of Standards was renamed the National Institute of Standards and Technology (NIST) in 1988.

supports the proposed revision to the TS. Therefore, the NRC staff concludes that the licensee has acceptably accounted for FO heat values, API gravity, and FO consumption rates to support the proposed TS change.

### 3.4 Overall Conclusion

Based on the above, the NRC staff has determined that the proposed amendment to revise TS SR 3.8.1.4 is consistent with the requirements in 10 CFR 50.36, and will have no impact on the licensee's compliance with GDC 17, as incorporated in the DNPS UFSAR. Therefore, the staff concludes that the proposed TS change is acceptable and is consistent with the NRC's regulations.

### 4.0 STATE CONSULTATION

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

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 or changes an SR. 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 (81 FR 10680, dated March 1, 2016) and there has been no public comment on such finding. 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.

### 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) there is reasonable assurance that 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 Contributors:       RWolfgang, NRR/EPNB  
   VGoel, NRR/EEEB

Date of issuance: November 30, 2016

B. Hanson

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If you have any questions concerning this licensing action, please contact me at 301-415-1129 or by e-mail at [Russell.Haskell@nrc.gov](mailto:Russell.Haskell@nrc.gov).

Sincerely,

/RA/

Russell S. Haskell II, Project Manager  
Plant Licensing Branch III-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosures:

1. Amendment No. 252 to DPR-19
2. Amendment No. 245 to DPR-25
3. Safety Evaluation

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