



PSEG
Nuclear L.L.C.

10 CFR 50.90

DEC 21 2009

LR-N09-0290
LAR H09-01

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Hope Creek Generating Station
Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: License Amendment Request Supporting the Use of Co-60 Isotope Test Assemblies (Isotope Generation Pilot Project)

References: (1) Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies," dated June 26, 2009

In accordance with 10CFR50.90, PSEG Nuclear LLC (PSEG) hereby requests an amendment to Facility Operating License No. NPF-57 for Hope Creek Generating Station (HCGS). In accordance with 10 CFR 50.91(b)(1), a copy of this request for amendment has been sent to the State of New Jersey.

The proposed change modifies License Condition 2.B.(6) and creates new License Conditions 1.J and 2.B.(7) as part of a pilot program to irradiate Cobalt (Co)-59 targets to produce Co-60. In addition to the proposed license condition changes, PSEG also requests an amendment to the Technical Specifications (TS) of the HCGS Facility Operating License. This proposed change would modify TS 5.3.1, "Fuel Assemblies," to describe the specific Isotope Test Assemblies (ITAs) being used.

PSEG is collaborating with Global Nuclear Fuel - Americas, LLC (GNF) and GE – Hitachi Nuclear Energy Americas, LLC (GEH) to develop and implement a pilot program for producing Co-60 in the HCGS reactor during power operation. The Co-60 is intended for use in the medical industry for use in cancer treatments, and blood and instrument sterilization, in the radiography and security industries for imaging, and in the food industry for cold pasteurization and irradiation sterilization. PSEG plans to load 12 ITAs (known as GE14i ITAs) as part of the HCGS Reload 16 Cycle 17 core reload, during the Fall 2010 refueling outage.

A001
NRR

Exelon Generation Company, LLC recently submitted a similar ITA license amendment request for Clinton Power Station (Reference 1). To support Reference 1 on October 16, 2009 the NRC issued Requests for Additional Information (RAI) to Exelon related to their ITA license amendment request based on GEH Safety Analysis Report NEDC-33505P. Since the Exelon RAIs are applicable to this PSEG ITA license amendment request (and GEH Safety Analysis Report NEDC-33529P for HCGS), a response to the October 16, 2009 Exelon RAIs is also included as part of this PSEG submittal.

Attachment 1 to this letter provides an evaluation supporting the proposed changes. The marked-up Operating License and TS pages, with the proposed changes indicated, are provided in Attachment 2 to this letter. Attachment 3 to this letter provides GEH Report NEDC-33529P, "Safety Analysis Report to Support Introduction of GE14i Isotope Test Assemblies (ITAs) in Hope Creek Generating Station," dated December 2009, which GEH considers to contain proprietary information. The proprietary information is identified by bracketed text. GEH requests that the proprietary information in Attachment 3 be withheld from public disclosure, in accordance with the requirements of 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," paragraph (a)(4). A signed affidavit supporting this request is also included in Attachment 3. Attachment 4 to this letter provides a nonproprietary version of the GEH Report (NEDO-33529). Attachment 5 to this letter provides GEH proprietary responses which address the October 16, 2009 RAIs provided to Clinton Power Station, as they relate to HCGS. Per the requirements of 10 CFR 2.390, Attachment 6 to this letter provides the GEH signed affidavit requesting that the proprietary information in Attachment 5 be withheld from public disclosure. Attachment 7 to this letter provides a nonproprietary version of Attachment 5. Attachment 8 to this letter summarizes the formal regulatory commitments pending NRC approval of the proposed amendment.

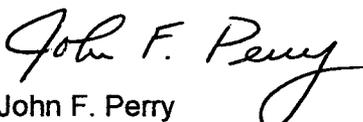
PSEG requests approval of the proposed change by September 1, 2010, with the amendment being implemented within 45 days of issuance.

If you have any questions or require additional information, please do not hesitate to contact Mr. Jeff Keenan at (856) 339-5429.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 12/21/09
(Date)

Sincerely,


John F. Perry
Site Vice President
Hope Creek Generating Station

Attachments (8)

S. Collins, Regional Administrator - NRC Region I
R. Ennis, Project Manager - USNRC
NRC Senior Resident Inspector - Hope Creek
P. Mulligan, Manager IV, NJBNE
Commitment Coordinator – Hope Creek
PSEG Commitment Coordinator - Corporate

**License Amendment Request Supporting the Use of Co-60 Isotope Test Assemblies
(Isotope Generation Pilot Project)**

Table of Contents

1.	DESCRIPTION.....	2
2.	PROPOSED CHANGE.....	2
3.	BACKGROUND	3
4.	TECHNICAL ANALYSIS	3
5.	REGULATORY ANALYSIS	7
6.	ENVIRONMENTAL CONSIDERATION.....	10
7.	REFERENCES.....	11

1.0 DESCRIPTION

In accordance with the provisions of 10CFR50.90, PSEG Nuclear LLC (PSEG) hereby requests an amendment to Facility Operating License No. NPF-57 for Hope Creek Generating Station (HCGS).

The proposed change modifies License Condition 2.B.(6) and creates new License Conditions 1.J and 2.B.(7) as part of a pilot program to irradiate Cobalt (Co)-59 targets to produce Co-60. The Co-60 would ultimately be used in the medical industry for use in cancer treatments, for blood and instrument sterilization, in the radiography and security industries for imaging, and in the food industry for cold pasteurization and irradiation sterilization. In addition to the proposed license condition changes, PSEG also requests an amendment to the Technical Specifications (TS) of the HCGS Facility Operating License. This proposed change would modify TS 5.3.1, "Fuel Assemblies," to describe the specific Isotope Test Assemblies (ITAs) being used (GE14i ITAs) to produce Co-60. A similar license amendment request was submitted by the Clinton Power Station on June 26, 2009 (Reference 1 of Section 7.0).

2.0 PROPOSED CHANGE

PSEG proposes to add a new License Condition 1.J which states, "The receipt, production, possession, transfer, and use of Cobalt-60 as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Part 30." This new license condition allows for the production and transfer of Cobalt-60 in accordance with 10 CFR Part 30.

Condition 2.B.(6) of the current Operating License for HCGS is revised to state, "PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility. Mechanical disassembly of the GE14i Isotope Test Assemblies containing Cobalt-60 is not considered separation." This change is intended to provide clarification of the term "separation" relative to the removal of enclosed rods containing Co-60 from the HCGS reactor core.

PSEG proposes to add a new License Condition 2.B.(7) which states, " PSEG Nuclear LLC, pursuant to the Act and 10 CFR Part 30, to intentionally produce, possess, receive, transfer, and use Cobalt-60." This new License Condition supports the pilot ITA project at HCGS by allowing intentional production of Cobalt-60 during operation of the HCGS facility.

PSEG also proposes to modify TS 5.3.1 as follows to describe the ITAs:

"The reactor core shall contain 764 fuel assemblies and shall be limited to those assemblies which have been approved for use in BWRs.

A maximum of twelve GE14i Isotope Test Assemblies may be placed in non-limiting core regions, beginning with Reload 16 Cycle 17 core reload, with the purpose of obtaining surveillance data to verify that the GE14i cobalt Isotope Test Assemblies perform satisfactorily in service (prior to evaluating a future license amendment for use of these design features on a production basis). Each GE14i assembly contains a small number of Zircaloy-2 clad isotope rods containing Cobalt-59. These Cobalt-59 targets will transition into Cobalt-60 isotope targets during cycle irradiation of the assemblies.

A copy of the affected HCGS Operating License and TS pages marked-up to show the proposed changes identified above is provided in Attachment 2.

3.0 BACKGROUND

The radionuclide Co-60 is a commonly used source of gamma radiation for radiation technology, both for medical and industrial purposes. Currently, Co-60 is used in applications such as neurosurgical devices, food irradiation, and gamma sterilization of medical devices. New applications are also being developed.

In medicine, Co-60 has been used to effectively treat patients over the last 30 years. It is widely used in applications for treating benign and malignant brain tumors, vascular malformations, and pain or other functional problems. It also plays a role in the food pasteurization industry. Food irradiation is the process of imparting ionizing energy to food to kill microorganisms. A third use of the Co-60 radionuclide is in the medical sterilization industry. More than 40% of US made medical devices (i.e., syringes, bandages, etc.) are sterilized using medical isotopes.

Production of radioactive cobalt starts with natural cobalt, which is an element composed of 100% Co-59, a stable isotope. Pellets made of 99.4% pure cobalt are placed in a nuclear reactor, where they stay for varying amounts of time that depend upon neutron flux, exposure limits, and the desired specific activity. While in the reactor, a Co-59 atom absorbs a neutron and is converted into a Co-60 atom. The resulting Co-60 is then sent offsite for further processing.

Exelon Generation Company, LLC recently submitted a similar ITA license amendment request for Clinton Power Station (Reference 1). To support Reference 1, References 2 and 3¹ provided a Request for Additional Information (RAI) to Exelon related to their ITA license amendment request based on GEH Safety Analysis Report NEDC-33505P. References 4 and 5 provided Exelon's response to References 2 and 3. Since References 2 and 3 are applicable to the PSEG ITA license amendment request (and GEH Safety Analysis Report NEDC-33529P), a response to the RAIs is also included as part of this submittal. Attachment 5 provides GEH proprietary responses which address the Reference 2 and 3 RAIs provided to Clinton Power Station, as they relate to HCGS.

4.0 TECHNICAL ANALYSIS

PSEG plans to load 12 ITAs as part of HCGS Reload 16 Cycle 17 core reload during the Fall 2010 refueling outage. These bundles, also referred to as GE14i ITAs, are planned to be in operation as part of a joint program with Global Nuclear Fuel - Americas, LLC (GNF) and GE - Hitachi Nuclear Energy Americas, LLC (GEH). The purpose of this ITA pilot program is to obtain surveillance data to verify that fuel bundles with the design features of the GE14i fuel bundle perform satisfactorily in service, prior to use of those features on a production basis. This proposed program results in the introduction of a new fuel assembly to the HCGS core. These ITAs will be located in non-limiting locations in the core with respect to thermal limit margins and shutdown margin.

¹ In addition to the Reference 2 and Reference 3 RAIs, Clinton also received additional dose related RAIs (Reference 6) in a letter dated November 2, 2009. Since the GEH and Exelon response to these additional RAIs were still under review and development at the time this PSEG license amendment request was being prepared, it was not practical to address the additional dose related RAIs in this submittal.

GEH proprietary report NEDC-33529P, "Safety Analysis Report to Support Introduction of GE14i Isotope Test Assemblies (ITAs) in Hope Creek Generating Station," dated December 2009, is provided in Attachment 3. This report contains a description of the GE14i fuel assembly, as well as, descriptions of the nuclear core design and applicability of nuclear and safety analysis methods. Attachment 3 also contains details relative to the licensing evaluations that were performed by GNF and GEH in support of the introduction of these new fuel assemblies to the HCGS core. A non-proprietary version of this report (NEDO-33529) is provided in Attachment 4. Attachment 5 provides GEH proprietary responses which address the Reference 2 and 3 RAIs provided to Clinton Power Station, as they relate to HCGS. As described in Attachment 3, all aspects of the GE14i ITAs are controlled under the GE Nuclear Energy Quality Assurance Program. The GE14i zirconium tubing and components are procured, fabricated, and handled under the same quality controls as standard production fuel rods at GNF. Target pellets are handled with similar quality controls as UO₂ pellets.

The GE14i isotope assemblies are placed in the nuclear reactor, where they stay for varying amounts of time that depend upon neutron flux and the desired specific activity. While in the reactor, a Co-59 atom absorbs a neutron and is converted into a Co-60 atom. The resulting irradiated isotope rods, now containing Co-60, are sent offsite for further processing.

As documented in Attachment 3, the design of the GE14i assembly utilizes segmented cobalt isotope rods. The design for the cobalt isotope rods is based on a proven design of segmented rods that has operated successfully without failure in a number of GNF fuel products and Lead Use Assembly (LUA) programs for decades, most recently at Forsmark and Gundremmingen.

GEH has completed the required non-cycle specific evaluations to support the loading of the GE14i ITAs in the HCGS reactor as described in Attachment 3. Attachment 3 also describes the number of cobalt isotope rods in each of the twelve GE14i assemblies, and the criteria used for determining the locations of the cobalt isotope rods in the lattice design. Cycle specific analyses will be performed for HCGS Reload 16 Cycle 17 to establish operating requirements for the ITAs that will assure compliance with regulatory limits. These cycle specific analyses will also ensure that the core loading has been designed such that the ITAs will not be the most limiting fuel assemblies at any time during the operating cycles, based on planned control rod patterns. Results of the cycle specific analyses will be documented in the HCGS Reload 16 Cycle 17 Supplemental Reload Licensing Report (SRLR).

The impact of the cobalt isotope rods on the anticipated operational occurrences (AOO) and design basis accidents (DBA) has been assessed and the assessment results are documented in Attachment 3. This includes an evaluation of the impact on previously evaluated AOOs (e.g., increase in reactor pressure events, decrease in reactor coolant system flow rate events, reactivity and power distribution anomalies, and increase in reactor coolant inventory events), other transients (e.g., Anticipated Transients without Scram), DBAs (e.g., Control Rod Drop Accident, Main Steam Line Break Accident, Fuel Handling Accident, and Loss of Coolant Accident), and radiological source terms and accident doses. These assessments have demonstrated that there is no impact to the current AOO and DBA results due to the introduction of this new fuel assembly.

Attachment 3 also addresses the applicability of the current analysis methods and methodologies to the GE14i ITA fuel design. In particular, the unique characteristics of GE14i ITA that the methods must address are the impacts of non-power producing cobalt isotope rods and the impacts of the connector sections of the cobalt isotope rods. The discussion in

Attachment 3 describes the approach utilized to address the unique characteristics of the GE14i ITA. Changes to methods that have been previously approved by the NRC are not required for the implementation of the GE14i ITAs at HCGS.

The HCGS containment analysis has also been evaluated to determine if there is an impact resulting from the introduction of the GE14i ITAs. As documented in Attachment 3, the key parameters determining containment response do not change for the GE14i ITA, including no significant change in core decay heat.

The addition of GE14i ITAs in either the reactor or spent fuel pool will not affect or alter refueling equipment environmental qualification radiation dose requirements. Attachment 3 concludes that there is no significant increase in occupational radiation exposure and no significant radiological environmental impacts with the implementation of the GE14i ITAs.

As discussed in Attachment 3, the gamma radiation effect on the spent fuel pool walls was evaluated. Due to gamma radiation heating effects on concrete, GE14i bundles are restricted to a location four feet from the Spent Fuel Pool (SFP) walls. The evaluation shows that, at 4 feet, the energy deposition rate is well below that required to cause significant concrete heating. This requirement will be implemented through appropriate procedural controls; a commitment to revise appropriate procedures is included as part of this submittal. Long-term concrete degradation begins with a total integrated gamma dose of approximately $1E+10$ R. The total integrated dose from a GE14i assembly left in the spent fuel pool, one foot from the side, after 3 years is less than $3.65E+9$ R, without taking into account any decay of the Co-60 or fission products. Therefore, there is no restriction on the amount of time a GE14i bundle can be stored in the SFP, provided the bundle is stored at least one foot from the pool wall to avoid integrated dose effects. Note that the four foot limit for gamma heating will be more limiting for storage locations.

The design of the GE14i fuel assemblies has been completed and is documented in Attachment 3. This includes isotope rod failure mechanisms, design limits and drawings and specifications. There has been no prototype testing completed on these fuel assemblies that PSEG can take credit for. However, the analysis documented in Attachment 3 shows that there will be no significant impact from operation in the HCGS core. The purpose of the introduction of these new fuel assemblies in an operating reactor core is to gain data on the performance of these assemblies under actual operational conditions.

As discussed in Attachment 5, typical calculations supporting use of core and channel decay ratios for HCGS facility will be provided. As stated in Attachment 8, PSEG commits to provide the NRC the calculations by July 8, 2010, consistent with the scheduled cycle specific reload required analyses (note that normally these calculations would be provided to PSEG by GNF just prior to the refuel outage; PSEG proposes to submit them to the NRC in advance to support the ITA license amendment request).

Once the 12 ITAs are introduced to the HCGS reactor core they are planned to remain in the core for three to four 18-month cycles depending on achieving the desired specific activity in subsequent core designs. Post irradiation examinations as described in Attachment 3 will be performed as necessary. In addition to these ITA examinations, cobalt isotope rods will be removed intact from the ITAs using the fuel prep machine located in the HCGS spent fuel pool. PSEG intends to remove one GE14i assembly after one cycle in the core and a single isotope rod will be removed from a GE14i assembly for inspection. This rod will be replaced with a new

cobalt isotope rod and the assembly will be returned to the reactor. After achieving the required level of activation of the Co-60 targets, the GE14i assemblies will be discharged from the HCGS core. These assemblies will be disassembled in accordance with the description provided in Attachment 3. The intact cobalt isotope rod segments will then be shipped in an approved shipping cask to the GEH Vallecitos Nuclear Center facility in Sunol California for examination and subsequent processing for commercial use in the medical or food industries. No removal of Co-60 from the cobalt isotope rods will take place at HCGS. Removal of the Co-60 sources from the cobalt isotope rod segments will only take place at off-site facilities under appropriate license.

Attachment 3 describes the cobalt isotope rod removal process including dose rates, curie content, potential impact on the shielding design of the spent fuel pool, the design of the tools used to disassemble the cobalt isotope rods, and contingency plans if issues are encountered. As noted above, Attachment 3 concludes that there is no significant increase in occupational radiation exposure and no significant radiological environmental impacts with the implementation of the GE14i ITA's. Therefore, all measures in place to ensure there is no overexposure due to movement of an irradiated assembly will prevent overexposure when transferring a GE14i assembly. PSEG and GEH do not intend to shuffle cobalt isotope rods between power cycles. The discharged cobalt isotope rods are not reinserted into the core as part of the same assembly or a different assembly.

HCGS TS 5.3.1 provides a description of the fuel assemblies used at HCGS. PSEG is also proposing to provide additional detail to TS 5.3.1 describing the specific GE14i ITAs containing the Co-59 targets. This additional change does not impact the description of the existing fuel assemblies or any assemblies other than the proposed ITAs.

Activities requiring a byproduct material license are covered under the requirements specified in 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," section 30.3, "Activities requiring license." This section states that except as provided for in 10 CFR 30.3, "...no person shall manufacture, produce, transfer, receive, acquire, own, possess, or use byproduct material except as authorized in a specific or general license issued in accordance with the regulations in this chapter." PSEG has reviewed the requirements for a specific byproduct material license as defined in 10 CFR Parts 32, 33, 34, 35, 36, 39, and 40 to determine if any of these requirements are applicable to the generation of Co-60 in the operating HCGS reactor. It has been determined that none of these requirements are applicable to this situation. In addition, it has been determined that a general byproduct license, as defined in 10 CFR Part 31, is also not required for this situation. Therefore, it has been determined that a Part 30 byproduct material license will not be required to proceed with the HCGS ITA pilot project.

PSEG is proposing to revise several operating license conditions to provide clarification as to how the proposed ITA pilot program meets the requirements of 10 CFR Parts 30 and 50. This clarification is provided by acknowledging that HCGS will be producing and transferring byproduct material (i.e., Co-60) in accordance with Parts 30 and 40. As described above, a separate Part 30 license is not required to support the introduction of the GE14i assembly at HCGS; introduction of the GE14i assembly is not outside the authorizations of the current HCGS Facility Operating License. In addition, the license condition indicating that PSEG is licensed to possess but not separate byproduct material will be revised to clarify that the removal of the intact Co-60 cobalt rod segments by disassembly of the fuel bundle does not constitute separation of the byproduct material as defined in 10 CFR Part 30. Finally, PSEG is

also proposing to add a new license condition that will acknowledge the intentional production of byproduct material in accordance with Part 30.

Attachment 3 provides a discussion for the source tracking considerations associated with the Co-60 produced in the HCGS ITAs. Details of how the individual cobalt rod segments are marked and tracked before and after removal from the reactor are provided in Attachment 3. The cobalt isotope rods will be identified with unique tracking numbers to aid in bundle placement and post-processing core location identification. In accordance with the NRC requirements, as documented in the final rule for 10 CFR Parts 20 and 32, source tracking will begin after the irradiated cobalt targets are removed from the cobalt isotope rods and encapsulated into sealed sources for final product use.

In summary, PSEG plans to implement an ITA pilot program at HCGS that will result in the generation of byproduct material in the core during power operation. Use of these assemblies will not affect the operation of the plant as demonstrated in the safety analysis report provided in Attachment 3. PSEG has determined that the proposed ITA pilot program continues to comply with the requirements of 10 CFR Parts 30 and 40. PSEG is proposing to revise the applicable license conditions, however, to provide clarification as to how HCGS continues to meet the requirements for possessing and handling byproduct material.

5.0 REGULATORY ANALYSIS

5.1 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met. As described above, PSEG has verified that HCGS will continue to meet the requirements of 10 CFR 30 and 10 CFR 40 while implementing the ITA pilot program.

10 CFR 50.36, "Technical specifications," requires that the facility's Technical Specifications (TS) will include a section addressing design features. In accordance with 10 CFR 50.36(d)(4), the design features to be included in this section are "those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety" and are not addressed in other sections of the TS. While the proposed change adds clarification as to the ITA materials of construction, the proposed change has no significant effect on safety. Based on the above, the only required change to TS is clarification to TS 5.3.1 as a result of the intentional production of Co-60 and implementation of the ITA pilot program. HCGS will continue to meet the requirements of 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities."

PSEG has determined that the proposed changes do not require any exemptions or relief from regulatory requirements, other than the facility operating license and technical specifications, and do not affect conformance with any General Design Criteria (GDC) differently than described in the UFSAR.

5.2 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," PSEG Nuclear LLC (PSEG) requests an amendment to Facility Operating License No. NPF-57 for Hope Creek Generating Station (HCGS). Specifically, the proposed change modifies HCGS License Condition 2.B.(6) and creates new License Conditions 1.J and

2.B.(7) as part of a pilot program to produce Co-60. The Co-60 would ultimately be sold to licensed users in the medical industry for use in cancer treatments, and blood and instrument sterilization, in the radiography and security industries for imaging, and to the food industry for cold pasteurization or irradiation sterilization. In addition to the proposed license condition changes, PSEG also requests an amendment to Appendix A, Technical Specifications (TS), of the HCGS Facility Operating License. This proposed change would modify TS 5.3.1, "Fuel Assemblies," to describe the Isotope Test Assemblies (ITAs) being used.

PSEG has evaluated whether a significant hazards consideration is involved with the proposed amendment by focusing on the three conditions set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed changes to the license conditions provide clarification and do not impact plant operation in any manner. The handling of byproduct material (i.e., Co-60) will continue to be done in accordance with the requirements of 10 CFR 30 and the requirements of the HCGS Facility Operating License. The proposed change to TS 5.3.1 provides clarification and additional description of the proposed ITAs to be used in the HCGS core. These changes do not involve an increase in the probability or consequences of an accident previously evaluated.

The use of the GE14i ITAs, has been evaluated for impact on the previously evaluated transients and design basis accidents for HCGS. GEH Safety Analysis Report- NEDC-33529P, "Safety Analysis Report to Support Introduction of GE14i Isotope Test Assemblies (ITAs) in Hope Creek Generating Station," dated December 2009, documents the results of the analyses completed to demonstrate the impact on operation following introduction of the ITAs in the HCGS core. The use of these ITAs does not adversely affect accident initiators or precursors, design assumptions, or the manner in which the plant is operated and maintained. The Cycle 17 (i.e., the first cycle of operation with the GE14i assembly) core will be designed so that the ITAs will be placed in non-limiting locations with respect to thermal limit margins or shutdown margins. The ITAs do not adversely affect the ability of any structures, systems or components (SSCs) to perform their intended safety function to mitigate the consequences of an initiating event within the assumed acceptance limits.

PSEG has also evaluated the effects of these ITAs on post-irradiation conditions. The additional heat from the Co-60 decay is insignificant when compared to the total heat from a normal refueling discharge. The small amount of extra heat added by the cobalt isotope rods poses no additional risk of spent fuel pool (SFP) local boiling over that previously analyzed. The maximum incident radiation due to an irradiated GE14i bundle placed one foot from the spent fuel pool walls is in excess of the radiation that would result in significant gamma heating of the concrete. However, analysis has demonstrated that at four feet, the energy deposition rate is well below that required to cause significant concrete heating. HCGS procedures exist to guide placement of irradiated fuel bundles in the SFP to avoid gamma heating of the wall concrete. These procedures will be modified to specify that irradiated GE14i bundles must be stored at least four feet from the SFP walls. With the four foot distance requirement in effect, there is no limitation on the amount of time an irradiated GE14i bundle can be stored in the SFP.

Handling of the licensed transfer casks will be in accordance with the guidance in NUREG 0612, "Control of Heavy Loads at Nuclear Power Plants," using the Reactor Building crane. These precautions will support safe movement of the casks within the Reactor Building.

The consequences of a previously analyzed event are dependent on the initial conditions assumed in the analysis, the availability and successful functioning of equipment assumed to operate in response to the analyzed event, and the setpoints at which these actions are initiated. The consequences of a previously evaluated accident are not significantly increased by the proposed change. As documented in NEDC-33529P, the proposed change does not affect the performance of any equipment credited to mitigate the radiological consequences of an accident. Evaluation of operation with the GE14i assemblies in the HCGS core demonstrated that the licensing basis radiological analyses are not adversely impacted by the introduction of twelve GE14i assemblies at HCGS. This includes the analyses done for the transients and design basis accident events.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed revision to the HCGS license conditions and TS 5.3.1 will not introduce any new or modified equipment since these changes are intended to provide clarification only. These clarifications will not result in operation of the facility in a different way than currently operated.

While the proposed ITA pilot program does result in the introduction of several modified fuel bundles (the GE14i assemblies) these assemblies are essentially the same as the GE14 assemblies currently in use in the HCGS core. The only difference is the use of a number of cobalt isotope rods in place of fuel rods. The GE14i assembly was designed for mechanical, nuclear, and thermal-hydraulic compatibility with the GE14 fuel design. The details of the design differences between GE14 and GE14i are documented in NEDC-33529P. Use of the proposed ITAs does not involve the addition or modification of any plant equipment other than the bundles modified to include the cobalt isotope rods. Also, use of the proposed ITAs will not alter the design configuration or method of operation of plant equipment beyond its normal functional capabilities. The ITA pilot program does not create any new credible failure mechanisms, malfunctions or accident initiators.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

The proposed changes to the HCGS operating license conditions are intended to provide clarification as to how the generation of byproduct material in the HCGS reactor core meets the requirements of 10 CFR Part 30. The proposed change to TS 5.3.1 also provides clarification and additional description of the proposed ITAs to be used in the HCGS core. These proposed changes will not affect the design or operation of any equipment important to safety. In addition, the proposed changes to the license conditions and TS do not affect the results of any safety calculations.

Cycle independent analyses documented in NEDC-33529P show that the acceptance criteria for the safety analyses are not affected and are met. Cycle specific analyses for the ITAs will be performed as described in NEDC-33529P to establish fuel operating requirements that assure compliance with regulatory limits.

The proposed ITA pilot program has no impact on equipment design or fundamental operation, other than the modifications made to the fuel assembly as part of the program. The GE14i ITAs meet the same fuel design and licensing criteria as GE14 bundles. There are no changes being made to safety limits or safety system allowable values that would adversely affect plant safety as a result of the proposed ITAs. The performance of the systems important to safety is not affected by the use of the proposed ITAs. The proposed change does not adversely affect safety analysis assumptions, initial conditions, or acceptance criteria and therefore, the margin of safety in the original safety analyses is maintained.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, PSEG concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified.

5.3 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set

forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 REFERENCES

1. Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies," dated June 26, 2009 (ADAMS Accession No. ML091801061)
2. Letter from U. S. NRC to Mr. Charles G. Pardee (Exelon Generation Company, LLC), "Clinton Power Station, Unit No. 1 - Request for Additional Information Related to License Amendment Request to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies (TAC No. ME1643)," dated October 16, 2009 (ADAMS Accession No. ML092800426)
3. Letter from U. S. NRC to Mr. Charles G. Pardee (Exelon Generation Company, LLC), "Clinton Power Station, Unit No. 1 - Request for Additional Information Related to License Amendment Request to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies (TAC No. ME1643)," dated October 16, 2009 (ADAMS Accession No. ML092800374)
4. Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "Additional Information Supporting the Request for a License Amendment to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies," dated November 4, 2009 (ADAMS Accession No. ML093100313)
5. Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "Additional Information Supporting the Request for a License Amendment to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies," dated November 17, 2009 (ADAMS Accession No. ML093210561)
6. Letter from U. S. NRC to Mr. Charles G. Pardee (Exelon Generation Company, LLC), "Clinton Power Station, Unit No. 1 - Request for Additional Information Related to License Amendment Request to Modify Clinton Power Station Facility Operating License in Support of the Use of Isotope Test Assemblies (TAC No. ME1643)," dated November 2, 2009 (ADAMS Accession No. ML0930302180)

Mark-up of Proposed Operating License and Technical Specification Pages

The following Technical Specifications and Facility Operating License pages for Facility Operating License NPF-57 are affected by this change request

<u>Facility Operating License</u>	<u>Page</u>
License Conditions 1.J (new)	2
License Condition 2.B.(6)	3
License Conditions 2.B.(7) (new)	3

<u>Technical Specification</u>	<u>Page</u>
5.3.1	5-4

- H. After weighing the environmental, economic, technical, and other benefits of the facility against environmental and other costs and considering available alternatives, the issuance of Facility Operating License No. NPF-57, subject to the conditions for protection of the environment set forth in the Environmental Protection Plan attached as Appendix B, is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied; and
 - I. The receipt, possession, and use of source, byproduct and special nuclear material as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Parts 30, 40 and 70.
 - J. *The receipt, production, possession, transfer, and use of Cobalt-60 as authorized by this license will be in accordance with the Commission's regulations in 10 CFR Part 30.*
2. Based on the foregoing findings and approval by the Nuclear Regulatory Commission at a meeting on July 21, 1986, the License for Fuel Loading and Low Power Testing, License No. NPF-50, issued on April 11, 1986, is superseded by Facility Operating License NPF-57 hereby issued to PSEG Nuclear LLC (the licensee), to read as follows:
- A. This license applies to the Hope Creek Generating Station, a boiling water nuclear reactor, and associated equipment (the facility) owned by PSEG Nuclear LLC. The facility is located on the licensees' site on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey. The facility is located approximately eight miles southwest of Salem, New Jersey and is described in the PSEG Nuclear LLC Final Safety Analysis Report, as supplemented and amended, and in the Environmental Report, as supplemented and amended.
 - B. Subject to the conditions and requirements incorporated herein, the Commission hereby licenses:
 - (1) PSEG Nuclear LLC, pursuant to Section 103 of the Act and 10 CFR Part 50, to possess, use and operate the facility at the above designated location in Salem County, New Jersey, in accordance with the procedures and limitations set forth in this license;
 - (2) Deleted
 - (3) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;

- (4) PSEG Nuclear 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;
- (5) PSEG Nuclear 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
- (6) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility. *Mechanical disassembly of the GE14i isotope test assemblies containing Cobalt-60 is not considered separation.*
- (7) *PSEG Nuclear LLC, pursuant to the Act and 10 CFR Part 30, to intentionally produce, possess, receive, transfer, and use Cobalt-60.*

C. This 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 and 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

PSEG Nuclear LLC is authorized to operate the facility at reactor core power levels not in excess of 3840 megawatts thermal (100 percent rated power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 179, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated into the license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Inservice Testing of Pumps and Valves (Section 3.9.6, SSER No. 4)*

This License Condition was satisfied as documented in the letter from W. R. Butler (NRC) to C. A. McNeill, Jr. (PSEG) dated December 7, 1987. Accordingly, this condition has been deleted.

*The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

DESIGN FEATURES

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 764 fuel assemblies—and shall be limited to those assemblies which have been approved for use in BWRs

A maximum of twelve GE14i Isotope Test Assemblies may be placed in non-limiting core regions, beginning with Reload 16 Cycle 17 core reload, with the purpose of obtaining surveillance data to verify that the GE14i cobalt Isotope Test Assemblies perform satisfactorily in service (prior to evaluating a future license amendment for use of these design features on a production basis). Each GE14i assembly contains a small number of Zircaloy-2 clad isotope rods containing Cobalt-59. Cobalt-59 targets will transition into Cobalt-60 isotope targets during cycle irradiation of the assemblies.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 185 cruciform shaped control rod assemblies. The control material shall be boron carbide powder (B₄C) and/or hafnium metal. The absorber material has a nominal absorber length of 143 inches.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

- a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,
- b. For a pressure of:
 1. 1250 psig on the suction side of the recirculation pump.
 2. 1500 psig from the recirculation pump discharge to the jet pumps.
- c. For a temperature of 575°F.

VOLUME

5.4.2 The total water and steam volume of the reactor vessel and recirculation system is approximately 21,970 cubic feet at a nominal steam dome saturation temperature of 547°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1.1-1.