

RS-09-181

10 CFR 50.90

December 28, 2009

U. S. Nuclear Regulatory Commission
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Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: 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

- 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
 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 November 2, 2009 (ADAMS Accession No. ML093030218)
 3. 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 20, 2009
 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 17, 2009

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to the facility operating license for Clinton Power Station (CPS), Unit 1. Specifically, the proposed change would modify CPS License Condition 2.B.(6) and create 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, EGC also requests an amendment to Appendix A, Technical Specifications (TS), of the CPS Facility Operating License. This proposed change would modify TS 4.2.1, "Fuel Assemblies," to describe the Isotope Test Assemblies (ITAs) being used. In Reference 2, the NRC requested that EGC provide additional information in support of their review of Reference 1. The NRC request for additional information and the specific EGC responses were provided in Reference 3.

On November 30, 2009, EGC and the NRC conducted a conference call to discuss the responses provided in Reference 3. During this conference call additional information was requested concerning the EGC response to RAI 4. A number of subsequent conference calls were also conducted to address the request for clarification on the EGC response to RAI 4. In a call on December 17, 2009 with the CPS NRC Project Manager, EGC was asked to provide an evaluation of the need for a new TS to address the addition of the ITAs in the CPS core. Specifically, the NRC requested that EGC perform an evaluation against the requirements of 10 CFR 50.36, "Technical specifications," to determine if a new TS addressing a limit on cobalt in the reactor coolant system is required. This requested evaluation is provided in the attachment to this letter.

EGC has reviewed the information supporting a finding of no significant hazards consideration that was provided to the NRC in Reference 4. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. No new regulatory commitments are established by this submittal.

If you have any questions concerning this letter, please contact Mr. Timothy A. Byam at (630) 657-2804.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of December 2009.

Respectfully,



Jeffrey L. Hansen
Manager – Licensing
Exelon Generation Company, LLC

Attachments: 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

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In Reference 1, the NRC requested that Exelon Generation Company, LLC (EGC) provide justification as to how Technical Specification (TS) Limiting Condition for Operation (LCO) 3.4.8, "RCS Specific Activity," remains able to ensure that 10 CFR 50.67 and 10 CFR 100 limits, as applicable, and radiation shielding and plant personnel radiation protection design limits are met following the introduction of the Isotope Test Assemblies (ITAs) to the Clinton Power Station (CPS) core. In the Attachment to Reference 2, EGC documented the basis for LCO 3.4.8. It was stated that the iodine isotopic activities per gram of reactor coolant are expressed in terms of a DOSE EQUIVALENT I-131. The allowable levels are intended to limit the two hour radiation dose to an individual at the site boundary to a small fraction of the 10 CFR 50.67 limit. EGC noted in this response that while LCO 3.4.8 does not specifically address the additional cobalt in the CPS core, it does address the isotopic specific activity that ensures the source term assumed in the safety analysis for the Main Steam Line Break (MSLB) is not exceeded.

EGC has completed an additional review of the wording of LCO 3.4.8 based on the current Standard TS (i.e., NUREG-1434). It was confirmed that at one time there was a limit for the reactor coolant system gross specific activity. This limit was subsequently removed from the standard TS when NUREG-1434 was developed. The removal of this limit was completed based on Standard Technical Specification Change Traveler BWR-12. This change traveler supported the removal of this limit on the basis that the requirement of the gross specific activity limit is not necessary as a result of existing TS requirements. As documented in BWR-12, it was concluded that since (1) the reactor coolant limit on DOSE EQUIVALENT I-131 adequately assures that offsite doses will not exceed small fractions of the limits of 10 CFR 100 (10 CFR 50.67 for the current CPS licensing basis) in the event of a MSLB outside containment and (2) gross gamma radioactivity rate of the noble gases measured at the condenser evacuation system pretreatment monitor station is limited by LCO 3.11.2.7 (see CPS LCO 3.7.5, "Main Condenser Offgas") to a value that provides reasonable assurance the reactor coolant gross specific activity is maintained at a sufficiently low level to preclude offsite doses from exceeding a small fraction of the limits of 10 CFR 100, the requirements associated with the gross specific activity are unnecessary.

BWR-12 stated that BWR operating experience showed that as fuel leakage increases, the DOSE EQUIVALENT I-131 approaches the TS limit much more rapidly than does the gross specific activity. As documented in the BWR-12 No Significant Hazards Consideration, the BWR design utilizes main condenser air ejectors to remove non-condensable gases from the reactor coolant. The non-condensable gases are then sampled, monitored, and processed by the offgas treatment system prior to release to the environment. The offgas pretreatment sample provides a more representative sample of the noble gases that would be released in the event of a main steam line failure outside containment than did the reactor coolant sample taken from the reactor recirculation system as part of the former gross specific activity requirement. The offgas pretreatment monitor includes a setpoint which responds to release rates above a specified level which is established to ensure that untreated releases would not result in a whole body dose that exceeds a small fraction of the limits of 10 CFR 100.

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10 CFR 50.36, "Technical specifications," requires that each license authorizing operation of a production facility will include technical specifications. The TS will be derived from the analyses and evaluation included in the safety analysis report. 10 CFR 50.36(c)(2)(i) defines the limiting conditions for operation as the lowest functional capability or performance level of equipment required for safe operation of the facility. It goes on to state that when a limiting condition for operation is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met. As defined in 10 CFR 50.36(c)(2)(ii), a TS limiting condition for operation must be established for each item meeting one or more of the following criteria.

"(A) *Criterion 1.* Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

(B) *Criterion 2.* A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

(C) *Criterion 3.* A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

(D) *Criterion 4.* A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety."

The following provides an evaluation of the proposed ITA pilot program against each of the criterion for an LCO, to determine if a new TS is required.

Criterion 1

Criterion 1 addresses the installation of instrumentation used to detect and indicate in the control room a significant abnormal degradation of the reactor coolant pressure boundary. The proposed change to CPS involves the introduction of a new fuel assembly design (i.e., GE14i) that includes a number of isotope rods containing cobalt (Co)-59. The introduction of the GE14i assembly is part of a pilot program to irradiate the Co-59 targets to produce Co-60. There is no new instrumentation being installed at CPS and no new assumptions associated with existing instrumentation as part of this pilot program. Therefore, no new LCO is required under Criterion 1.

Criterion 2

This criterion addresses process variables, design features, or operating restrictions that are an initial condition for a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The specific activity in the reactor coolant system is an initial condition in the evaluation of the consequences of a MSLB outside containment. As a result, any contributor to the

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reactor coolant system specific activity could potentially affect this initial condition. While there is a small amount of Co-60 assumed to be in the reactor coolant system during normal operation, as defined in Regulatory Position 3.1 of Regulatory Guide 1.183, the other isotopes (i.e., DOSE EQUIVALENT I-131 and non-condensable gases) assumed in the coolant are a much more significant contributor to the accident analysis initial conditions. As stated above, it is expected that as fuel leakage increases, the DOSE EQUIVALENT I-131 approaches the TS limit much more quickly than any of the other isotopes present would approach a limit affecting the 10 CFR 100 or 10 CFR 50.67 guidelines, as applicable.

In the EGC response to RAI 4 in Reference 2, it was stated that failure of the isotope rods such that they were to become significantly compromised (i.e., that cobalt may have escaped from the isotope rods) is highly unlikely. References 4 and 5 document the multiple cobalt isotope rod design features intended to mitigate the failure and/or consequences of the failure of the ITA during operation. Regardless of the failure mode, two layers of zircaloy cladding and a layer of nickel plating must be breached before cobalt is exposed to reactor coolant. In order for an entire target to escape, the outer cladding and inner cladding must be breached, then the two breach points would need to be aligned and of sufficient size. Beyond this, the nickel coating on the cobalt targets provides a protective barrier against releasing cobalt from the targets to the reactor coolant.

If the Co-60 targets were to be released into the reactor coolant, they are expected to remain in solid form and therefore, will not result in additional gaseous isotopes being released. This means that in the unlikely event that an isotope rod was to fail such that Co-60 targets were released to the reactor coolant system, there would be no impact to the initial conditions for the MSLB. The impact would be much less than the impact from the DOSE EQUIVALENT I-131 and the noble gases released through the off-gas system.

EGC has performed a scoping study that evaluated the impact on the Control Room dose resulting from a Loss of Coolant Accident (LOCA) with the additional Co-60 in the core. The LOCA Control Room dose was evaluated since it is the limiting dose for CPS in the radiological design basis analyses. The alternative source term (AST) analysis RADTRAD computer LOCA runs were modified to increase the amount of Co-60 to correspond to the amount being added in the ITAs. The new total Co-60 inventory was then multiplied by a factor of 10 to evaluate the impact of a potentially higher release fraction. The results of the scoping study indicate that there is no observable change in the total dose for the control room within the accuracy of the reported doses. Additionally, this study indicates that there is little impact to the offsite dose even in the unlikely case that Co-60 is released using a potentially increased release fraction.

Therefore, introduction of the ITAs to the CPS core will not result in the need to create a new LCO in accordance with Criterion 2.

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Criterion 3

This criterion addresses any structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient. The introduction of the ITAs does not add a new structure, system or component taken credit for in the mitigation of a design basis accident or transient. The GE14i bundle design has been evaluated against the CPS design basis accidents and transients as documented in Reference 3. This evaluation indicates that the proposed pilot program does not involve a significant increase in the probability or consequences of an accident previously evaluated or create the possibility of a new or different kind of accident from any accident previously evaluated. As a result, no existing structure, system, or component, not already addressed in TS, requires a new LCO. In addition, no new structure, system or component is taken credit for such that a new LCO is required under Criterion 3.

Criterion 4

Criterion 4 requires an LCO for any structure, system or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety. The EGC response to RAI 9a in the attachment to Reference 4 addresses the potential for failure of an isotope rod. As documented in the response, it is noted that the design features of the isotope rods include multiple levels of safety including two layers of encapsulation before exposure of nickel-plated cobalt targets, solid Zircaloy connections at all spacer locations, and a lower heat generation rate compared to fuel rods. The isotope rods are not more vulnerable to common failure modes than normal fuel rods during operation. As documented in the response to RAI 4 in Reference 2, failure of the isotope rods such that they were to become significantly compromised (i.e., that cobalt may have escaped from the isotope rods) is highly unlikely. If the Co-60 targets were to be released into the reactor coolant, they are expected to remain in solid form and therefore, will not result in additional gaseous isotopes being released. As such, the introduction of ITAs as part of the pilot program at CPS does not result in a significant impact to the public health and safety. Therefore, a new LCO in accordance with the requirement of Criterion 4 is not necessary.

In summary, the above evaluation demonstrates that the implementation of the pilot program to introduce the ITAs to the CPS core will not result in the need to create a new LCO in accordance with the criteria specified in 10 CFR 50.36(c)(2)(ii). The existing TS LCOs will continue to ensure the reactor coolant gross specific activity and the offgas release rates are maintained at a sufficiently low level to preclude offsite doses from exceeding a small fraction of the limits of 10 CFR 100 and 10 CFR 50.67, as applicable.

References:

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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
5. Letter from 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