



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

October 9, 2018

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

SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION CALVERT CLIFFS
NUCLEAR POWER PLANT – NRC INTEGRATED INSPECTION REPORT
05000317/2018001 AND 05000318/2018001

Dear Mr. Hanson,

This letter refers to your June 7, 2018, correspondence (ML18162A076)¹, in response to our May 9, 2018, letter and integrated NRC inspection report 05000317/2018001 and 05000318/2018001 (ML18130A878), which included a non-cited violation (NCV).

In your June 7, 2018, letter, you stated that the NCV was unwarranted and that it should be rescinded. Specifically, Exelon Generation Company (Exelon) contends that “it was not reasonable to expect high radiation levels in the 11A reactor coolant pump bay given the 4.5 foot thickness of the concrete wall between the refuel pool (refueling cavity) and the 11A reactor coolant pump bay.”

The NRC conducted a detailed review of your response and the applicable NRC regulations and inspection guidance. Region I staff who were not involved with the initial inspection effort performed this review.

The NRC acknowledges that its regulations are not explicit with respect to the identification of the dose rate necessary to determine whether an area is required to be locked in accordance with Technical Specifications. The NRC acknowledges that based on your previous experience, if the in-core detectors were stored at the same location used during previous outages, your radiological practices would likely have been reasonable. However, the circumstances during this outage were not the same. Therefore, it remains the NRC’s conclusion that Exelon, in preparing to store 25 in-core detectors in a new location in the refueling cavity adjacent to the reactor coolant pump area, did not adequately assess the potential for an increase in dose rates in the 11A reactor coolant pump bay. Specifically, a radiological survey was not performed during the in-core detector movement to verify that movement and storage of the in-core detectors against the refueling cavity wall would not change dose rates in the 11A reactor coolant pump bay. When performing evolutions that involve movement and storage of highly radioactive sources such as the withdrawn in-core instrumentation, it is imperative that

¹ Designation in parentheses refers to an Agency-wide Documents Access and Management System (ADAMS) accession number. Documents referenced in this letter are publicly-available in accordance with agency policy using the accession number in ADAMS, except for documents containing sensitive information in accordance with agency policy.

licensees take necessary actions to appropriately assess the radiological impact in order to assure that controls are in place to inform and protect plant workers. The NRC recognizes, however, that the potential consequences in this specific case were largely mitigated by the licensee's practice of using personnel dose rate alarming dosimetry. Further, the conservatively low dose rate setpoint enabled workers to avert and avoid high doses.

The NRC considered Exelon's position that requiring the performance of surveys to verify that as-built design features are maintained, would set a costly new precedence resulting in licensees performing additional unnecessary radiation surveys. It is the NRC's position, as clarified in the enclosure to this letter, that when highly radioactive sources such as the withdrawn in-core instrumentation are moved and stored in a new plant location, it is reasonable under such circumstances to appropriately evaluate the radiological impact of the proposed activity and take actions, as necessary, commensurate with the potential risk to workers.

Therefore, after careful consideration of the bases for your denial of the NCV, we determined that the violation and characterization of the finding were sufficiently supported in the inspection report. The specific basis for this determination is described in the enclosure.

In accordance with 10 CFR 2.390 of the NRC's "Rule of Practice," a copy of this letter, its enclosure and your June 7, 2018, response will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

/RA J. L. Nick for/

James Trapp, Director
Division of Nuclear Materials Safety

Docket Nos. 50-317 and 50-318
License Nos. DPR-53 and DPR-69

Enclosure: Summary as stated

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SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION CALVERT CLIFFS
 NUCLEAR POWER PLANT – NRC INTEGRATED INSPECTION REPORT
 05000317/2018001 AND 05000318/2018001 DATED OCTOBER 9, 2018

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NRC Staff Review of June 7, 2018 Letter

Non-Cited Violation (NCV) 05000317/2018001-01

Restatement of the Violation:

On February 23 - 24, 2018, the inspectors reviewed a self-revealed Green non-cited violation (NCV) of Title 10 *Code of Federal Regulations* (10 CFR) 20.1501, "Surveys and Monitoring: General," that was identified when Exelon Generating Company (Exelon) did not make or cause to be made surveys that were necessary for the licensee to comply with the regulations in Part 20 and that were reasonable under the circumstances to evaluate the magnitude and extent of radiation levels. As a result of that failure, Exelon did not identify the presence of dose rates exceeding 1000 mrem/hr within an area being controlled as a High Radiation Area. Specifically, the licensee had been applying High Radiation Area access controls for the 11A reactor coolant pump (RCP) bay, based on initial radiological surveys performed at the start of the outage and historical dose rates in the room from the adjacent refueling cavity. However, the licensee did not perform subsequent surveys to evaluate the resulting radiation levels in the 11 RCP bay after changing the storage location of the in-core instrument (ICI) wires to an area approximately ten feet higher within the cavity. Due to the change in location of the aggregated highly radioactive in-core instrumentation surveys were reasonably necessary to demonstrate compliance with Exelon procedure RP-AA-460 section 3.4. The area wasn't identified and controlled as a Locked High Radiation Area, however, until a worker's electronic dosimeter alarmed.

Licensee Response (Summary):

The NRC issuance of an NCV of 10 CFR 20.1501 is not warranted in that Exelon took adequate radiological protection actions that were reasonable under the known circumstances for the ICI wires storage evolution in accordance with 10 CFR 20.1501. Exelon could not have been reasonably expected to foresee that dose rates in 11A RCP bay would be impacted given the as-built design features of the 4.5 foot thick refuel pool concrete wall. As indicated in 10 CFR 20.1501(a)(2) surveys must be made when it is reasonable under the circumstances. It is Exelon's contention that the design of the refuel pool and the procedural requirements governing its operation are such that it would not have been reasonable to survey the adjacent 11A RCP bay when the ICI wires were stored alongside the refuel pool concrete wall.

Exelon procedure RP-AA-300-1005, Removing Items from the Spent Fuel Pool, Reactor Cavity, and Equipment Pit, that governs movement of highly irradiated equipment, contains a note stating that movement of irradiated components past gates, nozzles, and penetrations can cause streaming and elevated dose rates. However, given that the area of the 11A RCP bay where the localized high radiation occurred contains none of these features, there was no reason for Exelon to have foreseen the need to perform a radiological survey in this area. Only the existence of a previously unknown, undetectable anomaly in the concrete wall resulted in localized radiation streaming requiring the adjacent, affected area to become a locked high radiation area. The licensee's root cause investigation identified that the most likely cause of the localized radiation streaming experienced in 11A RCP bay was a previously unknown anomaly that exists within the tongue and groove construction joint at that location.

Although there are numerous external operating experiences where citations have been issued to licensees for failure to perform adequate surveys, none of these violations were such that any of these could have reasonably led Exelon to identify the need to perform a survey in the areas adjacent to the refuel pool concrete wall.

NRC Evaluation:

10 CFR 20.1501, states, in part, “Each licensee shall make or cause to be made, surveys of areas, including the subsurface, that (1) May be necessary for the licensee to comply with the regulations in this part; and (2) Are reasonable under the circumstances to evaluate –

- (i) The magnitude and extent of radiation levels; and
- (ii) Concentrations or quantities of residual radioactivity; and
- (iii) The potential radiological hazards of the radiation levels and residual radioactivity detected.”

The NRC Region I staff performed an independent review of the assertion that due to the robust design features of the refuel pool concrete wall, Exelon could not have foreseen the localized streaming into the 11A RCP bay, and thus your evaluation of potential radiological hazards was “reasonable under the circumstances.”

During this evolution, the NRC notes that Exelon made significant changes from past operations when handling the very highly radioactive in-core detectors. During this evolution, Exelon aggregated a total of 25 in-core detectors immediately adjacent to the refuel pool concrete wall, which is approximately 40 percent more than previously aggregated. Exelon also stored the aggregated in-core detectors in a new location, approximately ten feet higher than in previous evolutions. This created higher potential dose rates in adjacent areas than previously encountered. After storing the in-core instrumentation in the refueling cavity adjacent to the reactor coolant pump area, Exelon did not perform a radiological survey in the 11A Reactor Coolant Pump bay or conduct an assessment to evaluate potential dose rates in the area. In this case, the dose rates in the reactor coolant pump area exceeded the dose rate that would require locking the area to protect plant workers, by more than a factor of two. It was not until a worker’s alarming dosimeter alarmed while working in the area that Exelon conducted a survey and determined that the area should have been locked. When performing evolutions that involve movement and storage of highly radioactive sources, such as the withdrawn in-core instrumentation, it is imperative that licensees take necessary actions to evaluate the extent of radiation levels present and assure controls are in place to inform and protect plant workers. The NRC did not find any indication that a review had been performed in this case; subsequently, plant personnel accessed the area without knowledge of the potential dose rate and appropriate controls to prevent potential consequences.

In our review, we acknowledged that the follow-up calculations demonstrated that a 4½ feet of concrete would have been typically sufficient to effectively shield radiation from the in-core wires, and that there was no history of documented elevated dose rates in the 11A RCP bay associated with the movement and storage of spent fuel or in-core instrumentation wires. Nevertheless, a thorough evaluation of the radiological hazards associated with moving and storing highly radioactive withdrawn in-core instrumentation may have invalidated the assumptions of adequate shielding. The inspectors also considered that the 11A RCP bay was physically accessible for a radiological survey which would have been a reasonable measure, in this specific case, to assure that adequate shielding is present for the new storage location of the withdrawn in-core instrumentation. The 10 CFR 20.1003 definition of a survey specifies an evaluation of potential hazards incident to the production, use, transfer, release, disposal, or

presence of radioactive material, and when appropriate, such an evaluation includes a physical survey. In this case, the evaluation did not fully evaluate the adequacy of shielding and a physical survey was not performed.

Therefore, the staff concludes that during this evolution, the licensee did not comply with 10 CFR 20.1501, in that the licensee did not make or cause to be made surveys that were reasonable under the circumstances to evaluate the magnitude and extent of radiation levels, and the potential radiological hazards of radiation levels in the 11A reactor coolant pump bay. The staff also concluded that this failure was within the ability of Exelon to foresee and correct. Consequently, the inspectors confirmed that the non-cited violation was correctly documented, as described in ML18130A878, Calvert Cliffs Nuclear Power Plant – Integrated Inspection Report 05000317/2018001 and 05000318/2018001, May 9, 2018.

References

- 1) ML18130A878, Calvert Cliffs Nuclear Power Plant – Integrated Inspection Report 05000317/2018001 and 05000318/2018001, May 9, 2018
- 2) ML18162A076, Response to NRC Integrated Inspection Report 05000317/2018001 and 05000318/2018001 dated May 9, 2018, June 7, 2018
- 3) Drawing 61759, Containment Interior Plan @ EL. 45'-0", Revision 11
- 4) Drawing 60061, Civil Standards, Revision 9
- 5) Drawing 61791, Containment Interior Refueling Canal Reinf. Sheet #1, Revision 1
- 6) CCNPP 2018001-01 – Post-Event Shielding Calculations, April 24, 2018
- 7) RV-68, In-Core Instrumentation Removal, Revision 23
- 8) RP-AA-300-1005, Removing Items from the Spent Fuel Pool, Reactor Cavity, and Equipment Pit, Revision 1
- 9) RP-AA-300-1006, Radiological Controls for System Operations with Radiological Impact in Normally Accessible Areas, Revision 0
- 10) RP-AA-401, Operational ALARA Planning and Controls, Revision 22
- 11) RP-AA-460, Controls for High and Locked High Radiation Areas, Revision 31
- 12) NUREG-1736, Consolidated Guidance: 10 CFR Part 20 – Standard for Protection Against Radiation, October 2001
- 13) Survey 2018-003270, Unit 1 CTMT – 11 RCP Bay – Motor Level, February 23, 2018
- 14) Survey 2018-003297, Unit 1 CTMT – 11 RCP Bay – Motor Level, February 24, 2018
- 15) Survey 2018-003329, Unit 1 CTMT – 11 RCP Bay – Motor Level, February 25, 2018
- 16) Survey 2018-003356, Unit 1 CTMT – 69' – Refueling Mode, February 26, 2018

- 17) Survey 2018-003400, Unit 1 CTMT Refuel – Refuel Pool, February 27, 2018
- 18) 18RFO-0015, Combined ALARA Plan – RT 10842007, Remove ICI's IAW RV-68 Procedure, February 2, 2018
- 19) Regulatory Guide 8.38, Revision 1, May 2006, Control of Access to High and Very High Radiation Areas in Nuclear Power Plants
- 20) NRC Information Notice No. 93-39: Radiation Beams from Power Reactor Biological Shields, May 25, 1993.
- 21) NRC Information Notice No. 93-33: Sources of Occupational Radiation Exposures at Spent Fuel Storage Pools, May 9, 1990
- 23) NRC Information Notice No. 95-56: Shielding Deficiency in Spent Fuel Transfer Canal at a Boiling-Water Reactor, December 1995