



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

January 22, 2020

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

SUBJECT: THREE MILE ISLAND NUCLEAR STATION, UNIT 1 – WITHDRAWAL OF ORDER EA-12-049, “ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS” (EPID NO. L-2019-JLD-0018)

Dear Mr. Hanson:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A735), the U.S. Nuclear Regulatory Commission (NRC, the Commission) issued Order EA-12-049 to Exelon Generation Company, LLC (Exelon, the licensee). This order requires certain actions at Three Mile Island Nuclear Station, Unit 1 Station (TMI-1) associated with the Fukushima Near-Term Task Force recommendations. Specifically, Order EA-12-049 directed all power reactor licensees, and holders of construction permits in active or deferred status, to develop and implement strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE).

Section IV of Order EA-12-049 (the Order) required that Exelon submit to the Commission for review an overall integrated plan by February 28, 2013, describing how TMI-1 will achieve compliance with the requirements of the Order. The licensee responded to the Order by letter dated February 28, 2013 (ADAMS Accession No. ML13059A299). By letter dated June 29, 2016 (ADAMS Accession No. ML16183A025), the licensee notified the NRC that full compliance with the Order had been achieved at TMI-1. The NRC staff issued a safety evaluation describing its review of the TMI-1 order compliance plan on February 14, 2017 (ADAMS Accession No. ML17025A409), and documented a compliance inspection at the TMI-1 site by letter dated September 11, 2017 (ADAMS Accession No. ML17255A131).

Section IV of the Order also stipulates that the NRC’s Director of the Office of Nuclear Reactor Regulation may, in writing, relax or rescind any of the conditions of the Order upon demonstration by the licensee of good cause.

By letter dated June 20, 2017 (ADAMS Accession No. ML17171A151), Exelon submitted to the NRC a certification of permanent cessation of operations for TMI-1 in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.82(a)(1)(i). In this letter, Exelon provided notification to the NRC of its intent to permanently cease operations at TMI-1 on or about September 30, 2019. The reactor at TMI-1 was permanently shutdown on September 20, 2019. By letter dated September 26, 2019 (ADAMS Accession No. ML19269E480), Exelon certified to the NRC that it had permanently removed all fuel from the TMI-1 reactor vessel and placed it in the SFP. Further, Exelon confirmed its understanding

that, under 10 CFR 50.82(a)(2), the 10 CFR Part 50 license for TMI-1 no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel.

By letter dated November 11, 2019 (ADAMS Accession No. ML19315A005), Exelon requested the withdrawal of Order EA-12-049, to be effective after November 15, 2019. This corresponds to the end of a 56-day period following the permanent cessation of operations. Exelon states that, after 56 days, the decay heat load in the SFP has sufficiently decreased to a point where the order requirements for maintaining the SFP cooling safety function after a BDBEE are not necessary.

According to the licensee, the development, implementation, and maintenance of guidance and strategies to maintain or restore core cooling and primary containment capabilities are now unnecessary. This is based on the lack of fuel in the reactor vessel and the resulting absence of challenges to the primary containment.

The NRC staff concludes that Exelon has demonstrated good cause for the withdrawal of the core cooling and containment capability safety functions requirements specified in Order EA-12-049 with respect to TMI-1 based on:

- Exelon's certifications provided under 10 CFR 50.82(a)(1) that all fuel has been removed from the TMI-1 reactor vessel;
- the regulatory prohibition of 10 CFR 50.82(a)(2) that the 10 CFR Part 50 license for TMI-1 no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel; and
- the licensee's acknowledgement that the 10 CFR Part 50 license for TMI-1 no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel.

Exelon provided the following information as the basis for the withdrawal of the SFP cooling portion of Order EA-12-049:

- The fuel in the TMI-1 SFP will have had at least 56 days of radioactive decay when the requested withdrawal becomes effective.
- The calculated decay heat level at 56 days after the permanent cessation of operations shows that the time to reach boiling conditions and then reduce SFP water inventory to a level 10 feet above the top of the spent fuel rack would be approximately 7.75 days.
- At least 7 days is available to respond to any extended loss of power impacting the normal SFP cooling system prior to water level reaching a point where it may no longer maintain substantial shielding for a person standing on the SFP operating deck.
- Existing Extensive Damage Mitigation Guideline (EDMG) equipment would still be available under the provisions of 10 CFR 50.155(b)(2) (formerly 10 CFR 50.54 (hh)(2)) for deployment to provide makeup to the SFP.
- Memorandums of Understanding are in place with local fire departments with capabilities to support providing makeup cooling water to the SFP, upon request.

The NRC staff reviewed the licensee's statements and calculations with regard to decay heat levels. The staff performed a confirmatory evaluation of the licensee's calculations. The staff considers that the licensee's predicted fuel decay heat levels and the SFP thermal-hydraulic estimate under loss of cooling conditions is reasonable.

The NRC staff concludes that Exelon has demonstrated good cause for the withdrawal of the SFP cooling capability safety functions requirements specified in Order EA-12-049 with respect to TMI-1 based on:

- Given the low decay heat levels and the slow heat up rate, the reliance on the SFP water inventory for passive cooling will provide a level of protection equivalent to that which would be provided by the initial phase of the guidance and strategies for maintaining or restoring SFP cooling capabilities, which would otherwise be necessary for compliance with Order EA-12-049.
- The long time for boiling to reduce the SFP inventory to a point at which makeup would be necessary for radiation shielding purposes. This eliminates the need for the transition phase of the guidance and strategies for maintaining or restoring SFP cooling capabilities, which would otherwise be necessary for compliance with Order EA-12-049 through using onsite portable equipment.
- The NRC staff notes that the licensee is required to maintain equipment necessary for compliance with the requirements of 10 CFR 50.155(b)(2) (formerly 10 CFR 50.54(hh)(2)) that could be available for deployment, if needed.
- The low decay heat and the long boil-off period of the SFP provides sufficient time for the licensee to obtain off-site resources on an ad hoc basis to sustain the SFP cooling safety function indefinitely. This eliminates the need for the final phase of the guidance and strategies for maintaining or restoring SFP cooling capabilities, which would otherwise be necessary for compliance with Order EA-12-049.

The licensee for TMI-1 has docketed the 10 CFR 50.82(a)(1)(i) and (ii) certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel. In addition, the licensee has acknowledged, consistent with 10 CFR 50.82(a)(2), that the 10 CFR Part 50 license for TMI-1 no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel. Therefore, the NRC staff has determined that the licensee has demonstrated good cause for the withdrawal of the Order requirements regarding core cooling and containment capability safety functions

In addition, the licensee's letter dated November 11, 2019, provided information regarding decay heat level effective 56 days after the permanent cessation of operations, which corresponded to November 15, 2019. Information was also provided with regard to EDMG equipment and offsite resource availability. Based on this information, the NRC staff has concluded that the licensee has demonstrated good cause for the withdrawal of the Order requirements for the SFP cooling safety function. The NRC staff also considered that a sequence of events such as the Fukushima Dai-ichi accident is unlikely to occur in the United States based on the current regulatory requirements and existing plant capabilities.

Based on the above, the NRC staff concludes that the licensee has demonstrated good cause for the withdrawal of Order EA-12-049. Accordingly, with respect to TMI-1, the NRC is withdrawing, in its entirety, its March 12, 2012, Order EA-12-049. All other regulatory requirements remain applicable and are not impacted by this withdrawal.

Sincerely,

*/RA Mirela Gavrilas for/*

Ho K. Nieh, Director  
Office of Nuclear Reactor Regulation

Docket No. 50-289

cc: LISTSERV

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DATED JANUARY 22, 2020

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**ADAMS Accession No.: ML19318E145****\*via email****NRR-106**

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