AmerGen SM

An Exelon Company
AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

www.exeloncorp.com

Exelon Nuclear

Exelon Generation
4300 Winfield Road
Warrenville, IL 60555

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Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket Nos. 50-461

Dresden Nuclear Station, Units 1, 2 and 3
Facility Operating License No. DPR-2
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-10, 50-237, 50-249 and 72-37

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. STN 50-373 and STN 50-374

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Oyster Creek Generating Station
Facility Operating License No. DPR-16
NRC Docket Nos. 50-219 and 72-15

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Peach Bottom Atomic Power Station, Units 1, 2 and 3
Facility Operating License No. DPR-12
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-171, 50-277, 50-278 and 72-1027

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254, 50-265

Three Mile Island Nuclear Station, Unit 1
Facility Operating License No. DPR-50
NRC Docket Nos. 50-289

Subject: Application to Use Weighting Factors for External Exposure

Pursuant to 10 CFR Part 20.1003, "Definitions - Weighting factor w_T," Exelon Generation Company, LLC (Exelon) and AmerGen Energy Company, LLC (AmerGen) hereby request approval to use weighting factors for calculating external whole body dose. The evaluation supporting this application is provided as an enclosure to this letter.

Specifically, Exelon/AmerGen requests NRC approval to apply the weighting factors specified in the consensus technical standard, American National Standard Institute/Health Physics Society, ANSI/HPS N13.41-1997, "Criteria for Performing Multiple Dosimetry," to assign Total Effective Dose Equivalent from external sources of radiation. As described in the application, approval would improve the assessment of occupational dose to individuals from exposure to highly non-uniform radiation fields.

The technical basis for this application is the consensus technical standard approved by the American National Standards Institute – Accredited HPS N13 Committee. The standard is practical and consistent with the organ or tissue weighting factors in 10 CFR Part 20.1003.

Approval of this request will allow Exelon/AmerGen to proceed with procedure changes to use weighting factors for calculating external whole body dose in planned refueling outages. Therefore, Exelon/AmerGen requests approval of this application by February 15, 2006 in order to support use during the Spring 2006 refueling outages.

If any additional information is needed, please contact Mr. David J. Distel at (610) 765-5517.

Sincerely,

Pamela B. Cowan
Director – Licensing & Regulatory Affairs
Exelon Generation Company, LLC
AmerGen Energy Company, LLC

Enclosure: Evaluation of the Use of Weighting Factors For External Exposure

cc: Regional Administrator - NRC Region I
Regional Administrator - NRC Region III
NRC Project Manager, NRR - Braidwood Station
NRC Project Manager, NRR - Byron Station
NRC Project Manager, NRR - Clinton Power Station
NRC Project Manager, NRR - Dresden Nuclear Power Station
NRC Project Manager, NRR - LaSalle County Station
NRC Project Manager, NRR - Limerick Generating Station
NRC Project Manager, NRR - Oyster Creek Generating Station
NRC Project Manager, NRR - Peach Bottom Atomic Power Station
NRC Project Manager, NRR - TMI Unit 1
NRC Project Manager, NRR - Quad Cities Nuclear Power Station
NRC Senior Resident Inspector - Braidwood Station
NRC Senior Resident Inspector - Byron Station
NRC Senior Resident Inspector - Clinton Power Station
NRC Senior Resident Inspector - Dresden Nuclear Power Station
NRC Senior Resident Inspector - LaSalle County Station
NRC Senior Resident Inspector - Limerick Generating Station
NRC Senior Resident Inspector - Oyster Creek Generating Station
NRC Senior Resident Inspector - Peach Bottom Atomic Power Station
NRC Senior Resident Inspector - TMI Unit 1
NRC Senior Resident Inspector - Quad Cities Nuclear Power Station
Illinois Emergency Management Agency - Division of Nuclear Safety
Director, Bureau of Radiation Protection - Pennsylvania Department of Environmental Resources
Director, Bureau of Nuclear Engineering, New Jersey Department of Environmental Protection
Chairman, Board of County Commissioners of Dauphin County, PA
Chairman, Board of Supervisors of Londonderry Township, PA
Mayor of Lacey Township, Forked River, NJ
R. I. McLean, State of Maryland
R. R. Janati, Commonwealth of Pennsylvania
K. N. Jabbour, NRC Project Manager, NRR - (Exelon/AmerGen Fleet)

ENCLOSURE

EVALUATION OF THE USE OF WEIGHTING FACTORS FOR EXTERNAL EXPOSURE

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1.0 INTRODUCTION

1.1 PURPOSE

Pursuant to 10 CFR Part 20.1003, "Definitions - Weighting factor W_T," Exelon/AmerGen hereby requests NRC approval to use weighting factors for calculating external whole body dose.

Specifically, Exelon/AmerGen requests NRC approval to use weighting factors specified in American National Standard Institute/Health Physics Society, ANSI/HPS N13.41-1997, "Criteria for Performing Multiple Dosimetry," for assessing effective dose equivalent (EDE) based on direct measurement of external exposures using personnel dosimeters. The assigned EDE is the sum of each dosimeter measurement modified by its appropriate weighting factor.

Exelon/AmerGen's application seeks approval to calculate the external dose quantity EDE using the compartments, compartment factors, and method of summation specified in ANSI/HPS N13.41-1997. EDE will be used in place of deep dose equivalent (DDE) in the calculation of total effective dose equivalent (TEDE). Exelon/AmerGen's application does not seek approval to use the ANSI standard's Section 4, "Criteria for When to Use Multiple Dosimeters" or Section 5.5, "Alternatives to the Use of Multiple Dosimeters."

Exelon/AmerGen's application is essentially identical to the San Onofre Nuclear Generating Station, Units 1, 2, and 3, request dated December 20, 2004, and approved by the NRC on May 10, 2005, thereby providing precedence for this application.

1.2 REGULATORY EVALUATION

Dose limits in 10 CFR Part 20 are specified in the dose quantity TEDE. TEDE is defined in 10 CFR Part 20.1003 as the sum of the external dose quantity called DDE plus the internal dose quantity called committed effective dose equivalent (CEDE).

Footnote 2, in the "Organ Dose Weighting Factors" Table in 10 CFR 20.1003, permits the use of weighting factors for external exposure with prior NRC approval. Exelon/AmerGen hereby requests NRC approval to use weighting factors to calculate the external exposure quantity EDE and to use EDE in place of DDE in the calculation of TEDE.

2.0 TECHNICAL JUSTIFICATION

2.1 IMPROVED ASSESSMENT OF DOSE

In uniform radiation fields, the dosimeter used to measure whole body dose is worn on the chest. The dosimeter measures radiation exposure using an operational dose quantity called DDE.

When the radiation field is highly non-uniform, either the chest dosimeter is moved to the part of the whole body expected to receive the highest dose or additional dosimeters are worn so that the highest whole body dose can be measured.

Difficulties arise because the annual occupational dose limit is based on the stochastic risk from whole body exposure, which is related to the dose quantity EDE. While the use of DDE as a surrogate quantity to approximate EDE works well in uniform radiation fields, in highly non-uniform radiation fields, a more accurate estimate of EDE is needed to improve the assessment of occupational dose.

2.2 COMPARTMENT FACTORS

ANSI/HPS N13.41-1997, "Criteria for Performing Multiple Dosimetry," provides a method for assessing EDE based on measurements of DDE at specific areas of the body called "compartments" and applying appropriate weighting factors called "compartment factors". A compartment factor "relates the fractional risk to the organs underlying the measurement location to the total risk from uniform irradiation of the whole body."

ANSI/HPS N13.41-1997, Appendix A describes how the 10 CFR Part 20 organ or tissue weighting factors are apportioned to each "compartment" based on the associated underlying organs and tissues. The resulting compartment factors used to calculate EDE are listed below:

HPS N13.41 COMPARTMENT FACTORS

Compartment Name	Compartment Factor
Head and neck	0.10
Thorax, above the diaphragm	0.38
Abdomen, including the pelvis	0.50
Upper right arm	0.005
Upper left arm	0.005
Right thigh	0.005
Left thigh	0.005

2.3 CHEST COMPARTMENT

Consistent with Exelon/AmerGen current practice, a single chest dosimeter will measure the dose to both the thorax and abdomen compartments. The combined compartments will be called the chest compartment.

2.4 DOSIMETER SELECTION AND PLACEMENT

Exelon/AmerGen will monitor the part of the whole body within each compartment (and/or composite compartment) that receives the highest dose. Exelon/AmerGen will use the criteria in the current Radiation Protection Procedure RP-AA-210, "Dosimetry Issue, Usage, and Control," for determining dosimeter selection and placement. Multiple primary and secondary whole body dosimeters for those portions of the whole body that might receive the highest dose equivalent are issued when the location on the whole body for the highest dose equivalent is not known or the worker to source orientation is subject to change. Multiple dosimetry is appropriate under these circumstances when the radiation dose to any portion of the whole body has the potential to be greater than 30% of the expected dose equivalent at the reference dosimeter location on the body, and the dose equivalent for the evolution has the potential to exceed 100 mrem when a significant component of the effective dose equivalent comes from a non-uniform field.

The same National Voluntary Laboratory Accreditation Program (NVLAP) accredited dosimeters will be worn at the same whole body locations after the application is approved as they are currently. The dosimeter orientation toward the source will not change since the part of the body expected to receive the highest dose will continue to be monitored. Therefore, approval of this application results in no new challenges to the dosimeter's angular response characteristics.

2.5 DOSE ASSIGNMENT

The DDE for each compartment will be determined from dosimeters worn at that location. When no dosimeter is worn at a particular compartment, DDE will be determined from the dosimeter positioned where the exposure is judged to be similar. The assigned EDE will be the sum of each DDE measurement multiplied by its appropriate compartment factor.

The assigned lens dose equivalent (LDE) will be the higher of the head or chest dosimeters. The assigned shallow dose equivalent (SDE) will be the highest of any whole body dosimeter.

2.6 CONCLUSION

Accurate assessment of occupational dose from external sources of radiation in highly non-uniform radiation fields requires a method for assessing EDE. NRC approval of this application will improve the accuracy of licensee assessment of occupational dose.

Exelon/AmerGen will assess EDE based on the consensus technical standard, ANSI/HPS N13.41-1997, "Criteria for Performing Multiple Dosimetry." This standard was approved by the American National Standards Institute - Accredited HPS N13 Committee, on June 20, 1996. At the time of balloting, the HPS N13 Committee membership included representatives from the

Nuclear Regulatory Commission and the National Council on Radiation Protection and Measurements.

The ANSI/HPS N13.41-1997 consensus technical standard has previously been approved for use by the NRC for evaluating occupational dose to medical personnel wearing lead aprons in Regulatory Issue Summary 2002-06, "Evaluating Occupational Dose for Individuals Exposed to NRC-Licensed Material and Medical X-Rays," dated April 16, 2002.

The proposed method will monitor the part of the whole body expected to receive the highest dose using the criteria for dosimeter selection and placement found in current NRC inspection procedures.