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

December 2, 2015

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

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3 - REQUEST FOR 10 CFR 20.2002 ALTERNATE DISPOSAL APPROVAL (CAC NOS. MF3644 AND MF3645)

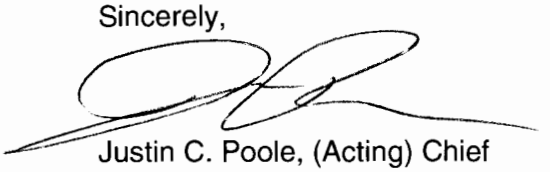
Dear Mr. Hanson:

By application dated March 18, 2014, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14077A140), as supplemented by letters dated May 20, and June 8, 2015 (ADAMS Accession Nos. ML15140A728 and ML15163A304), Exelon Generation Company, LLC (the licensee) requested the U.S. Nuclear Regulatory Commission's (NRC or Commission) approval for the onsite disposal of contaminated soil at the Dresden Nuclear Power Station (DNPS), Units 2 and 3. The proposed action would allow DNPS to land-spread a current inventory of approximately 6,000 cubic meters (m^3) of soil containing trace quantities of radionuclides and to conduct future disposal operations onsite, within the bounds of the radiological dose assessment provided in the application, not to exceed a total disposal volume of 20,000 m^3 of soil and sludge containing trace quantities of radionuclides. The licensee's request is in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 20, Section 20.2002, "Method for obtaining approval of proposed disposal procedures."

The NRC staff has reviewed the licensee's application and has determined, based on the enclosed safety evaluation, the licensee's proposed action to perform soil and sludge disposal activities at DNPS is acceptable. Therefore, the NRC approves the licensee's request to make onsite transfers of up to 20,000 m^3 of soil and sludge containing trace quantities of radionuclides at the specified DNPS location, provided the disposal activities are accomplished in accordance with the licensee's application as supplemented. Furthermore, the licensee is reminded that the license termination rule (LTR) requires that the dose contribution from all onsite disposals be accounted for at the time of license termination to meet the criteria for decommissioning in 10 CFR, Part 20, Subpart E, per the requirements of 10 CFR 50.82 (a)(11)(ii).

In accordance with 10 CFR 2.390, a copy of this letter will be available for public inspection in the NRC Public Document Room or from the Publicly Available records component in ADAMS and is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,



Justin C. Poole, (Acting) Chief
Plant Licensing Branch III-2 and
Planning and Analysis Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249

Enclosure:
Safety Evaluation

cc w/enclosure:

Distribution via Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO LICENSEE REQUEST FOR

ONSITE DISPOSAL OF CONTAMINATED SOIL

EXELON GENERATION COMPANY, LLC

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

By application dated March 18, 2014, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14077A140), as supplemented by letters dated May 20, 2015 and June 8, 2015 (ADAMS Accession Nos. ML15140A728 and ML15163A304), Exelon Generation Company, LLC (the licensee) requested the U.S. Nuclear Regulatory Commission's (NRC or Commission) approval for the onsite disposal of soil containing trace quantities of radionuclides at the Dresden Nuclear Power Station (DNPS), Units 2 and 3, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 20.2002, "Method for obtaining approval of proposed disposal procedures."

2.0 REGULATORY EVALUATION

2.1 Licensee's Proposed Action

The proposed action would allow DNPS to land-spread a current inventory of approximately 6,000 cubic meters (m^3) of soil and sludge containing trace quantities of radionuclides and to conduct future disposal operations onsite, within the bounds of the radiological dose assessment provided in the application, but not to exceed a total disposal volume of 20,000 m^3 of contaminated soil and sludge. The designated disposal site, located in the Owner Controlled Area north of DNPS, would measure 100 meters (m) (328 feet (ft.)) X 100 m (328 ft.) X 2m (~6.5 ft.) in depth. All soil and sludge deposits to the designated on-site disposal area will be sampled and evaluated by the licensee to ensure compliance with the proposed procedural requirements.

The licensee states in the application that it will limit the disposal to waste containing licensed material that does not exceed the derived concentration guideline levels (DCGLs), with the sum of fractions (SOF) rule applied, as described in Attachment 2, Enclosure 1, "Single Soil DCGL that Results in 25 mrem/yr [millirem per year] to an Average Member of the Critical Group," of the submittal. The application states that the average concentration of the disposed licensed

material will be kept to less than or equal to 20 percent of the DCGLs to adhere to as low as reasonably achievable (ALARA) radiological dose principles.

2.2 Regulatory Requirements and Guidance

The licensee's application was submitted in accordance with the regulatory requirements of 10 CFR 20.2002. NUREG–1757, Volume 1, Revision 2, "Consolidated Decommissioning Guidance, Decommissioning Process for Materials Licensees," Section 15.12, "Onsite Disposal of Radioactive Materials Under 10 CFR 20.2002," dated September 2006, provides guidance and criteria used by the NRC staff for reviewing applications under 10 CFR 20.2002, which is applicable to power reactor licensees.

NUREG-1757 states that the NRC will approve onsite disposal based on a dose criterion of a few millirem per year (i.e., a total effective dose equivalent (TEDE) of 0.05 millisieverts per year (5 mrem/yr) or less). By generally constraining doses from onsite disposal to a few millirem per year, it is likely that an entire site will meet the requirements in 10 CFR 20, Subpart E, "Radiological Criteria for License Termination," without the need to remediate an onsite disposal area.

Although not required, the licensee used the criteria in 10 CFR 20.1402, "Radiological criteria for unrestricted use," to support the application. Section 20.1402 of 10 CFR states:

> A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year, including that from groundwater sources of drinking water, and the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels which are ALARA must take into account consideration of any detriments, such as deaths from transportation accidents, expected to potentially result from decontamination and waste disposal.

3.0 TECHNICAL EVALUATION

The licensee's proposed action will use a disposal site measuring up to 20,000 m^3 (100 m X 100 m X 2 m) located in the Owner Controlled Area on the north side of the DNPS site. The licensee's submittal states, that for modeling purposes, the soil will have a homogeneous radionuclide concentration throughout the 20,000 m^3 of soil. The materials proposed for disposal will remain within the DNPS Owner Controlled Area. The nearest other potentially affected licensed or unlicensed facility is the General Electric boiling-water reactor spent fuel storage facility which is approximately 0.7 miles to the southwest of DNPS. The licensee stated that no impact to this facility or any other licensed or unlicensed facility is expected.

The NRC staff reviewed the licensee's dose criteria and proposed procedures for the onsite disposal for waste containing licensed material. These criteria and procedures would cover both current and future inventory. In addition, the staff reviewed the licensee's evaluation of its disposal procedures and dose criteria and compared it to the current inventory of soil for disposal.

3.1 Evaluation of Disposal Procedures and Dose Criteria

The licensee evaluated three likely exposure scenarios to determine the critical group associated with the site upon license termination. These exposure scenarios included the resident farmer, industrial worker, and recreationalist. The licensee calculated conservative single-soil DCGLs for each exposure scenario using RESRAD, Version 6.5, a commonly used dose assessment computer code, with a combination of site-specific and default parameter values. Based on the RESRAD analyses, the licensee determined the resident farmer scenario to be the most restrictive exposure scenario and was used as the basis for the dose assessment calculations. The staff considered the industrial worker as the most realistic scenario based on current conditions and anticipated conditions in the reasonably foreseeable future. Although the resident farmer was identified as being the most restrictive exposure scenario, the staff consider this scenario to be unlikely, but plausible.

Attachment 2, Enclosure 1, of the submittal includes a table containing all of the radionuclides and their resident farmer single soil DCGL values. The table also includes the most sensitive exposure pathway for each radionuclide, which was established by determining which pathway contributed most to the dose in the year in which the most restrictive DCGL was calculated. The NRC staff confirmed that the licensee used NRC-approved methods to identify the radionuclides anticipated to be in the soil and sludge disposed onsite and that the site-specific, single-soil DCGLs provided in Attachment 2, Enclosure 1, of the application are acceptable.

As stated above, the licensee will limit the average concentration of the disposed licensed material to less than or equal to 20 percent of the DCGLs with the SOF rule applied to meet ALARA principles. In addition, the application states that the materials will be sampled and evaluated prior to disposal to ensure compliance with the licensee's procedural requirements, including this limit. The NRC staff position, as stated in NUREG-1757, is that onsite disposal of licensed material will generally be approved if the dose is limited to a few millirem per year. The licensee's proposed procedural requirements for meeting ALARA will ensure that the dose is limited to no more than 5 mrem/yr. Based on this, the NRC staff finds that the licensee's plan to sample and evaluate material against its procedural requirements for onsite disposal is adequate to meet ALARA principles and meets the NUREG-1757 guidance, including limiting the dose to a few millirem per year.

3.2 Evaluation of Current Soil Inventory

The licensee collected and analyzed 10 samples from the initial accumulated inventory of 6000 m^3 of soil. Based on historical analyses of the site the licensee determined that Co [cobalt]-60 and Cs [cesium]-137 were the two primary radionuclides of concern. The Cs-137 concentrations include background contributions in the environment resulting from previous human activities (e.g., fallout from nuclear tests). Other radionuclides, including naturally occurring radionuclides, were also analyzed but determined to be less than the minimum detectable activity. Table 1 below (adapted from Attachment 2 of licensee's submittal) includes both the average and maximum concentrations of the radionuclides measured from the samples collected.

Table 1 – Summary of Sample Results from Current Soil Inventory

Radionuclide	Average Concentration (pCi/g)	Maximum Concentration (pCi/g)
K [potassium]-40*	1.02	11.7
Co [cobalt]-60	0.176	0.401
Cs [cesium]-137	1.03	2.33
Ra [radium]-226*	1.35	1.35
Th [thorium]-232*	0.348	0.481
U [uranium]-235*	0.0817	0.0817

*Naturally occurring radionuclides

Using the resident farmer DCGLs and considering ALARA radiological dose principles, the licensee used the SOF approach discussed in NUREG-1757, Volume 2, Revision 1, to demonstrate that the average concentrations of Co-60 and Cs-137 for the current soil inventory met the criteria in 10 CFR 20.1402. The application states that the DCGLs were calculated assuming that the resident farmer would receive a maximum of 0.25 mSv/yr (25 mrem/yr), which is equivalent to an SOF value of 1.0. However, to demonstrate adherence to ALARA radiological dose principles, the licensee proposes a maximum dose rate of 0.05 mSv/yr (5 mrem/yr) for the site, meaning the calculated SOF must be less than or equal to 0.2 (20 percent of DCGL). The licensee calculated a SOF value of 0.156 (3.9 mrem/yr) using the sample results in Table 1, which is less than the licensee's established upper limit of 0.2 for ALARA radiological dose purposes.

The NRC staff evaluated the dose analyses provided by DNPS and confirmed its results. Using RESRAD, Version 6.5, the staff used a combination of site-specific and default parameter values as well as the site-specific DCGL values of 0.56 pCi/g for Co-60 and 2.2 pCi/g for Cs-137 to perform these dose calculations. The staff confirmed that individually these isotope concentrations resulted in a dose rate equal to 0.05 mSv/yr (5 mrem/yr) for the resident farmer scenario.

The NRC staff also performed additional analyses, using Co-60 and Cs-137 isotope concentrations that would greatly exceed the licensee's criteria for disposal, to further evaluate potential impacts from the proposed onsite disposal of the contaminated soil and sludge to both an industrial worker and a resident farmer. With both Co-60 and Cs-137 present at the DCGL values, the staff calculated a dose rate of 0.027 mSv/yr (2.7 mrem/yr) for an industrial worker and 0.1 mSv/yr (10 mrem/yr) for the resident farmer. Using the maximum concentrations of Co-60 and Cs-137 identified in the current soil inventory (see Table 1), the staff calculated a dose rate of 0.23 mSv/yr (2.3 mrem/yr) to an industrial worker and 0.88 mSv/yr (8.8 mrem/yr) to a resident famer. Thus, in the hypothetical situation where the Co-60 and Cs-137 isotope concentrations greatly exceed the licensee's disposal criteria, the staff's analysis show that the more realistic industrial worker scenario continues to result in a dose rate of no more than a few millirem per year. The analysis further show that, under this hypothetical situation, the limiting resident farmer scenario dose rate results remain well below the 0.25 mSv/yr (25 mrem/yr) dose standard in 10 CFR 20.1402.

The NRC staff evaluated the licensee's methodology and calculations used in support of the proposed plan for onsite disposal of soil at DNPS. Specifically, the staff confirmed that doses calculated based on radionuclide concentrations measured in soil samples collected at DNPS do not exceed the 10 CFR 20.1402 TEDE dose limit of 0.25 mSv/yr (25 mrem/yr). The NRC staff also confirmed that the average radionuclide concentrations of Co-60 and Cs-137 were

less than the DCGL for each radionuclide. Based on these evaluations, the NRC staff has determined that the licensee's proposed plan for onsite disposal of its current inventory of soil and sludge containing trace quantities of radionuclides, as described in the application, is acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

The NRC staff finds that the licensee's request 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 Finding of No Significant Impact as published in the *Federal Register* on October 5, 2015 (80 FR 60183).

Pursuant to the regulatory requirements as set forth in 10 CFR 51.30; "Environmental Assessment," the NRC staff determined no Environmental Impact Statement was required for this application.

5.0 CONCLUSION

Based on the above, the NRC staff has determined that the licensee's proposed action to perform on-site soil and sludge disposal activities at DNPS is acceptable. Therefore, the NRC approves the licensee's request for the onsite disposal of up to 20,000 m^3 of soil and sludge, at the specified on-site DNPS disposal area, provided the disposal activities are accomplished in accordance with the licensee's application as supplemented.

Principal Contributor: Adam Schwartzman

Date of issuance: December 2, 2015.

In accordance with 10 CFR 2.390, a copy of this letter will be available for public inspection in the NRC Public Document Room or from the Publicly Available records component in ADAMS and is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Sincerely,

/RA/

Justin C. Poole, (Acting) Chief
Plant Licensing Branch III-2 and
Planning and Analysis Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-237 and 50-249

Enclosure:
Safety Evaluation

cc w/enclosure:

Distribution via Listserv

DISTRIBUTION:
PUBLIC
LPL3-2 R/F
RidsACRS_MailCTR Resource
RidsRgnIIIMailCenter Resource
RidsNrrDorl Resource
RidsNrrLASRohrer Resource
RidsOpaMail Resource
RidsNrrPMDresden Resource
RidsNrrDlrRerb Resource
RidsNmssOd Resource
RidsNrrDraArcb

Accession Number: (NRR-106) ML14353A033

OFFICE	NRR/LPL3-2/PM	NRR/LPL3-2/LA	NMSS/RDB/BC	NRR/LPL3-2/PM
NAME	RHaskell	SRohrer	BWatson	BPurnell
DATE	10/30 /15	11/2/15	11/3/15	11/3/15
OFFICE	OGC	NRR/LPL3-2/BC		
NAME	EHouseman	JPoole		
DATE	11/30/15	12/2/15		

OFFICIAL RECORD COPY