Enclosure 2

Meeting Handouts

Susquehanna Steam Electric Station

PPL Exemption Request for Certificate of Compliance 1004 Amendment 8

PPL Susquehanna, LLC

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Agenda

- Introductions
  - PPL
  - Transnuclear
  - NRC
- Need for Exemption Request
- Susquehanna and Issue Background
- Proposed Timeline
- Technical Content of Exemption Request
- Duration of Proposed Exemption
- Follow-up Discussion

Need For Exemption Request

- Problem Statement
  - Current NUHOMS® Certificate of Compliance 1004, Amendment 8 - Technical Specifications Table 1-1c allows loading of "7x7, 8x8, 9x9 or 10x10 fuel assemblies manufactured by General Electric or equivalent reload fuel that are enveloped by the fuel assembly design characteristics listed in Table 1-1d".
  - Table 1-1d only permits loading of 9x9 fuel with 66 Full and 8 Partial Length Rods. Framatome 9x9-2 fuel assemblies contain 79 full length rods and no partial length rods, and therefore cannot be loaded.
  - Susquehanna cannot load any additional canisters until the loading of Framatome 9x9-2 (FANP9) is approved.
  - An exemption is requested pending the issuance of Amendment 9, in order to avoid undesirable implications.

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Need For Exemption Request

- Safety
  - Offload Capability - Without an exemption, Susquehanna will lose ability to offload even one reactor, prior to Unit 2 refuel outage
  - Decay Heat - Insufficient room in the Susquehanna SFP to have optimum management of decay heat load
- Outage Complexity
  - Fuel Movement Strategy - Insufficient pool locations result in a more complicated fuel movement strategy
    - Additional 2-3 days to complete core maintenance and core alterations
    - Additional handling of irradiated fuel

Susquehanna Steam Electric Station (SSES)

- **Background**:
  - Two GE BWR 4 Reactors rated at 3489 MWth
  - 764 Fuel Assemblies Core / 280 – 320 Reload Size
    - Initial Core GE 8x8 fuel (stored in DFS)
    - Framatome 8x8 fuel (stored in DFS)
    - Framatome 9x9-2 (79 full length fuel rods)
    - Framatome ATRIUM™-10
  - GE & Framatome 8x8 fuel assemblies already transferred to ISFSI
  - PPL uses Transnuclear NUHOMS® DFS System

Issue Background

- Only available window for DFS campaign in 2006 is late April through mid-June
  - Emergent fuel channel bowing problems may cause Unit 2 mid-cycle channel maintenance outage
  - Spent fuel pool cleanout scheduled and contracted to maximize fuel pool space
  - New Fuel Receipt for Unit 2 outage begins in December
- No additional canisters can be loaded without loading Framatome 9x9-2

Proposed Timeline for Exemption Request

- 12/19/2005 PPL/TN/NRC Telecon to discuss Exemption Request and proposed technical analysis methodology
- 1/19/2006 Public Meeting
- 2/2 Transmit Exemption Request to NRC
- 4/14 Requested Date of Issuance
- 4/15-4/21 Finalize 72.212 Evaluation and Procedure Changes based on Exemption
- 4/24-4/28 DFS Dry-Run and Training
- 5/1 Load First Framatome 9x9-2 Assembly into 61BT

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Why Exemption vs. Amendment

- Exemption involves single issue vs. many complex issues in Amendment 9
- Amendment 9 submittal to NRC not scheduled until March/April 2006
- FANP9 is technically bounded by other fuel types currently referenced in C of C – Amendment 8
- Timing of Amendment 9 will not support Susquehanna needs to maximize:
  - full core offload capability
  - optimum decay heat management of spent fuel pool
  - ability to conduct an efficient refueling outage with less reactivity management challenges and complexity

Technical Content of Exemption Request

- All Required NUHOMS® FSAR Issues Addressed:
  - Criticality Analysis
  - Simplified Thermal Analysis, with reduced allowable decay heat in canister
  - Qualitative Review of:
    - Structural and Materials Analysis
    - Shielding Analysis
    - Environmental Analysis

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Criticality Analysis

- Analysis identical to that documented in NUHOMS® FSAR - Appendix K.6.4.2 was performed for Framatome 9x9-2 (FANP9) fuel assemblies

- The original limiting design basis fuel assembly (GE 10x10) remains bounding for criticality

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Thermal Evaluation

- Thermal Evaluation is Documented in NUHOMS® FSAR – Appendix K.4
- Methodology for Evaluation of FANP9:
  - Evaluated Framatome 9x9-2 fuel properties and compared to 61BT design basis fuel properties (Effective density, specific heat, axial and transverse thermal conductivities)
  - Since fuel properties are very similar, or bounded by design basis properties, the ratio of FANP9 decay heat to design basis decay heat was used to estimate the FANP9 maximum clad temperatures
- With a FANP9 maximum allowable decay heat of 13.0 kW/DSC (29% less than the design basis heat load of 18.3 kW/DSC), the NUHOMS® FSAR thermal evaluation for storage, transfer (normal, off-normal & accident conditions) remains bounding for FANP9 fuel assemblies
- Fuel Cladding Temperatures all remain below ISG-11, Rev. 3 allowable temperatures

Thermal Analysis - Vacuum Drying

- NUHOMS® 61BT FSAR maximum clad temperature after 96 hours of vacuum drying is 827°F for decay heat load of 18.3 kW/DSC
- For FANP9 heat load restricted to 13.0 kW/DSC, maximum clad temperature is 617°F
- FANP9 clad temperature is well bounded by the allowable temperature of 752 °F per ISG-11, Rev 3

Structural and Materials Analyses

- The structural and ~~shielding~~ materials analysis for the 61BT is documented in NUHOMS® FSAR - Appendix K.3
- The materials used for the FANP9 are the same as used in the design basis analysis
- All design parameters used in the design basis analysis are bounding for FANP9

Shielding Analysis

- The shielding evaluation for the 61BT is documented in NUHOMS® FSAR - Appendix K.5
- The GE 7x7 assembly remains bounding because it has a higher initial heavy metal loading (0.198 MTU), as compared Framatome 9x9-2 (0.180 MTU)
- Initial Co59 content used in each of the four fuel assembly source regions (bottom, in-core, plenum and top) for the FANP9 < design basis fuel assembly.
- Therefore, the design basis radiation and thermal source terms for all burnup, initial enrichment and cooling time combinations allowed to be stored in the NUHOMS® 61BT DSC remain bounding for the FANP9 fuel assembly. All dose rates reported in the tables in Chapter K.5 of the FSAR and dose rate limits reported in the Technical Specifications remain bounding for this additional assembly type.

Environmental Assessment

- PPL Exemption Request review determined that the Amendment 8 NRC conclusions remain valid with the implementation of a limit on decay heat of less than or equal to 13.0 kW/DSC
  - Fuel can be safely stored with reasonable assurance of meeting the acceptance criteria of 10 CFR 72, as documented in SER
  - Occupational exposure not significantly increased and well within 10 CFR 20

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Duration of Proposed Exemption

Exemption Request will be needed by PPL until issuance and implementation of Transnuclear Certificate of Compliance 1004 - Amendment 9 has been completed.

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Follow-up Discussions

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**SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR EXEMPTION FROM NUHOMS®
CERTIFICATE OF COMPLIANCE NO. 1004,
AMENDMENT NO. 8
PLA-6004**

**Docket Nos. 50-387
and 50-388**

Pursuant to the provisions of 10 CFR 72.7, "Specific exemptions," PPL Susquehanna, LLC (PPL) requests an exemption from a requirement specified in 10 CFR 72.212, "Conditions of general license issued under §72.210." The specific exemption would be from the requirements of 10 CFR 72.212(b)(2)(i)(A) and 10 CFR 72.212(b)(7), both of which require that the licensee comply with the terms and conditions of the certificate.

PPL is requesting an exemption from a condition in Amendment 8 to Certificate of Compliance (CoC) No. 1004 for the standardized NUHOMS®-61BT storage system. CoC No. 1004, Amendment No. 8, Technical Specification Table 1-1d, "BWR Fuel Assembly Design Characteristics for the NUHOMS®-61BT DSC," allows for the storage of GE (or equivalent) 9x9-2 fuel assemblies that contain 66 full and 8 partial length fuel rods. The Framatome-ANP 9x9, Version 9x9-2 fuel assemblies (FANP9) that the Susquehanna Steam Electric Station (SSES) has stored in the spent fuel pool contain 79 full-length fuel rods and no partial-length fuel rods. With the exception of 33 fuel assemblies stored in the fuel pool, PPL has no other fuel types that can be loaded into the NUHOMS®-61BT canisters under Amendment No. 8. Thus, the requested exemption is required to allow PPL to load FANP9 assemblies into the NUHOMS®-61BT canisters under Amendment No. 8.

The exemption request is required to support the late April 2006 DFS campaign at SSES. The campaign must occur at this time to ensure fuel pool space is available to allow for new fuel receipt in December 2006. In order to meet this need, PPL requests approval of the proposed exemption request by April 14, 2006.

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Transnuclear, Inc., is preparing a proposed Amendment No. 9 to CoC No. 1004, which would include the FANP9 fuel assemblies as part of the authorized contents for the NUHOMS®-61BT or -61BTH storage systems. Proposed Amendment No. 9 is scheduled to be submitted to the NRC in March - April 2006. As such, PPL requests that the exemption be in effect for 90 days after the NRC approves proposed Amendment No. 9. The 90-day time period will allow PPL adequate time to implement proposed Amendment No. 9.

Details regarding PPL's need and justification for the issuance of the proposed exemption are included in the attached. Should you have any questions concerning the submittal, please contact Ms. Brenda O'Rourke, Senior Engineer - Nuclear Regulatory Affairs, at (610) 542-1791.

B. T. McKinney

Attachment

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Attachment to PLA-6004

Request for Exemption from NUHOMS®
Certificate of Compliance No. 1004, Amendment 8

Susquehanna Steam Electric Station
Request for Exemption from NUHOMS®
Certificate of Compliance No. 1004, Amendment 8

I. Exemption Request

Pursuant to the provisions of 10 CFR 72.7, "Specific exemptions," PPL Susquehanna, LLC (PPL) requests an exemption from a requirement specified in 10 CFR 72.212, "Conditions of general license issued under §72.210."

The specific exemption would be from the requirements of 10 CFR 72.212(b)(2)(i)(A) and 10 CFR 72.212(b)(7), both of which require that the licensee comply with the terms and conditions of the certificate. Specifically, PPL is requesting an exemption from a condition in Certificate of Compliance No. 1004, Amendment No. 8 for the standardized NUHOMS®-61BT storage system.

Certificate of Compliance No. 1004 (CoC), Amendment No. 8, Technical Specification Table 1-1d, "BWR Fuel Assembly Design Characteristics for the NUHOMS®-61BT DSC," allows for the storage of GE (or equivalent) 9x9-2 fuel assemblies that contain 66 full and 8 partial length fuel rods. The 9x9-2 fuel assemblies (i.e., Framatome-ANP 9x9, Version 9x9-2 fuel assemblies (FANP9)) that the Susquehanna Steam Electric Station (SSES) has stored in the spent fuel pool contain 79 full-length fuel rods and no partial-length fuel rods. Thus, the requested exemption is required to allow FANP9 assemblies to be loaded into NUHOMS®-61BT DSC.

SSES's FANP9 fuel assemblies meet all other fuel design characteristics as specified in Table 1-1d.

II. Background

Transnuclear, Inc., (TN) has been preparing a proposed amendment to CoC No. 1004 which would permit PPL to load the FANP9 fuel stored in SSES's spent fuel pool into the NUHOMS®-61BT or -61BTH canisters. The proposed amendment was to be submitted to the Nuclear Regulatory Commission (NRC) and would have allowed sufficient time for review and issuance of the CoC amendment prior to PPL's planned Fall 2006 dry fuel storage (DFS) campaign. However, due to rules of engagement established between the NRC and TN regarding the processing of CoC amendments, TN was unable to submit the proposed amendment until Amendment Nos. 8 and 9 (which were combined and renumbered No. 8) were approved for final rulemaking. Amendment No. 8 was approved and issued by the NRC on December 5, 2005. TN expects to submit proposed Amendment No. 9 to the NRC in March - April 2006.

Subsequent developments, including the potential need for a Unit 2 mid-cycle fuel channel replacement outage, necessitate the loading and transfer of five NUHOMS® 61BT canisters of FANP9 fuel assemblies to the ISFSI beginning May 1, 2006.

Following the DFS campaign, PPL must complete the previously scheduled and contracted fuel pool cleanout campaign. This campaign is also necessary to support the 2007 Unit 2 refueling outage. Receipt of the new fuel begins in December 2006. Staging of the new fuel in the fuel pool would result in a loss of full core offload capability.

III. Technical Justification

10 CFR 72.7 specifies that "... the Commission may, upon application by any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest."

The safety analysis of the NUHOMS®-61BT system is described in the current license in Appendix K of the Final Safety Analysis Report (FSAR) for the standardized NUHOMS® system [1]. The current Technical Specifications (TS) for CoC No. 1004 [2] that are issued to TN for the standardized NUHOMS® system contain the following requirements regarding the authorized content of the DSC:

> Technical Specification 1.2.1, "Fuel Specifications, Functional and Operating Limits," states that "The characteristics of the spent fuel which is allowed to be stored in the standardized NUHOMS® system are limited by those included in Tables 1-1a, 1-1b, 1-1c, 1-1d, 1-1e, 1-1f, 1-1g, 1-1i, 1-1j, 1-1l, and 1-1m."

The applicable TS tables for the NUHOMS®-61BT DSCs with intact BWR fuel are described in Amendment No. 8 to CoC No. 1004, Tables 1-1c and 1-1d [2]. PPL cannot comply with these tables because the FANP9 fuel assemblies do not meet one of the fuel assembly design parameters specified in Table 1-1d. Specifically, the number of fuel rods specified in Table 1-1d are 66 full and 8 partial rods for 9x9-74/2 fuel assemblies and SSES's FANP9 fuel assemblies have 79 full and no partial rods.

Despite this difference, PPL has determined that it is acceptable to load FANP9 fuel assemblies in the NUHOMS®-61BT canisters because the FANP9 assembly type is bounded by the design basis fuel assemblies that is evaluated in the current license in Appendix K of the FSAR [1]. As such, loading of FANP9 fuel assemblies is effectively no different from loading assemblies approved in Amendment No. 8 to CoC No. 1004 and therefore the requested exemption will not endanger life or property or the common defense and security.

The exemption will be in the public interest in that it will allow for the safe and efficient storage of spent nuclear fuel at SSES. NRC approval of the exemption will maintain full core offload capability and flexibility for fuel storage options related to managing decay heat loads within the pool.

The following discussion demonstrates that the FANP9 fuel assembly is bounded by the NUHOMS®-61BT system design basis analysis presented in Appendix K of the FSAR [1]. PPL will load those FANP9 fuel assemblies with the characteristics shown in Table 1:

Table 1

Summary of Key Parameters for FANP9 Fuel and NUHOMS®-61BT DSC Design Basis Fuel

	FANP9 Fuel Assembly Parameters	NUHOMS®-61BT Design Basis Fuel Parameters
Maximum Decay Heat Load per Assembly (kW)	0.21	0.3
Maximum Total Decay Heat load per NUHOMS®-61BT DSC (kW)	13.0	18.3
Maximum Assembly Average Burnup (MWD/MTU)	36,000	40,000
Maximum Initial Bundle Average Enrichment (wt% U235)	3.33	4.4
Maximum Initial Uranium Content (kg/Assembly)	180	198
Maximum Fuel Assembly Weight with Channels (lbs)	642	705

PPL has completed an evaluation of the required NUHOMS® FSAR sections. The results of that evaluation are summarized below.

Structural Evaluation

The structural evaluation of the NUHOMS®-61BT DSC is documented in Chapter K.3 of the FSAR [1]. All the design parameters for the design basis fuel assembly used in Chapter K.3 of the FSAR (e.g., total fuel assembly weight, temperatures, and pressures) bound the FANP9 fuel assembly. As a result, all of the structural evaluation results reported in Chapter K.3 of the FSAR are bounding for the FANP9 fuel assembly.

Thermal Evaluation

The thermal evaluation of the NUHOMS®-61BT DSC is documented in Chapter K.4 of the FSAR [1]. The method used for the thermal evaluation of the FANP9 fuel is documented below.

1. Evaluate the effective fuel properties (thermal conductivity (K), heat capacity (Cp) and density (ρ)) of the FANP9 fuel assembly and compare it with the NUHOMS®-61BT DSC design basis fuel [1]. If the FANP9 fuel can be bounded by the design basis fuel, the corresponding thermal analysis results for the NUHOMS®-61BT design basis fuel in the FSAR [1] can be conservatively used for thermal evaluation of the NUHOMS®-61BT DSC with the FANP9 fuel assembly.

2. Based on the thermal analysis results of NUHOMS®-61BT DSC for the maximum design basis heat load of 18.3 kW per DSC [1], use the ratio of heat loads and the temperature difference (ΔT) to calculate the maximum cladding temperatures in the NUHOMS®-61BT DSC with FANP9 fuel assemblies with a maximum heat load 13 kW per DSC. Use these results to demonstrate that the maximum cladding temperatures with FANP9 fuel meet the guidance of ISG-11, Revision 3 [3] during all storage and transfer conditions.

As shown in Table 1, the maximum decay heat per assembly, maximum total decay heat per DSC and maximum assembly average burnup for the FANP9 fuel are all bounded by the design basis values used for the NUHOMS®-61BT thermal evaluation.

The fuel assembly effective thermal conductivities for the FANP9 were calculated similar to Chapter K.4 of the FSAR [1] and compared with the design basis fuel assembly values. The comparison is documented in Table 2 below:

Table 2

Summary of Effective Density, Specific Heat and Axial Thermal Conductivity for NUHOMS®-61BT DSC

Assembly Effective Thermal Properties	NUHOMS®-61BT DSC Fuel Assembly [1]	FANP9 Fuel Assembly
Thermal Properties		
Effective Density, lbm/in^3	0.105	0.106
Heat Capacity Cp, Btu/lbm-°F	0.0574	0.0578
Thermal Conductivity $K_{eff\ axial}$, Btu/hr-in-°F	0.0437	0.0490

Similarly, the computed radial (transverse) fuel thermal effective conductivity values as a function of temperature for Helium backfill conditions and vacuum drying conditions are tabulated in Table 3 for the FANP9 fuel assembly and the bounding NUHOMS®-61BT DSC design basis fuel assembly [1].

Table 3

Transverse Fuel Thermal Effective Conductivity for Helium Backfill and Vacuum Condition, FANP9 and NUHOMS®-61BT DSC Bounding Fuel Assembly

	Helium Backfill			Vacuum Drying			
	FANP9	**61BT Design Basis Fuel Assembly [1]**	**Comparison**		**FANP9**	**61BT Design Basis Fuel Assembly [1]**	**Comparison**
T	$k_{eff,FANP9}$	$k_{eff,61BT}$	Difference (%)	T	$k_{eff,FANP9}$	$k_{eff,61BT}$	Difference (%)
°F	Btu/(hr·in·°F)	Btu/(hr·in·°F)	$\frac{k_{eff,FANP9}-k_{eff,61BT}}{k_{eff,61BT}}$	°F	Btu/(hr·in·°F)	Btu/(hr·in·°F)	$\frac{k_{eff,FANP9}-k_{eff,61BT}}{k_{eff,61BT}}$
214.4	0.01590	0.01600	-0.6	240.0	0.005793	0.005800	-0.1
312.4	0.01845	0.01860	-0.8	331.6	0.007367	0.007300	0.9
410.7	0.02145	0.02150	-0.2	425.1	0.009274	0.009200	0.8
509.3	0.02496	0.02490	0.2	520.1	0.011531	0.011400	1.2
608.0	0.02885	0.02880	0.2	616.3	0.013951	0.014100	-1.1

As seen from Table 2, the effective density, heat capacity, and axial thermal conductivities for FANP9 fuel assembly are bounded by the NUHOMS®-61BT DSC design basis fuel assembly used in the NUHOMS® FSAR thermal evaluation. As seen from Table 3, the transverse thermal conductivities for the FANP9 fuel assembly are negligibly different from the design basis fuel assembly used in the NUHOMS® FSAR thermal evaluation.

The maximum decay heat load for the FANP9 fuel assemblies for inclusion in the authorized contents of the NUHOMS®-61BT DSC is 13.0 kW per DSC (0.21 kW per fuel assembly). This is approximately 29% less than the design basis heat load for NUHOMS®-61BT DSC [1]. The FANP9 fuel thermal properties are similar to the design basis fuel for the NUHOMS®-61BT DSC [1] as described in Table 2 and 3. Therefore, the thermal evaluation in the FSAR [1] for the design basis fuel in NUHOMS®-61BT DSC during storage and transfer for normal, off-normal and accident conditions remains bounding for the FANP9 fuel assemblies with decay heat loads less than or equal to 13.0 kW/DSC.

The maximum fuel cladding temperatures during storage and transfer operations are shown in Table 4 for the NUHOMS®-61BT DSC with design basis heat loads (18.3 kW/DSC) from Tables K.4-1, K.4-2 and K.4-4 of the FSAR [1]. When these fuel cladding temperatures are compared with the allowable cladding temperatures in

ISG-11, Revision 3 [3], all the fuel cladding temperatures, including the vacuum drying operations at 96 hours, are below the ISG-11 allowable values. The following evaluation calculates the expected maximum fuel cladding temperature with FANP9 fuel assemblies with a maximum heat load of 13.0 kW/DSC.

Maximum Fuel Cladding Temperatures with FANP9 Fuel Assemblies During Vacuum Drying Condition

The maximum fuel cladding temperatures within the NUHOMS®-61BT DSC (decay heat load of 18.3 kW per DSC) after 96 hours of vacuum drying condition (Table K.4-4) in the FSAR [1] is used to evaluate the corresponding maximum fuel cladding temperature for loading the NUHOMS®-61BT DSC with the FANP9 fuel assemblies with 13.0 kW/DSC heat load.

According to the FSAR [1], the maximum fuel cladding temperature after 96 hours of the vacuum drying condition is $T_{FC,\ 18.3kW,\ 96hrs}$ = 827 °F where the initial temperatures $T_{a,\ 18.3kW}$ for the DSC and basket are assumed to be at 100°F. Therefore, the temperature increasing (ΔT) after 96 hours of the vacuum drying condition is:

$$\Delta T_{FC,\ 18.3kW,\ 96hrs} = T_{FC,\ 18.3kW,\ 96hrs} - T_{a,\ 18.3kW,\ 0hr} = 827 - 100 = 727\ °F$$

For the 13.0 kW per DSC heat load, the corresponding maximum fuel cladding temperature increase after 96 hours of the vacuum drying condition is estimated as:

$$\Delta T_{FC,\ 13kW,\ 96hrs} = 13/18.3 * \Delta T_{FC,\ 18.3kW,\ 96hrs} = 516.4\ °F$$

Then,

$$T_{FC,\ 13kW,\ 96hr} = 516.4 + 100 = 616.4\ °F$$

The results show that at the end of 96 hours of the vacuum drying condition for FANP9 fuel assemblies with 13.0 kW/DSC heat load, the maximum fuel cladding temperature during vacuum drying condition also meets the allowable of 752 °F from ISG-11 [3].

Table 4

Maximum Cladding Temperatures during Storage and Transfer

Condition	Operation	Maximum Cladding Temperature in FSAR [1] (°F)	Maximum Cladding Temperature with FANP9 Fuel with 13 kW/DSC (°F)	Allowable Temperature Range per ISG-11 Rev. 3 (°F)
Storage	Normal, 100°F Ambient	569	<569	752
	Off-Normal, 125°F Ambient	590	<590	1058
	Accident – Block Vent	809	<809	1058
Transfer	Normal/Off-Normal Ambient	638	<638	752
	Vacuum Drying, 96 hrs	827	617	752

Table 4 shows that all maximum fuel cladding temperatures for the FANP9 fuel assembly do not exceed the allowable temperatures from ISG-11 for all storage and transfer operations. Therefore, the inclusion of the FANP9 fuel assembly in the authorized contents of the NUHOMS®-61BT DSC satisfy both the requirements of ISG-11, Revision 3 and Chapter K.4 of the FSAR [1].

All the design parameters for the design basis fuel assembly used in Chapter K.4 of the FSAR (e.g., heat load per assembly, temperatures, and pressures) bounds the FANP9 fuel assembly. As a result, all of the thermal evaluation results reported in Chapter K.4 of the FSAR are bounding for the FANP9 fuel assembly. In addition, the FANP9 fuel assembly results also meet the guidance provided in ISG-11, Revision 3 [1].

Shielding Evaluation

Chapter K.5 of the FSAR [1] documents the shielding evaluation for the NUHOMS® 61BT DSC. Chapter K.5 of the FSAR states:

> "The design basis BWR fuel source terms are derived from the GE 7x7, GE 2/3 assembly design as defined below. The GE 7x7 assembly is bounding because it has the highest initial heavy metal loading [0.198MTU] as compared to the 8x8, 9x9 and 10x10 fuel assemblies which are also authorized contents of the NUHOMS®-61BT DSC. In addition, the maximum Co_{59} content of each hardware region for each assembly type is used to determine the activation source for each assembly region."

The initial heavy metal content of the FANP9 fuel assembly is 0.180 MTU per assembly while the shielding design basis fuel assembly is 0.198 MTU. In addition, the initial Co_{59} content used in each of the four fuel assembly source regions (i.e., bottom, in-core, plenum and top) for the FANP9 are all less than that of the shielding design basis fuel assembly. Therefore, the design basis radiation and thermal source terms for all burnup, initial enrichment and cooling time combinations allowed to be stored in the NUHOMS®-61BT DSC remain bounding for the FANP9 fuel assembly. As a result, all of the dose rates reported in the tables in Section K.5 of the FSAR and dose rate limits reported in the Technical Specifications remain bounding for this additional assembly type.

<u>Criticality Analysis</u>

The criticality evaluation for the NUHOMS®-61BT DSC is documented in Chapter K.6 of the FSAR [1]. Section K.6.4.2 A of the FSAR documents the determination of the most reactive fuel lattice, which is used for the remainder of the criticality evaluation for the NUHOMS®-61BT DSC to demonstrate criticality safety for the system with all of its authorized contents. Additional analysis identical to that documented in Section K.6.4.2 A of the FSAR was performed to demonstrate that the criticality design basis fuel assembly bounds the FANP9 fuel assembly. Using the same models (except the fuel assembly is replaced with the FANP9 assembly) the calculated reactivity for the FANP9 assembly without a fuel channel and with a 0.065, 0.080 and 0.120 inch-thick fuel channels were evaluated. The results of the calculations are provided in Table 5. The evaluation was performed using the same CSAS25 control module of the SCALE4.4 computer code, with 44 Group ENDF-V cross section library.

Table 5

Additional Results for Most Reactive Fuel Assembly Lattice Evaluation

Model Description	k_{KENO}	1 σ	k_{eff}
FANP9 Fuel Assembly			
No Channel	0.9072	0.0015	0.9102
0.120-inch Channel	0.9066	0.0013	0.9092
0.080-inch Channel	0.9074	0.0013	0.9100
0.065-inch Channel	0.9065	0.0011	0.9087
Design Basis GE 10x10 Fuel Assembly Results from Table K.6.6 of the FSAR [1]			
No Channel	**0.9095**	**0.0013**	**0.9121**

As demonstrated in the Table 5, the design basis fuel assembly for criticality remains bounding. Therefore, all of the results of the criticality evaluation presented in Chapter K.6 of the FSAR [1] remain bounded for the FANP9 fuel assembly.

Confinement Evaluation

The confinement evaluation of the system is documented in Chapter K.7 of the *FSAR [1]*. This section of the FSAR is not affected by the authorized contents and therefore remains applicable when the FANP9 fuel assembly is added to the authorized contents.

Operating Systems

The operating procedures for the system are documented in Chapter K.8 of the FSAR [1]. This section of the FSAR is not affected by the authorized contents and therefore remains applicable when the FANP9 fuel assembly is added to the authorized contents.

Test and Maintenance Program

The Test and Maintenance program for the system is documented in Chapter K.9 of the FSAR [1]. This section of the FSAR is not affected by the authorized contents and therefore remains applicable when the FANP9 fuel assembly is added to the authorized contents.

Radiation Protection

Occupational Exposure and Off-site dose evaluations for the system are presented in Chapter K.10 of the FSAR [1]. As addressed in the Shielding Evaluation discussion above, the design basis source terms and calculated dose rates with the design basis fuel bound those for the FANP9 fuel. Therefore, the Occupational Exposure and Off-site dose evaluations presented in Chapter K.10 of the FSAR remain bounding.

Accident Analysis

Accident analyses for the system are presented in Chapter 11 of the FSAR [1]. As addressed in the discussion for the Structural Evaluation, Thermal Evaluation and Shielding Evaluation above, the critical parameters for these analyses with design basis fuel bound those for the FANP9 fuel. Therefore, the accident analysis results presented in Chapter K.11 of the FSAR remain bounding.

Conditions for Cask Use – Operating Controls and Limits or Technical Specification

Conditions for cask use – operating controls and limits or technical specifications for the system are presented in Chapter 12 of the FSAR [1] which refers to the Technical Specifications for the CoC No. 1004 [2]. Except for adding the FANP9 fuel assembly as an authorized intact fuel assembly for the NUHOMS® -61BT canister, all other TSs remain limiting as the FANP9 fuel assembly is bounded by the design basis analysis presented in Chapter K.12 of the FSAR.

Quality Assurance

The Quality Assurance program to be applied to the system is described in Chapter K.13 of the FSAR [1]. This section of the FSAR is not affected by the authorized contents and therefore remains applicable when the FANP9 fuel assembly is added to the authorized contents.

Decommissioning

The decommissioning evaluation for the system is described in Chapter 14 of the FSAR [1]. This section of the FSAR is not affected by the authorized contents and therefore remains applicable when the FANP9 fuel assembly is added to the authorized contents.

IV. Environmental Assessment

The following information is provided in support of an environmental assessment and finding of no significant impact for the proposed exemption:

Identification of the Proposed Action

Pursuant to the provisions of 10 CFR 72.7, "Specific exemptions," PPL requests an exemption from a requirement specified in 10 CFR 72.212, "Conditions of general license issued under §72.210." The specific exemption would be from the requirement of 10 CFR 72.212(b)(7), which states, "...The licensee shall comply with the terms and conditions of the certificate," and 10 CFR 72.212(b)(2)(i)(A), which states, "Perform written evaluations, prior to use, that establish that conditions set forth in the Certificate of Compliance have been met."

The exemption would be from a condition in Amendment 8 to CoC No. 1004 for the NUHOMS®-61BT storage system. Specifically, PPL is requesting an exemption from Table 1-1d, "BWR Fuel Assembly Design Characteristics for the NUHOMS®-61BT DSC," which only allows for the storage of GE (or equivalent) 9x9-2 fuel assemblies that contain 66 full and 8 partial fuel rods. The exemption would allow PPL to store FANP9 fuel assemblies that contain 79 full fuel rods and no partial fuel rods in the NUHOMS® -61BT canisters.

The Need for the Proposed Action

Due to recent SSES Unit 1 fuel channel performance problems, 54 fuel channels were replaced and stored in the SFP. A possible Unit 2 mid-cycle mini-refueling outage may be necessary to inspect and replace, if necessary, any affected fuel channels. As a result, space available in the SFP has become limited and will impact PPL's ability to maintain flexibility for fuel storage options related to managing decay heat loads within the pool.

Susquehanna has contracted to perform a fuel pool cleanout beginning in June 2006 so adequate fuel pool space is restored to support the Unit 2 2007 refueling outage. PPL will begin receiving new fuel in December 2006 for the Unit 2 outage. During the outage, it will be necessary to offload fuel assemblies from the core to support planned in-vessel maintenance (e.g., LPRM, control blade and control rod drive replacements) and ISI inspections. Typically over 400-500 fuel assemblies must be transferred from the core to the pool during a refueling outage to support vessel maintenance, ISI inspection requirements, removal of discharged fuel and to support an efficient, analyzed core shuffle. Following receipt and staging of the new Unit 2 fuel assemblies in the pool, SSES will no longer have the ability to offload either the Unit 1 or Unit 2 reactor cores, should the need occur.

Additionally, if no fuel is transferred to dry storage prior to the start of the 2007 Unit 2 refueling outage, there will be insufficient space in the SFP to stage all of the 312 new fuel assemblies. This will also complicate the fuel handling evolutions required for core reload and would add approximately 2 - 3 days to complete core maintenance and core alterations. In summary, there will not be sufficient space in the pool to accommodate pre-staging of the 312 new fuel assemblies, offload the fuel assemblies from the core for core maintenance and perform ISI inspections, simultaneously.

In order to avoid these potential impacts, PPL currently plans to transfer 305 FANP9 spent fuel assemblies (five NUHOMS®-61BT casks of 61 assemblies each) from the current SFP inventory to dry storage. The DSCs and HSMs, consistent with the dry cask storage system, have been constructed and are available for loading operations.

The planned transfer of FANP9 fuel assemblies must be completed by June 20, 2006. After this date, resources, including personnel and equipment, will be dedicated to fuel pool cleanout preparations and will not be available for fuel transfer operations. In order to load and transfer five NUHOMS®-61BT casks to dry storage by June 20, 2006, the mobilization and loading activities for the first cask must begin by April 14, 2006. PPL discharges approximately 280 to 320 fuel assemblies each year to the SFP. As such, PPL has also scheduled DFS campaigns to take place in mid 2007 and late 2008 for which this exemption will also be necessary, if proposed Amendment No. 9 is not issued.

Part 10 CFR 72.7 specifies that the NRC may grant exemptions from the requirements of 10 CFR Part 72 when the exemptions are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest. PPL concluded that the conditions for granting an exemption are met and has provided the justification in this submittal.

Environmental Impacts of the Proposed Action

The NRC completed an Environmental Assessment of Amendment No. 8 in March 2005 and reached the following conclusions:

> "Considering the specific design requirements for each accident condition, the design of the cask would prevent loss of containment, shielding, and criticality control. Without the loss of either containment, shielding, or criticality control, the risk to public health and safety is not compromised.
>
> The staff reviewed the proposed changes and confirmed that the changes provide reasonable assurance that the spent fuel can be stored safely and that the changes meet the acceptance criteria specified in 10 CFR Part 72. The staff documented its findings in a Safety Evaluation Report. The occupational exposure is not significantly increased, and offsite dose rates remain well within the 10 CFR Part 20 limits. Therefore, the proposed action now under consideration would not change the potential environmental effects assessed in the initial rulemaking. Therefore, the NRC staff has determined that an acceptable safety margin is maintained and that no significant environmental impacts occur as a result of the amendment. Because the proposed changes will not change the environmental requirements for the storage of spent fuel, no change in environmental impact is anticipated."

PPL concludes that the conclusions reached by the NRC in the Environmental Assessment for Amendment No. 8 remain valid with the implementation of a limit on decay heat of less than or equal to 13.0 kW for the FANP9 fuel assemblies.

The FANP9 fuel assemblies which PPL plans to load into the canisters are bounded by the design basis fuel assemblies for dry fuel storage system as evaluated in Appendix K of the FSAR [1]. Because PPL has committed to loading only those FANP9 fuel assemblies with a decay heat load of less than or equal to 13.0 kW, the loading is also bounded by the analyses documented in Appendix K of the FSAR [1]. The procedures that SSES will use for selecting, loading and storing its spent fuel will also meet the intent of the Technical Specifications requirements. As such, the exemption will have no significant environmental impact. The exemption will not significantly increase the probability or consequences of accidents. There are no changes being made in the types or amounts of effluents that may be released offsite, and there is no significant increase in occupational or public radiation exposure as a result of the proposed activities. Therefore, there are no significant radiological environmental impacts associated with the proposed exemption. With regard to potential non-radiological environmental impacts, PPL has determined that the proposed exemption has no potential to affect any historic sites. It does not affect non-radiological plant effluents and has no other environmental impact. Therefore, there are no significant non-radiological environmental impacts associated with the requested exemption.

Environmental Impacts of the Alternatives to the Proposed Action

As an alternative to the requested exemption, the NRC could consider denial (i.e., the "no-action" alternative). Denial of the exemption would result in no change to the current environmental impacts. PPL considers the "no-action" alternative to potentially impact PPL's ability to provide safe, affordable, competitive, and reliable electrical power generation.

Alternative Use of Resources

The requested exemption does not involve the use of any different resources than those previously considered in the Final Environmental Statement for the SSES, Units 1 and 2, dated June 1981. Accordingly, the proposed action is not a major federal action significantly affecting the quality of the environment.

V. References

1. "Standardized NUHOMS® Horizontal Modular Storage System for Irradiated Nuclear Fuel, Final Safety Analysis Report, Appendix K," NUH-003, Revision 8, dated June 2004.

2. Certificate of Compliance No. 1004 for the Standardized NUHOMS® System, Amendment 8, effective December 5, 2005.

3. Interim Staff Guidance -11, Revision 3, "Cladding Considerations for the Transportation and Storage of Spent Fuel," NRC Spent Fuel Project Office, dated November 2003.