

10 CFR 140.8  
10 CFR 140.11(a)(4)

TM-19-167

January 3, 2020

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

Three Mile Island Nuclear Station, Unit 1  
Renewed Facility Operating License No. DPR-50  
NRC Docket Nos. 50-289

Three Mile Island Nuclear Station, Unit 2  
Possession Only License No. DPR-73  
NRC Docket No. 50-320

**Subject:** Request for Exemptions from 10 CFR 140.11(a)(4), Concerning Primary and Secondary Liability Insurance

**Reference:**

- 1) Letter from W. J. Dircks (NRC) to J. S. Herbein (Metropolitan Edison Company), *[No Subject]*, dated February 25, 1982 (Refer to ADAMS Accession No. ML19141A211, page 55)
- 2) Letter from Michael T. Masnik (NRC) to T. G. Broughton (GPU Nuclear Corporation), *"Exemption from the Requirements of 10 CFR 140.11(a)(4) for the Three Mile Island Nuclear Station, Unit 2 (TMI-2) (TAC No. M88362),"* dated July 29, 1994 (ADAMS Accession No. 9408050260 (Legacy Library)) [or General Public Utilities Nuclear Corp., Three Mile Island Nuclear Station, Unit 2, Exemption, dated August 8, 1994 (59 Federal Register 40380)]
- 3) Letter from J. Bradley Fewell (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, *"Certification of Permanent Cessation of Power Operations for Three Mile Island Nuclear Station, Unit 1,"* dated June 20, 2017 (Accession No. ML17171A151)
- 4) Letter from Michael P. Gallagher (Exelon Generation Company, LLC), to U.S. Nuclear Regulatory Commission, *"Certification of Permanent Removal of Fuel from the Reactor Vessel for Three Mile Island Nuclear Station, Unit 1,"* dated September 26, 2019 (Accession No. ML19269E480)

10 CFR 140.11(a)(4) requires licensees to have and maintain two levels of financial protection against offsite liability for each nuclear reactor which is licensed to operate, designed for the production of electrical energy, and has a rated capacity of 100,000 kilowatts electric (kWe) or more. The two levels of financial protection are as follows:

- Primary insurance coverage of \$450,000,000 from private sources (referred to as “primary offsite liability insurance”); and,
- Secondary financial protection in the form of private liability insurance available under an industry retrospective rating plan (referred to as “secondary financial protection”).

Pursuant to 10 CFR 140.8, “*Specific exemptions*,” Exelon Generation Company, LLC (Exelon) is requesting an exemption from the requirements of 10 CFR 140.11(a)(4) for Three Mile Island Nuclear Station, Unit 1 (TMI-1) and approval to (1) reduce the required level of primary offsite liability insurance to \$100,000,000 and (2) eliminate the requirement for TMI-1 to carry secondary financial protection. The exemption request is provided in Attachment A to this letter.

The site of TMI-1 includes a second co-located shutdown reactor, Three Mile Island Unit 2 (TMI-2), that is owned by Metropolitan Edison Company, Jersey Central Power & Light Company, and Pennsylvania Electric Company, each of which is now a wholly owned subsidiary of FirstEnergy Corp. Another FirstEnergy Corp. subsidiary, GPU Nuclear, Inc., is the licensed operator to possess and maintain TMI-2 (collectively the FirstEnergy Corp. subsidiaries are referred to as the “FirstEnergy Companies”). The FirstEnergy Companies request a corresponding exemption to 10 CFR 140.11(a)(4) for TMI-2 to reduce the required level of primary offsite liability insurance for “extraordinary nuclear occurrences” to \$100,000,000. The exemption request is provided in Attachment B to this letter. The FirstEnergy Companies have already received certain exemptions from the 10 CFR 140.11 requirements (References 1 and 2).

In Reference 3, Exelon provided formal notification to the NRC in accordance with 10 CFR 50.82(a)(1)(i) that Exelon had determined to permanently cease operations at TMI-1 on or about September 30, 2019. On September 20, 2019, the TMI-1 reactor was permanently shut down, and as of September 26, 2019, all fuel has been permanently removed from the TMI-1 reactor vessel and placed in the Spent Fuel Pool (SFP). In Reference 4, Exelon provided formal notification in accordance with 10 CFR 50.82(a)(1)(ii) certifying all fuel has been permanently removed from the TMI-1 reactor vessel and placed in the SFP. As stated in 10 CFR 50.82(a)(2), upon docketing the certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel, 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.

TMI-2 has a possession only license. TMI-2 has not operated since the accident in 1979. Since the completion of the Clean-Up Program in 1993, TMI-2 has been maintained in accordance with the NRC approved SAFSTOR condition (method in which a nuclear facility is placed and maintained in a condition that allows it to be safely stored and subsequently decontaminated) known as “Post-Defueling Monitored Storage” (PDMS).

The underlying purpose of 10 CFR 140.11(a)(4) is to require sufficient liability insurance to ensure adequate funding of any claims resulting from a potential nuclear incident or precautionary evacuation associated with an individual power reactor. However, the

regulation does not take into consideration the reduced potential for, and consequences of, such nuclear incidents at permanently shutdown facilities. The proposed exemptions would allow a reduction in the level of financial protection for offsite liability resulting from TMI-1 and TMI-2 to a level that is commensurate with the permanently defueled status of TMI-1 and the PDMS condition of TMI-2, while still meeting the underlying purpose of the rule.

Offsite liability coverage may be maintained on a site basis. In 1982, when TMI-1 and TMI-2 were jointly owned by Metropolitan Edison Company, Jersey Central Power & Light Company, and Pennsylvania Electric Company (herein these three companies will be referred to collectively as “GPU”<sup>1</sup>), the NRC granted an exemption from certain requirements of 10 CFR 140.11(a)(4) (Reference 1). The exemption allowed the licensees to provide two endorsements to meet the financial protection requirements of subsection 170 of the Atomic Energy Act of 1954, as amended, following the accident at TMI-2 on March 28, 1979 (referred to as the “TMI-2 accident”). The first endorsement, Endorsement No. 43, restored the limits of liability to the amounts listed in other endorsements upon an “extraordinary nuclear occurrence” (ENO) being declared by the NRC arising out of the ownership, operation, maintenance, or use of TMI-1 and/or TMI-2 following the TMI-2 accident. The second endorsement, Endorsement No. 44, increased the TMI-1 liability limit to the NRC limit in effect at the time for any bodily injury or property damages caused by a nuclear energy hazard, but increased the TMI-2 liability limit only in the event the NRC declared an ENO as of May 1, 1979. Subsequently, in 1994, the NRC granted TMI-2 an exemption from participation in the secondary financial protection (Reference 2). The requested exemption herein is not intended to impact these exemptions already in place.

In 1999, AmerGen Energy Company acquired TMI-1 from GPU. In January 2009, AmerGen merged into Exelon, at which time AmerGen ceased to exist. Since TMI-1 was in operation until September 20, 2019, Exelon maintained offsite insurance based on the TMI-1 operational status, which set the level of offsite liability insurance for the site. However, as discussed in Attachment A, since TMI-1 has been permanently shutdown and defueled, and by regulation is no longer authorized to operate, there is a significant reduction in risk associated with any credible accident. Additionally, Exelon has determined that at the end of the zirconium fire period, which for TMI-1 is currently projected to occur at 488 days after shutdown, there will be sufficient decay of the spent fuel stored in the SFP such that there is a significant reduction in risk from SFP draining events. As discussed in Attachment B, there is already minimal offsite risk associated with TMI-2 in its PDMS condition. The reduced risk from either unit supports the basis for the 10 CFR 140.8 *“Specific exemptions.”*

Based on Exelon’s current projections, the end of the zirconium fire period will occur 488-days after the September 20, 2019 permanent shutdown date or on or around January 20, 2021. Therefore, approval of these exemptions is requested by December 18, 2020, with an effective date of January 20, 2021 and an implementation date no later than March 31, 2021. The approval date of December 18, 2020 would permit sufficient time to arrange for the reduced offsite liability insurance coverage allowed by the exemption.

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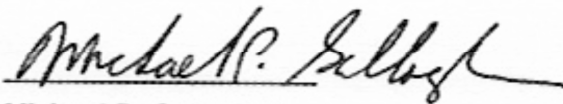
<sup>1</sup> In 1982, Metropolitan Edison Company, Jersey Central Power & Light Company, and Pennsylvania Electric Company were subsidiaries of General Public Utilities Corporation.

It is also requested that Indemnity Agreement No. B-64 be amended to be consistent with the exemption requests by (a) deleting Articles VI and VIII in their entirety, (b) substituting in the agreement the exemption permitting a reduction in the primary offsite liability insurance limit for the site to \$100,000,000, (c) withdrawing TMI-1 from participation in the secondary layer of financial protection; and (d) deleting Item 2.a of the Attachment to the Indemnity Agreement and substituting a new Item 2.a to provide financial protection in the amount of "\$100,000,000." A "form of" amendment is provided as Attachment E.

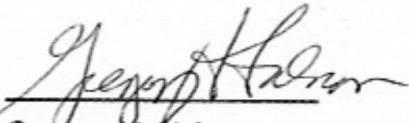
This letter contains no new regulatory commitments.

If you have any questions concerning this submittal, please contact Leslie Holden at (630) 657-2524.

Respectfully,



Michael P. Gallagher  
Vice President, License Renewal & Decommissioning  
Exelon Generation Company, LLC



Gregory H. Halnon  
President & CNO, GPU Nuclear, Inc.  
Vice President Nuclear Regulatory Affairs, FirstEnergy Corp.

*For Metropolitan Edison Company, Jersey Central Power & Light Company, Pennsylvania Electric Company, and GPU Nuclear, Inc.*

- Attachments:
- A. Request for Exemption from 10 CFR 140.11(a)(4) for Three Mile Island, Unit 1 (TMI-1), Concerning Primary and Secondary Liability Insurance
  - B. Request for Exemption from 10 CFR 140.11(a)(4) for Three Mile Island, Unit 2 (TMI-2), Concerning Primary Liability Insurance
  - C. Request for Exemptions from 10 CFR 140.11(a)(4) for Three Mile Island, Units 1 and 2, Justification for Exemption Request and Special Circumstances
  - D. Request for Exemptions from 10 CFR 140.11(a)(4) for Three Mile Island, Units 1 and 2, Environmental Assessment
  - E. Form of Indemnity Amendment, Indemnity Agreement No. B-64

cc: w/Attachments

Regional Administrator - NRC Region I



U.S. Nuclear Regulatory Commission  
TMI-1 Request for Exemption  
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NRC Project Manager, NRR – Three Mile Island, Unit 1  
NRC Project Manager, NMSS/DUWP/RDB – Three Mile Island, Unit 2  
Director, Bureau of Radiation Protection – PA Department of Environmental  
Resources

**Attachment A**

**Request for Exemption from 10 CFR 140.11(a)(4)  
for Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
Concerning Primary and Secondary Liability Insurance**

## 1.0 SPECIFIC EXEMPTION REQUEST

Pursuant to 10 CFR 140.8, "Specific exemptions," Exelon Generation Company, LLC (Exelon) requests a permanent exemption from the requirements of 10 CFR 140.11(a)(4) for Three Mile Island Nuclear Station Unit 1 (TMI-1) and approval to (a) reduce the required level of primary offsite liability insurance from \$450,000,000 to \$100,000,000 and (b) eliminate the requirement to carry secondary financial protection for TMI-1 based on the significantly reduced risks associated with its permanently defueled condition.

10 CFR 140.11(a)(4) requires individual power reactor licensees to have and maintain two levels of financial protection against offsite liability for each nuclear reactor that is licensed to operate, designed for the production of electrical energy, and has a rated capacity of 100,000 kilowatts electric (kWe) or more. The two levels of financial protection are as follows:

- 1) Primary insurance coverage of \$450,000,000 from private sources (referred to as "primary offsite liability insurance"); and
- 2) Secondary financial protection in the form of private liability insurance available under an industry retrospective rating plan (referred to as "secondary financial protection").

10 CFR 140.11(a)(4) reads as follows:

*(a) Each licensee is required to have and maintain financial protection:*

*< ... >*

*(4) In an amount equal to the sum of \$450,000,000 and the amount available as secondary financial protection (in the form of private liability insurance available under an industry retrospective rating plan providing for deferred premium charges equal to the pro rata share of the aggregate public liability claims and costs, excluding costs payment of which is not authorized by section 170o.(1)(D) of the Act, in excess of that covered by primary financial protection) for each nuclear reactor which is licensed to operate and which is designed for the production of electrical energy and has a rated capacity of 100,000 electrical kilowatts or more: Provided, however, that under such a plan for deferred premium charges for each nuclear reactor that is licensed to operate, no more than \$121,255,000 with respect to any nuclear incident (plus any surcharge assessed under subsection 170o.(1)(E) of the Act) and no more than \$18,963,000 per incident within one calendar year shall be charged. Except that, where a person is authorized to operate a combination of 2 or more nuclear reactors located at a single site, each of which has a rated capacity of 100,000 or more electrical kilowatts but not more than 300,000 electrical kilowatts with a combined rated capacity of not more than 1,300,000 electrical kilowatts, each such combination of reactors shall be considered to be a single nuclear reactor for the sole purpose of assessing the applicable financial protection required under this section.*

In 1982, the NRC granted an exemption from certain requirements of 10 CFR 140.11(a)(4) (Reference 9.1). At the time, TMI-1 and another unit located on the same site, Three Mile Island Unit 2 (TMI-2), were jointly owned by Metropolitan Edison Company, Jersey Central Power & Light Company, and Pennsylvania Electric Company (herein these three companies will be collectively referred to as "GPU"), each of which was at the time a wholly owned subsidiary of General Public Utilities Corporation. The exemption allowed GPU to provide two endorsements

to meet the financial protection requirements of subsection 170 of the Atomic Energy Act of 1954, as amended, following an accident at TMI-2 on March 28, 1979 (referred to as the “TMI-2 accident”). The first endorsement, Endorsement No. 43, restored the limits of liability to the amounts listed in other endorsements upon an “extraordinary nuclear occurrence” (ENO) being declared by the NRC arising out of the ownership, operation, maintenance, or use of TMI-1 and/or TMI-2 following the TMI-2 accident. The second endorsement, Endorsement No. 44, increased the TMI-1 liability limit to the NRC limit in effect at the time for any bodily injury or property damages caused by a nuclear energy hazard, but increased the TMI-2 liability limit only in the event the NRC declared an ENO on or after May 1, 1979.

In 1999, AmerGen Energy Company acquired TMI-1 from GPU. In January 2009, AmerGen merged into Exelon, at which time AmerGen ceased to exist.

## **2.0 BACKGROUND**

TMI Station is located in an area of low population density about 12 miles southeast of Harrisburg, Pennsylvania. The area is in Londonderry Township, Dauphin County, about 2.5 miles from the southern tip of Dauphin County, where the county is coterminous with York and Lancaster Counties. The TMI site is part of an 814-acre tract consisting of TMI-1, TMI-2 which is now owned by the FirstEnergy Companies, and several adjacent islands. TMI-2 has not operated since the accident in 1979. The island, which is situated about 900 feet from the east bank and approximately one mile from the west bank of the Susquehanna River, is elongated parallel to the flow of the river with its longest axis oriented approximately due north and south. The north and south ends of the island have access bridges, which connect the island to State Highway Route 441. The north access bridge is used daily. Route 441 is a two-lane highway, which runs parallel to the island on the east bank of the Susquehanna River and is more than 2,000 feet from the TMI-1 and TMI-2 reactors at the closest point.

In Reference 9.2, Exelon provided formal notification to the NRC in accordance with 10 CFR 50.82(a)(1)(i) that Exelon had determined to permanently cease operations at TMI-1 on or about September 30, 2019. On September 20, 2019, TMI-1 was permanently shutdown, and in Reference 9.3, Exelon provided formal notification in accordance with 10 CFR 50.82(a)(1)(ii) to certify that as of September 26, 2019, all fuel has been permanently removed from the TMI-1 reactor vessel and placed in the spent fuel pool (SFP). As stated in 10 CFR 50.82(a)(2), upon docketing the certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel, 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.

## **3.0 BASIS FOR EXEMPTION REQUEST**

The underlying purpose of 10 CFR 140.11(a)(4) is to require sufficient liability insurance to ensure adequate funding of any claims resulting from a potential nuclear incident or precautionary evacuation associated with an individual power reactor. The financial protection limits of 10 CFR 140.11 were established to require that licensees maintain sufficient insurance to cover the costs of a nuclear incident at an operating reactor.

This regulation does not take into consideration the reduced potential for, and consequences of, such nuclear incidents at permanently shutdown facilities. The proposed exemption would allow



a reduction in the level of offsite liability insurance coverage to a level that is commensurate with the permanently shutdown and defueled status of TMI-1 while addressing the underlying purpose of the rule.

Even though the likelihood of an accident at an operating reactor is small, the consequences can be large, in part due to the high temperatures and pressures of the reactor coolant system as well as the inventory of radionuclides. For a permanently shutdown and defueled reactor such as TMI-1, nuclear accidents involving the reactor and its associated systems, structures and components are no longer possible. Furthermore, the probability and consequences of non-operating reactor nuclear incidents are substantially reduced because: 1) the decay heat from the spent fuel decreases over time, which reduces the amount of cooling required to prevent the spent fuel from heating up to a temperature that could compromise the ability of the fuel cladding to retain fission products, and 2) the relatively short-lived radionuclides contained in the spent fuel, particularly volatile components like iodine and noble gases, decay away, thus reducing the inventory of radioactive materials available for release.

Although the potential for, and consequences of, nuclear accidents decline substantially after a plant permanently defuels its reactor, they are not completely eliminated. There are potential onsite and offsite radiological consequences that could be associated with the onsite storage of the spent fuel in the SFP. In addition, a site with a permanently shutdown and defueled reactor may contain an inventory of radioactive liquids, activated reactor components, and contaminated materials. For purposes of modifying the amount of offsite liability insurance coverage maintained by a permanently shutdown and defueled reactor licensee, the potential radiological consequences of these non-operating reactor nuclear incidents are appropriate to consider, despite their very low probability of occurrence.

In SECY-93-127, *"Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning,"* (Reference 9.4), the NRC staff considered decommissioning plants' potential financial liability and the low likelihood and reduced short-term public health consequences of a zirconium fire, once spent fuel has sufficiently decayed, to determine that the overall risk at decommissioning plants does not justify the full insurance coverage that operating reactors have. In its Staff Requirements Memorandum for SECY-93-127, *"SECY-93-127 – Financial Protection Required of Licensees of Large Nuclear Power Plants during Decommissioning"* (Reference 9.5), the Commission approved a policy that authorized, through the exemption process, withdrawal from participation in the secondary insurance layer and a reduction in commercial liability insurance coverage to \$100 million, after the spent fuel had undergone an appropriate period of cooling.

In SECY-96-256, *"Changes to Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w)(1) and 10 CFR 140.11"* (Reference 9.6), the NRC staff generically evaluated the legal, technical, and policy issues regarding the financial protection requirements for large nuclear power plants that have been permanently shut down and recommended changes to the power reactor insurance regulations that would allow licensees to lower offsite primary liability insurance levels to \$100 million and withdraw from the secondary retrospective rating plan upon demonstration that the fuel stored in the SFP can be air-cooled. The NRC Commission approved the NRC staff's recommended course of action in Staff Requirements Memorandum to SECY-96-256, *"Re: SECY-96-256, Changes to Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors"* (Reference 9.7).

In SECY-00-0145, *"Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning"* (Reference 9.8) and SECY-01-0100, *"Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools"* (Reference 9.9), the NRC staff discussed additional information concerning SFP zirconium fire risks at decommissioning reactors and associated implications for offsite insurance. Analyzing when the spent fuel stored in the SFP is capable of adequate air-cooling is one measure that demonstrates when the probability of a zirconium fire would be exceedingly low. The NRC has previously determined in SECY-00-0145 that the minimum offsite financial protection requirement may be reduced to \$100 million and that secondary insurance is not required, once it is determined that the spent fuel in the SFP is no longer thermal-hydraulically capable of sustaining a zirconium fire based on a plant-specific analysis.

#### **4.0 TECHNICAL EVALUATION**

The most severe postulated accidents for nuclear power plants involve damage to the nuclear reactor core and the release of large quantities of fission products to the reactor coolant system. Many of the accident scenarios postulated during operation involve failures or malfunctions of systems which could affect the reactor core. However, based on the notifications of permanent cessation of power operations and permanent removal of fuel for TMI-1 (References 9.2 and 9.3, respectively), TMI-1 is no longer authorized to operate the reactor or to place or retain fuel in the reactor vessel in accordance with 10 CFR 50.82(a)(2), so most of the Design Bases Accident (DBA) scenarios postulated during operation are no longer possible. The irradiated fuel will be stored in the SFP and/or the Independent Spent Fuel Storage Installation (ISFSI), when constructed, until it is shipped off site in accordance with the schedules provided in the Post-Shutdown Decommissioning Activities Report (PSDAR) (Reference 9.10) and the Spent Fuel Management Plan (Reference 9.11).

With the TMI-1 reactor defueled, the reactor vessel assembly and supporting structures and systems are no longer in operation, and they have no function related to the safe storage and management of irradiated fuel. Additionally, the TMI-1 SFP and its supporting systems are dedicated solely to spent fuel storage. Fuel pool cooling and makeup capabilities function to remove decay heat from spent fuel stored in the fuel pool and to maintain a specified water temperature and level.

##### **4.1 Accident Analysis Overview**

Following the termination of reactor operations and the permanent removal of the fuel from the reactor vessel at TMI-1, the postulated accidents involving failure or malfunction of the reactor and supporting structures, systems and components are no longer applicable.

TMI-1 *"Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR Part 50, Appendix E,"* (Reference 9.12) provides information on the disposition of accidents and other incidents of concern.

A summary of the postulated radiological accidents analyzed for the permanently shutdown and defueled condition of TMI-1 is presented below.

#### 4.1.1 Consequences of Design Basis Events

The postulated design basis accident that will remain applicable to TMI-1 in its permanently shutdown and defueled condition is the Fuel Handling Accident (FHA) in the Fuel Handling Building where the SFP is located. A Post Permanent Shutdown FHA analysis (Reference 9.13) was performed. This new analysis did not credit the function of any structure, system, or component (SSC) or active mitigation measures. The analysis credits the decontamination of the 23 feet of water over the fuel assemblies in the SFP (i.e., 99.5% (or a Decontamination Factor (DF) of 200) of the iodine released from the fuel assembly is assumed to remain in the water).

The analysis shows that the dose at the exclusion area boundary (EAB) 365 days after shutdown (with no credit for containment) is  $1.78 \times 10^{-4}$  rem Total Effective Dose Equivalent (TEDE) and  $9.95 \times 10^{-13}$  rem Thyroid, which are less than the Environmental Protection Agency (EPA) Protective Action Guides (PAGs) of 1 rem TEDE and 5 rem Thyroid thresholds for recommended evacuation (Reference 9.14). Due to the amount of decay assumed (365 days), the results of this analysis may be applied after September 20, 2020, based on the September 20, 2019 shut down of TMI-1.

#### 4.1.2 Consequences of Beyond Design Basis Events (BDBE)

##### Hottest Fuel Assembly Adiabatic Heat-Up

The “*DECOM Spent Fuel Pool Thermohydraulic Analysis*” (Reference 9.15), provided with Reference 9.12, compares the conditions for the hottest fuel assembly stored in the TMI-1 fuel pools to the criteria proposed in SECY-99-168 “*Improving Decommissioning Regulations for Nuclear Power Plants*” (Reference 9.16), applicable to offsite emergency response for a unit in the decommissioning process. This criterion considers the time for the hottest assembly to heat up from 30 degrees Celsius (°C) to 900°C adiabatically. If the heat up time is greater than 10 hours, then offsite emergency preplanning involving the plant is not necessary. This is generally referred to as the end of the zirconium fire period.

Based on the limiting fuel assembly for decay heat and adiabatic heat up analysis (Reference 9.15), the end of the zirconium fire period for TMI-1 will occur at 488 days after permanent cessation of power operations (488 days of decay). At that point, the time for the hottest fuel assembly to reach 900°C is greater than 10 hours after the assemblies have been uncovered. As stated in NUREG-1738, “*Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants*” (Reference 9.17), 900°C is an acceptable temperature to use for assessing onset of fission product release under transient conditions (to establish the critical decay time for determining availability of 10 hours to evacuate) if fuel and cladding oxidation occurs in air.

Because of the length of time it would take for the adiabatic heat up to occur, there is ample time to respond ( $\geq 10$  hours) to any drain down event that might cause such an occurrence by restoring cooling or makeup or providing spray. As a result, the likelihood that such a scenario would progress to a zirconium fire is not deemed credible.

##### Air Cooling Analysis

As discussed above, the NRC has generically evaluated the legal, technical, and policy issues regarding the financial protection requirements for large nuclear power plants in SECY-93-0127



(Reference 9.4), SECY-96-0256 (Reference 9.6), SECY-00-0145 (Reference 9.8), and SECY-01-0100 (Reference 9.9), and the Commission has supported and approved a policy that authorized, through the exemption process, withdrawal from participation in the secondary insurance layer and a reduction in commercial liability insurance coverage to \$100 million, when a licensee is able to demonstrate that the spent fuel could be air-cooled if the SFP was drained of water. The staff has used this technical criterion of air coolability to grant similar exemptions to other decommissioning reactors (see Section 6.0 of this attachment).

NUREG/CR-6451, *"A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants,"* (Reference 9.18) presents the results of spent fuel heat-up analyses for representative pressurized water reactor (PWR) and boiling water reactor (BWR) plants. The NUREG provides justification for receiving an exemption based on the representative plants. Exelon performed an evaluation to disposition select differences between TMI-1 and the representative PWR plant assessed in NUREG/CR-6451. The differences assessed are summarized below.

Exelon compiled data comparing the input parameters to the representative PWR plant in NUREG/CR-6451 to the corresponding data for TMI-1. This comparison was provided to the NRC by Exelon in Reference 9.19. NUREG/CR-6451 determines a "critical decay time" which is the time beyond which fuel will not fail in the event that the SFP is drained. NUREG/CR-6451 (at §3.1.3) provides justification for receiving an exemption at approximately 17-months (519 days) after shutdown for PWRs, which is a slightly longer decay time than the zirconium fire period of 488 days on which the TMI-1 exemption request is based. In order to evaluate if the TMI-1 decay period was conservative, Exelon examined the decay heat at TMI-1 and determined that the average fuel assembly decay heat for the most recently offloaded TMI-1 spent fuel at 488 days after shutdown will be approximately 3% less than the decay heat for the average fuel assembly at 519 days for the representative PWR plant in NUREG/CR-6451.

A comparison of the parameters for the fuel assembly power, power density, and hydraulic resistance of the 15x15 fuel assemblies at TMI-1 indicated that these parameters are less than those of the 17x17 fuel assemblies modeled in NUREG/CR-6451. Therefore, the NUREG/CR-6451 fuel assembly model is conservative for TMI-1.

The SFP rack configuration was also evaluated and found to be conservative for TMI-1. The configuration / hydraulic resistance of the TMI-1 downcomers and plenum underneath the SFP storage racks is bounded by that modeled in NUREG/CR-6451. Additionally, the hydraulic resistance of the SFP rack loaded cells is less than that of the SFP rack configuration modeled in NUREG/CR-6451. The bottom orifices on all TMI-1 SFP racks are equal to or larger than those modeled in NUREG/CR-6451, which also makes the estimates for TMI-1 more conservative.

As a result of the comparison, Exelon concluded that the TMI-1 SFP conditions are bounded by the NUREG/CR-6451 benchmark and that the TMI-1 spent fuel would be air coolable at 488-days after permanent shutdown.

#### Fuel Pool Drain Down Event

TMI-1 analyzed a drain down event of the SFP to determine a dose rate curve at the EAB and Control Room. NUREG-0586, *"Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities,"* Supplement 1 (Reference 9.20), Section 4.3.9, identifies that a SFP drain down event is a beyond design basis event. Although the analysis described in



the section above demonstrated a significant release of radioactive material from the spent fuel in the absence of water cooling is not possible after 488 days following permanent cessation of power operations, the potential exists for radiation exposure to an offsite individual in the event that shielding of the fuel is lost. The SFP water and the concrete pool structure serve as radiation shielding. A loss of water shielding above the fuel could increase the offsite radiation levels because of the gamma rays streaming up out of the SFP being scattered back to a receptor at the site boundary.

The site-specific offsite and Control Room radiological impacts of a postulated complete loss of SFP water were assessed in TMI-1 Technical Evaluation 623073, "*TMI Spent Fuel Pool Draindown Shine Dose Rate Evaluation, Revision 0*," (Reference 9.21). With a decay of 365 days from shutdown the dose rate at the EAB would be  $4.04 \times 10^{-1}$  mrem/hour not crediting the shielding from the Fuel Handling Building (FHB) roof. Crediting the FHB roof structure, the dose rate at the EAB would be  $4.6 \times 10^{-10}$  mrem/hour.

The EPA PAGs were developed to respond to a mobile airborne plume that could transport and deposit radioactive material over a large area. In contrast, the radiation field formed by gamma scatter from a drained SFP would be stationary rather than moving and would not cause transport or deposition of radioactive materials. The extended period required to exceed the EPA PAG limit of 1 Rem TEDE would allow sufficient time to develop and implement onsite mitigative actions and provide confidence that additional offsite measures could be taken without planning if efforts to reestablish shielding over the fuel are delayed.

Additionally, the Control Room radiological impacts of a postulated complete loss of SFP water at 365 days after shutdown determined that the gamma radiation dose rate in the Control Room would be below 0.1 mrem/hour.

## **4.2 Conclusion**

The TMI-1 Hottest Fuel Assembly Adiabatic Heat Up analysis supports a conclusion that in the event of a SFP drain event occurring at or more than 488 days from permanent shutdown, there would be sufficient time ( $\geq 10$  hours) to take mitigative actions in response to events that could lead to a zirconium fire. In addition, the TMI-1 SFP conditions were determined to be bounded by the analysis of NUREG/CR-6451 benchmark demonstrating that the SFP would be air coolable at 488 days after permanent shutdown.

Regarding the dose assessments, as described above, with a decay time of 365 days from permanent shutdown, the dose for the FHA or the BDBE SFP drain down event would be below regulatory limits. The 365-day threshold is conservative with respect to the requested effective date of 488 days after permanent shutdown.

Because TMI-1 was permanently shut down on September 20, 2019, the end of the zirconium fire period will occur 488-days after the permanent shutdown date of September 20, 2019 or on January 20, 2021. The requested approval date of December 18, 2020 will enable Exelon adequate time before January 20, 2021, to arrange for the reduced insurance coverage allowed by the exemption.

## **5.0 JUSTIFICATION FOR EXEMPTIONS AND SPECIAL CIRCUMSTANCES**

10 CFR 140.8 states that the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of Part 140 which are authorized by law and are otherwise in the public interest. As discussed in Attachment C, *"Request for Exemptions from 10 CFR 140.11(a)(4) for Three Mile Island Nuclear Station, Units 1 and 2, Justification for Exemption Request and Special Circumstances,"* this exemption request satisfies the provisions of Section 140.8.

## **6.0 PRECEDENT**

Exelon's exemption request from the requirements of 10 CFR 140.11(a)(4) for TMI-1 is consistent with exemptions that have been issued by the NRC for other nuclear power reactor facilities beginning decommissioning. Specifically, the NRC granted similar exemptions to Exelon Generation Company, LLC for Oyster Creek (Reference 9.22); Southern California Edison Company for SONGS, Units 1, 2, and 3 (Reference 9.23); Duke Energy Florida, Inc. for Crystal River Unit 3 (Reference 9.24); Entergy Nuclear Operations, Inc. for Vermont Yankee (Reference 9.25); and Dominion Energy Kewaunee, Inc. for Kewaunee Power Station (Reference 9.26).

TMI-2 has also previously received an exemption from participation in the industry retrospective rating plan (secondary level financial protection) (Reference 9.27).

These precedents support approving exemptions from the requirements in 10 CFR 140.11(a)(4) for TMI-1.

## **7.0 ENVIRONMENTAL ASSESSMENT**

As discussed in Attachment D, *"Request for Exemptions from 10 CFR 140.11(a)(4) for Three Mile Island Nuclear Station, Units 1 and 2, Environmental Assessment,"* the proposed exemption meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(25).

## **8.0 CONCLUSION**

Pursuant to the provisions of 10 CFR 140.8, Exelon is requesting a permanent exemption from 10 CFR 140.11(a)(4) as provided above. Based on the considerations discussed herein, the requested exemption is authorized by law and is otherwise in the public interest.

## **9.0 REFERENCES:**

- 9.1 Letter from W. J. Dircks (NRC) to J. S. Herbein (Metropolitan Edison Company), *[No Subject]*, dated February 25, 1982 (Refer to ADAMS Accession No. ML19141A211, page 55)
- 9.2 Letter from J. Bradley Fewell (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, *"Certification of Permanent Cessation of Power Operations for Three Mile Island Nuclear Station, Unit 1,"* dated June 20, 2017 (ADAMS Accession No. ML17171A151)

- 9.3 Letter from Michael P. Gallagher (Exelon Generation Company, LLC), "*Certification of Permanent Removal of Fuel from the Reactor Vessel for Three Mile Island Nuclear Station, Unit 1*," dated September 26, 2019 (Accession No. ML19269E480)
- 9.4 Commission Paper, SECY-93-127, "*Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning*," dated May 10, 1993 (ADAMS Accession No. ML12257A628)
- 9.5 Staff Requirements Memorandum for SECY-93-0127, "*SECY-93-127 – Financial Protection Required of Licensees of Large Nuclear Power Plants during Decommissioning*," dated July 13, 1993 (ADAMS Accession No. ML003760936)
- 9.6 Commission Paper, SECY-96-256, "*Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11*," dated December 17, 1996 (ADAMS Accession No. ML15062A483)
- 9.7 Staff Requirements Memo, "*Re: SECY-96-256, Changes to Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors*," dated January 28, 1997 (ADAMS Accession No. ML15062A454)
- 9.8 Commission Paper, SECY-00-0145, "*Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning*," dated June 28, 2000 (ADAMS Accession No. ML003721626)
- 9.9 Commission Paper, SECY-01-0100, "*Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools*," dated June 4, 2001 (ADAMS Accession No. ML011450420)
- 9.10 Letter from Michael P. Gallagher (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission – "*Three Mile Island Nuclear Station, Unit 1 – Post-Shutdown Decommissioning Activities Report*," dated April 5, 2019 (ADAMS Accession No. ML19095A041)
- 9.11 Letter from Michael P. Gallagher (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission – "*Spent Fuel Management Plan for Three Mile Island Nuclear Station – Unit 1*," dated April 5, 2019 (ADAMS Accession No. ML19095A009)
- 9.12 Letter from Michael P. Gallagher (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission – "*Request for Exemptions from Portions of 10 CFR 50.47 and 10 CFR 50, Appendix E*," dated July 1, 2019 (ADAMS Accession No. ML19182A104)
- 9.13 C-1101-900-E000-088, "*Fuel Handling Accident Dose Consequence – Post Permanent Shutdown*," Revision 0, dated May 11, 2018
- 9.14 "*Environmental Protection Agency Protective Action Guides and Planning Guidance for Radiological Incidents, Draft for Interim Use and Public Comment*," dated March 2013
- 9.15 C-1101-202-E410-476, "*DECOM Spent Fuel Pool Thermohydraulic Analysis*," Revision 1, dated March 6, 2018
- 9.16 Commission Paper, SECY-99-168, "*Improving Decommissioning Regulations for Nuclear Power Plants*," dated June 30, 1999 (ADAMS Accession No. ML992800087)
- 9.17 NUREG-1738, "*Technical Study of Spent Fuel Accident Risk at Decommissioning Nuclear Power Plants*," dated February 2001 (ADAMS Accession No. ML010430066)

- 9.18 NUREG/CR-6451, *"A Safety and Regulatory Assessment of Generic BWR and PWR Permanently Shutdown Nuclear Power Plants,"* dated April 1997 (ADAMS Accession No. ML082260098)
- 9.19 Letter from Michael P. Gallagher (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission – *"Request for Exemption from 10 CFR 50.54(w)(1), Concerning On-Site Property Damage Insurance,"* dated November 25, 2019 (ADAMS Accession No. ML19330D862)
- 9.20 NUREG-0586, *"Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities,"* Supplement 1, published November 2002
- 9.21 Technical Evaluation 623073, *"TMI Spent Fuel Pool Draindown Shine Dose Rate Evaluation, Revision 0,"* dated May 28, 2018
- 9.22 Letter from J. G. Lamb (NRC) to B. C. Hanson (Exelon Generation Company, LLC), *"Oyster Creek Nuclear Generating Station – Exemption from the Requirements of 10 CFR 140.11(a)(4), Concerning Offsite Primary and Secondary Liability Insurance (EPID L-2018-LLE-0003),"* dated December 19, 2018 (ADAMS Accession No. ML18229A005)
- 9.23 Letter from M. Vaaler (NRC) to T. J. Palmisano (Southern California Edison Company), *"San Onofre Nuclear Generating Station, Units 1, 2, and 3 – Exemption from the Requirements of Title 10 of the Code of Federal Regulations, Part 140, Section 140.11(a)(4) Concerning Primary and Secondary Insurance (CAC Nos. L53084 and L53085),"* dated December 29, 2017 (ADAMS Accession No. ML17339A125)
- 9.24 Letter from M. D. Orenak (NRC) to T. D. Hobbs (Crystal River Nuclear Plant), *"Crystal River Unit 3 Nuclear Generating Plant – Exemption from the Requirements of Title 10 of the Code of Federal Regulations, Part 140, Section 140.11(a)(4) Concerning Primary and Secondary Liability Insurance (TAC No. MF3588),"* dated April 27, 2015 (ADAMS Accession No. ML14183B338)
- 9.25 Letter from J. D. Parrott (NRC) to Vice President, Operations (Entergy Nuclear Operations, Inc.), *"Vermont Yankee Nuclear Power Station – Exemption from the Requirements of Title 10 of the Code of Federal Regulations, Part 140, Section 140.11(a)(4), Concerning Primary and Secondary Liability Insurance (CAC No. MF3980),"* dated April 15, 2016 (ADAMS Accession Nos. ML16012A144 & ML16012A157)
- 9.26 Letter from T. J. Wengert (NRC) to D. A. Heacock (Dominion Energy Kewaunee), *"Kewaunee Power Station – Exemption from the Requirements of Title 10 of the Code of Federal Regulations, Part 140, Section 140.11(a)(4) Concerning Primary and Secondary Liability Insurance (TAC No. MF3916),"* dated March 16, 2015 (ADAMS Accession No. ML15026A522)
- 9.27 Letter from Michael T. Masnik (NRC) to T. G. Broughton (GPU Nuclear Corporation), *"Exemption from the Requirements of 10 CFR 140.11(a)(4) for the Three Mile Island Nuclear Station, Unit 2 (TMI-2) (TAC No. M88362),"* dated July 29, 1994 (ADAMS Accession No. 9408050260 (Legacy Library)) [or General Public Utilities Nuclear Corp., Three Mile Island Nuclear Station, Unit 2, Exemption, dated August 8, 1994 (59 Federal Register 40380)]



**Attachment B**

**Request for Exemption from 10 CFR 140.11(a)(4)  
for Three Mile Island Nuclear Station, Unit 2 (TMI-2)  
Concerning Primary Liability Insurance**

## 1.0 SPECIFIC EXEMPTION REQUEST

Pursuant to 10 CFR 140.8, "*Specific exemptions*," Metropolitan Edison Company, Jersey Central Power & Light Company, and Pennsylvania Electric Company, as the licensed owners of, and GPU Nuclear, Inc., as the licensed operator to possess and maintain, Three Mile Island Unit 2 (TMI-2), request a permanent exemption from the requirements of 10 CFR 140.11(a)(4) to reduce the required level of primary offsite liability insurance for "extraordinary nuclear occurrences" to \$100,000,000 based on the significantly reduced risks associated with its Post-Defueling Monitored Storage (PDMS) condition and, as described in Attachment A, the permanently shutdown and defueled condition of Three Mile Island Nuclear Station, Unit 1 (TMI-1).

10 CFR 140.11(a)(4) requires individual power reactor licensees to have and maintain two levels of financial protection against offsite liability for each nuclear reactor that is licensed to operate, is designed for the production of electrical energy, and has a rated capacity of 100,000 kilowatts electric (kWe) or more. The two levels of financial protection are as follows:

- 1) Primary insurance coverage of \$450,000,000 from private sources (referred to as "primary offsite liability insurance"); and
- 2) Secondary financial protection in the form of private liability insurance available under an industry retrospective rating plan (referred to as "secondary financial protection").

In 1982, the NRC granted an exemption from certain requirements of 10 CFR 140.11(a)(4) (Reference 9.1). At the time, TMI-2 and another unit co-located at the same site, Three Mile Island Unit 1 (TMI-1), were jointly owned by Metropolitan Edison Company, Jersey Central Power & Light Company, and Pennsylvania Electric Company (herein these three companies will be referred to collectively as "GPU"), each of which was at the time a wholly owned subsidiary of General Public Utilities Corporation. The exemption allowed GPU to provide two endorsements to meet the financial protection requirements of subsection 170 of the Atomic Energy Act of 1954, as amended, following an accident at TMI-2 on March 28, 1979 (referred to as the "TMI-2 accident"). The first endorsement, Endorsement No. 43, restored the limits of liability to the amounts listed in other endorsements upon an "extraordinary nuclear occurrence" (ENO) being declared by the NRC arising out of the ownership, operation, maintenance, or use of TMI-1 and/or TMI-2 following the TMI-2 accident. The second endorsement, Endorsement No. 44, increased the TMI-1 liability limit to the NRC limit in effect at the time for any bodily injury or property damages caused by a nuclear energy hazard, but increased the TMI-2 liability limit only in the event the NRC declared an ENO on or after May 1, 1979.

In 1994, the NRC approved a request to exempt TMI-2 from participation in the industry retrospective rating plan (secondary financial protection) (Reference 9.2).

The requested exemption herein would be in addition to the two exemptions already in place for TMI-2.

## 2.0 BACKGROUND

The location of the TMI Nuclear Station is as described in Attachment A, Section 2.0, "*Background*."

Following a March 28, 1979 accident that resulted in severe damage to the reactor core (the "TMI-2 Accident"), TMI-2 has not operated. Virtually all of the fuel and damaged core material has been

removed from the reactor<sup>1</sup> and the site. The license for TMI-2 is a possession only license. Since the completion of the Clean-Up program in 1993, TMI-2 has been maintained in accordance with the NRC approved SAFSTOR condition (method in which a nuclear facility is placed and maintained in a condition that allows it to be safely stored and subsequently de-contaminated) known as Post-Defueling Monitored Storage (PDMS) since 1993. There are no fuel assemblies in the TMI-2 reactor or the TMI-2 SFP.

### 3.0 BASIS FOR EXEMPTION REQUEST

The underlying purpose of 10 CFR 140.11(a)(4) is to require sufficient liability insurance to ensure adequate funding of any claims resulting from a potential nuclear incident or precautionary evacuation associated with an individual power reactor. The financial protection limits of 10 CFR 140.11 were established to require that licensees maintain sufficient insurance to cover the costs of a nuclear incident at an operating reactor. This regulation does not take into consideration the reduced potential for, and consequences of, such nuclear incidents at possession only facilities in PDMS.

In SECY-93-127, *"Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning,"* (Reference 9.3), the NRC staff considered decommissioning plants' potential financial liability and the low likelihood and reduced short-term public health consequences of a zirconium fire to determine that the overall risk at decommissioning plants does not justify the full insurance coverage that operating reactors have once a decommissioning plant's spent fuel has sufficiently decayed. As provided in SECY-93-127, the NRC included in its recommendations that using the standards set forth in SECY-93-127, primary financial protection could be reduced to \$100 million for nuclear power plants that have had the requisite spent fuel cooling period. However, as specifically mentioned in SECY-93-127 (Note 5), for TMI-2 "primary financial protection covering the site will remain at \$200 million [the full required regulatory value at the time of the issuance of SECY-93-127] **because there is at least one other operating reactor on [the] site**" [emphasis added]. Since TMI-1 is now permanently shutdown and the certifications for permanent cessation of operations and permanent removal of fuel from the reactor vessel have been provided to the NRC (see Attachment A), TMI-1 is no longer authorized to operate. As discussed in Attachment A, Section 4.2, "Conclusion," 488-days after permanent shutdown, TMI-1 will have sufficient time to take mitigative actions prior to the onset of a zirconium fire and the spent fuel will be air-coolable in the event of a SFP drain down event.

In its Staff Requirements Memorandum for SECY-93-127, *"SECY-93-127 –Financial Protection Required of Licensees of Large Nuclear Power Plants during Decommissioning,"* (Reference 9.4), the Commission approved a policy that authorized, through the exemption process, withdrawal from participation in the secondary insurance layer and a reduction in commercial liability

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<sup>1</sup> As noted by the NRC when granting an exemption for TMI-2 from the secondary financial protection requirements (Reference 9.2):

To the extent reasonably achievable, all fuel has been removed from the [TMI-2] reactor vessel, less than 1 percent of the original core inventory remains; therefore, the term defueled will be used to describe TMI-2. An estimated 2040 lbs and 385 lbs of residual fuel (core debris) remain in the reactor vessel and balance of the facility external to the reactor vessel, respectively. Independent evaluations performed by the NRC and its consultants confirmed the licensee analysis that the fuel debris could not sustain criticality.

insurance coverage to \$100 million, after the spent fuel had undergone an appropriate period of cooling.

Consistent with this approval, GPU sought and obtained an exemption for TMI-2 from participation in the industry retrospective rating plan (secondary financial protection) (Reference 9.2). In granting this exemption, the NRC staff concluded that "in view of the time that has elapsed since plant shutdown, aside from the handling, storage and transportation of the remaining core debris and radioactive materials, no reasonably conceivable<sup>[2]</sup> potential accident exists that could cause significant offsite damage." The NRC recognized that the potential hazards and consequences associated with a permanently shutdown reactor with no fuel are greatly reduced and found that the permanently shutdown TMI-2 reactor did not contribute to a level of risk to the participants in the secondary pool proportionate to that of an operating reactor; therefore, the NRC granted an exemption for TMI-2 from the secondary financial protection requirement in 140.11(a). In issuing this exemption, the NRC concluded that TMI-2 met the criteria established in SECY-93-127 since the license authorized possession only and there was virtually no TMI-2 spent fuel stored onsite.

#### **4.0 TECHNICAL EVALUATION**

As discussed in Attachment A, Section 4.0, "*Technical Evaluation*," the most severe postulated accidents for nuclear power plants involve damage to the nuclear reactor core and the release of large quantities of fission products to the reactor coolant system. Many of the accident scenarios postulated during operation involve failures or malfunctions of systems which could affect the reactor core.

As previously discussed, TMI-2 is in a PDMS condition and there are no fuel assemblies in the reactor or the TMI-2 SFP (see footnote 1, above).

##### **4.1 Accident Analysis Overview**

The bounding event for TMI-2 is a fire in the Reactor Building (RB) with the RB Purge System in operation. Per the TMI-2 Fire Protection Program Evaluation Report (Reference 9.5) the dose at the exclusion area boundary is 0.97 mrem Total Effective Dose Equivalent (TEDE) and 12.4 mrem expressed as a bone dose. The 0.97 mrem TEDE dose is less than the Environmental Protection Agency (EPA) Protective Action Guides (PAGs) of 1 rem total dose threshold for recommended evacuation (Reference 9.6).

The most significant accident sequence for a permanently defueled and shutdown reactor involves the complete loss of water from the spent fuel pool. As the NRC previously recognized when issuing an exemption for TMI-2 from the requirement to participate in the secondary financial protection, "[t]his accident scenario is not credible [nor "reasonably conceivable"] at TMI-2 since the spent fuel pool is drained and no spent fuel is stored in the pool." This has been previously recognized by the NRC in issuing an exemption for TMI-2 from participation in the industry retrospective rating plan (secondary liability) (Reference 9.2).

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<sup>2</sup> In SECY-93-127, the NRC Staff evaluated the potential for serious accidents that could occur at a shutdown reactor. They considered that some accidents may be considered "reasonable" for judging the appropriate level of Price-Anderson protection even though they are beyond those that are considered "credible" for reactor siting calculations or other regulatory purposes. The NRC Staff used the term "reasonably conceivable" in SECY-93-127 to refer to these postulated accidents.



## **4.2 Conclusion**

Since TMI-2 is being maintained in a PDMS condition, the reactor is defueled, and there is no fuel in the TMI-2 SFP, TMI-2 meets the criterion established in SECY-93-127 for relief from the requirements to maintain primary offsite liability insurance for “extraordinary nuclear occurrences” at a level above \$100,000,000.

## **5.0 JUSTIFICATION FOR EXEMPTIONS AND SPECIAL CIRCUMSTANCES**

10 CFR 140.8 states that the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of Part 140 which are authorized by law and are otherwise in the public interest. As discussed in Attachment C, *“Request for Exemptions from 10 CFR 140.11(a)(4) for Three Mile Island Nuclear Station, Units 1 and 2, Justification for Exemption Requests and Special Circumstances,”* this exemption request satisfies the provisions of Section 140.8.

## **6.0 PRECEDENT**

As discussed in Section 3.0 of this attachment, TMI-2 previously received an exemption from participation in the secondary level financial protection (Reference 9.2). In granting this exemption the NRC staff concluded that TMI-2 met the criteria established in SECY-93-127 that the requisite period of “time that has elapsed since plant shutdown, aside from the handling, storage and transportation of the remaining core debris and radioactive materials, no reasonably conceivable potential accident exists that could cause significant offsite damage.” Since the criteria presented in SECY-93-127 for removal from the secondary financial protection requirement are identical to those for reducing the primary offsite liability insurance, there is precedent for allowing the reduction of offsite liability insurance for TMI (as a site), once TMI-1 has met the criteria in SECY-93-127.

## **7.0 ENVIRONMENTAL ASSESSMENT**

As discussed in Attachment D, *“Request for Exemptions from 10 CFR 140.11(a)(4) for Three Mile Island Nuclear Station, Units 1 and 2, Environmental Assessment,”* the proposed exemption meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(25).

## **8.0 CONCLUSION**

Pursuant to the provisions of 10 CFR 140.8, the FirstEnergy Companies request a permanent exemption from the requirements in 10 CFR 140.11(a)(4) to carry primary financial protection in the amount of \$450,000,000 and authorizing providing the primary financial protection at the level of \$100,000,000 for the TMI site (TMI-1 and TMI-2). Based on the considerations discussed above, the requested exemption is authorized by law and is otherwise in the public interest.

## **9.0 REFERENCES:**

- 9.1 Letter from W. J. Dircks (NRC) to J. S. Herbein (Metropolitan Edison Company), *[No Subject]*, dated February 25, 1982 (Refer to ADAMS Accession No. ML19141A211, page 55)

- 9.2 Letter from Michael T. Masnik (NRC) to T. G. Broughton (GPU Nuclear Corporation), *“Exemption from the Requirements of 10 CFR 140.11(a)(4) for the Three Mile Island Nuclear Station, Unit 2 (TMI-2) (TAC No. M88362),”* dated July 29, 1994 (ADAMS Accession No. 9408050260 (Legacy Library)) [or General Public Utilities Nuclear Corp., Three Mile Island Nuclear Station, Unit 2, Exemption, dated August 8, 1994 (59 Federal Register 40380)]
- 9.3 Commission Paper, SECY-93-127, *“Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning,”* dated May 10, 1993 (ADAMS Accession No. ML12257A628)
- 9.4 Staff Requirements Memorandum for SECY-93-0127, *“SECY-93-127 – Financial Protection Required of Licensees of Large Nuclear Power Plants during Decommissioning,”* dated July 13, 1993 (ADAMS Accession No. ML003760936)
- 9.5 990-3017, *“Three Mile Island Unit No. 2 Fire Protection Program Evaluation,”* Revision 12, dated May 18, 2018, as modified by Engineering Change EC 626787, dated August 8, 2019
- 9.6 *“Environmental Protection Agency Protective Action Guides and Planning Guidance for Radiological Incidents, Draft for Interim Use and Public Comment,”* dated March 2013

**Attachment C**

**Request for Exemptions from 10 CFR 140.11(a)(4)  
for Three Mile Island Nuclear Station, Units 1 and 2  
Justification for Exemption Requests and Special Circumstances**

## JUSTIFICATION FOR EXEMPTIONS AND SPECIAL CIRCUMSTANCES

10 CFR 140.8, "*Specific exemptions*," states that the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of the regulations of Part 140 which are authorized by law and are otherwise in the public interest. As discussed below, these exemption requests satisfy the provisions of Section 140.8.

### **A. The Exemptions are Authorized by Law**

The proposed exemptions are consistent with the requirements of the Atomic Energy Act of 1954, as amended, which requires that power reactor licensees maintain some level of public liability financial protection. The legal and associated technical basis for granting exemptions from 10 CFR part 140 are set forth in SECY-93-127, "*Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning*" (Reference 1). The legal analysis underlying SECY-93-127 concluded that, upon a technical finding that lesser potential hazards exist after termination of operations, the Commission has the discretion under the Price-Anderson Act to reduce the amount of insurance required of a licensee undergoing decommissioning. The proposed reduction in primary offsite liability coverage to a level of \$100 million for the site, and the proposed withdrawal of TMI-1 from participation in the secondary insurance pool for offsite financial protection, are consistent with the policy established in SECY-93-127 and subsequent insurance considerations resulting from zirconium fire risks, as discussed in SECY-00-0145, "*Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning*," and SECY-01-0100, , "*Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools*," (References 2 and 3, respectively), and consistent with the exemption the NRC already granted authorizing the withdrawal of TMI-2 from the secondary insurance pool (Reference 4).

Additionally, as discussed in NRC letter to Dominion Nuclear Connecticut, Inc. (Reference 5), post-shutdown insurance requirements for nuclear power plants undergoing decommissioning were addressed in a letter from the NRC Executive Director for Operations to the Chairman of the Advisory Committee on Reactor Safeguards (ACRS) dated September 17, 2001. The staff and the ACRS agreed that onsite and offsite insurance coverage can be substantially reduced shortly after a facility permanently shuts down. The ACRS also accepted the staff's assessment that the primary offsite liability insurance level can be reduced to \$100 million and that decommissioning licensees can be released from participation in the secondary insurance pool. Therefore, the exemptions are authorized by law.

The NRC has granted exemptions from the requirements of 10 CFR 140.11(a)(4) to other licensees, confirming that the exemptions requested herein are authorized by law (see Section 6.0 of Attachments A and B for Units 1 and 2, respectively).

TMI-2 has been previously granted an exemption from participation in the industry retrospective rating plan (secondary financial protection) based on the NRC finding that lesser potential hazards exist after termination of operations (Reference 4).

### **B. The Exemptions are Otherwise in the Public Interest**

The financial protection limits of 10 CFR 140.11 were established to require licensees to maintain sufficient offsite liability insurance to ensure adequate funding for offsite liability claims, following an accident at an operating reactor. However, the regulation does not consider the reduced potential for and consequence of nuclear incidents at permanently shutdown and



decommissioning reactors. The basis provided in SECY-93-127 (Reference 1) and SECY-96-256, *"Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11"* (Reference 6), allows licensees of plants in decommissioning to reduce their primary offsite liability insurance and to withdraw from participation in the retrospective rating pool for deferred premium charges. As discussed in these documents, once the zirconium fire concern is determined to be negligible, possible accident scenario risks at permanently shutdown and defueled reactors are greatly reduced, when compared to the risks at operating reactors, and the associated potential for offsite financial liabilities from an accident are commensurately less. Accidents that could result in an offsite radiological risk have been assessed and the risks have been determined to be minimal, thereby justifying the proposed reductions in offsite primary liability insurance for the TMI site and withdrawal of TMI-1 from participation in the secondary retrospective rating pool for deferred premium charges.

Approval of the exemption requests would result in more efficient use of funds in the decommissioning trust funds. The reduction in offsite financial protection for TMI from \$450 million to \$100 million and elimination of the requirement for TMI-1 to participate in the secondary insurance pool would continue to require a level of financial protection commensurate with the underlying purpose of the rule while eliminating an unnecessary financial burden. Therefore, the proposed exemption is otherwise in the public interest.

#### REFERENCES:

1. Commission Paper, SECY-93-127, *"Financial Protection Required of Licensees of Large Nuclear Power Plants During Decommissioning,"* dated May 10, 1993 (ADAMS Accession No. ML12257A628)
2. Commission Paper, SECY-00-0145, *"Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning,"* dated June 28, 2000 (ADAMS Accession No. ML003721626)
3. Commission Paper, SECY-01-0100, *"Policy Issues Related to Safeguards, Insurance, and Emergency Preparedness Regulations at Decommissioning Nuclear Power Plants Storing Fuel in Spent Fuel Pools,"* dated June 4, 2001 (ADAMS Accession No. ML011450420)
4. Letter from Michael T. Masnik (NRC) to T. G. Broughton (GPU Nuclear Corporation), *"Exemption from the Requirements of 10 CFR 140.11(a)(4) for the Three Mile Island Nuclear Station, Unit 2 (TMI-2) (TAC No. M88362),"* dated July 29, 1994 (ADAMS Accession No. 9408050260 (Legacy Library)) [or General Public Utilities Nuclear Corp., Three Mile Island Nuclear Station, Unit 2, Exemption, dated August 8, 1994 (59 Federal Register 40380]
5. Letter from D. Holland (NRC) to D. A. Christian (Dominion Nuclear Connecticut, Inc.), *"Millstone Power Station, Unit 1 - Exemption from Certain Requirements of 10 CFR Part 140 (TAC NO. MA6658),"* dated March 30, 2004 (ADAMS Accession No. ML040890981))]
6. Commission Paper, SECY-96-256, *"Changes to the Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors, 10 CFR 50.54(w) and 10 CFR 140.11,"* dated December 17, 1996 (ADAMS Accession No. ML15062A483)

**Attachment D**

**Request for Exemptions from 10 CFR 140.11(a)(4)  
for Three Mile Island Nuclear Station, Units 1 and 2  
Environmental Assessment**

## ENVIRONMENTAL ASSESSMENT

The proposed exemptions meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(25), because the proposed exemptions involve: (i) no significant hazards consideration; (ii) no significant change in the types or significant increase in the amounts of any effluents that may be released offsite; (iii) no significant increase in individual or cumulative public or occupational radiation exposure; (iv) no significant construction impact; (v) no significant increase in the potential for or consequences from radiological accidents; and (vi) the requirements from which the exemption is sought involve: < ... > (H) surety, insurance or indemnity requirements. Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed exemption.

### **(i) No Significant Hazards Consideration Determination**

Exelon and the FirstEnergy Companies have evaluated the proposed exemptions to determine whether or not a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92 as discussed below:

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

Response: No

The proposed exemptions have no effect on structures, systems, and components (SSCs) and are unrelated to the capability of any plant SSC to perform its design function. The proposed exemptions would not increase the likelihood of the malfunction of any plant SSC.

When the exemptions become effective, there will be no credible events that would result in doses to the public beyond the exclusion area boundary (EAB) that would exceed the Environmental Protection Agency (EPA) Protective Action Guides (PAGs). The probability of occurrence of previously evaluated accidents is not increased, since most previously analyzed accidents will no longer be able to occur and the probability and consequences of the remaining accidents, the Fuel Handling Accident (FHA) at TMI-1 and the Reactor Building (RB) Fire with the RB Purge System in operation at TMI-2, are unaffected by the proposed amendment.

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

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

Response: No

The proposed exemptions do not involve a physical alteration of the plant. No new or different type of equipment will be installed and there are no physical modifications to existing equipment associated with the proposed exemption. Similarly, the proposed exemptions will not physically change any SSCs involved in the mitigation of any accidents. Thus, no new initiators or precursors of a new or different kind of accident are created. Furthermore, the proposed exemptions do not create the possibility of a new accident as a result of new failure modes associated with any equipment or personnel failures. No changes are being made to parameters within which the plant is normally operated, or in

the setpoints which initiate protective or mitigative actions, and no new failure modes are being introduced.

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

3. Do the proposed exemptions involve a significant reduction in a margin of safety?

Response: No

The proposed exemptions do not alter the design basis or any safety limits for the plant. The proposed exemptions do not impact station operation or any plant SSC that is relied upon for accident mitigation.

Therefore, the proposed exemptions do not involve a significant reduction in a margin of safety.

Based on the above, Exelon and the FirstEnergy Companies conclude that the proposed exemptions present no significant hazards consideration, and, accordingly, a finding of "no significant hazards consideration" is justified.

**(ii) There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.**

There are no expected changes in the types, characteristics, or quantities of effluents discharged to the environment associated with the proposed exemption. There are no materials or chemicals introduced into the plant that could affect the characteristics or types of effluents released offsite. In addition, the method of operation of waste processing systems will not be affected by the exemption. The proposed exemptions will not result in changes to the design basis requirements of SSCs that function to limit or monitor the release of effluents. All the SSCs associated with limiting the release of effluents will continue to be able to perform their functions. Therefore, the proposed exemptions will result in no significant change to the types or significant increase in the amounts of any effluents that may be released offsite.

**(iii) There is no significant increase in individual or cumulative public or occupational radiation exposure.**

The proposed exemptions do not involve any physical alterations to the plant configuration or any changes to the operation of the facility that could lead to a significant increase in individual or cumulative occupational radiation exposure.

**(vi) There is no significant construction impact.**

No construction activities will occur as a result of the proposed exemption.

**(v) There is no significant increase in the potential for or consequences from radiological accidents.**

See the no significant hazards considerations discussion in Item (i)(1) above.



**(vi) The requirements from which exemption is sought involve: (H) surety, insurance or indemnity requirements.**

The requirements from which the exemptions are sought involve financial protection and for the indemnification and limitation of liability of licensees pursuant to Section 170 of the Atomic Energy Act of 1954, as amended and 10 CFR 140.11(a)(4).

**Attachment E**  
**Form of Indemnity Amendment,**  
**Indemnity Agreement No. B-64**

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

Docket No. 50-289  
50-320

AMENDMENT TO INDEMNITY AGREEMENT NO. B-64  
AMENDMENT NO. 15

Effective January 20, 2021, Indemnity Agreement No. B-64, between Metropolitan Edison Company, Jersey Central Power & Light Company, Pennsylvania Electric Company, and GPU Nuclear Corporation, and the United States Nuclear Regulatory Commission, dated December 11, 1973, as amended, is hereby further amended as follows:

Articles VI and VIII of the Indemnity Agreement are deleted in their entirety and wherever it appears in the Agreement and is substituted therein by the requirements of the exemption permitting a reduction in primary financial protection from \$450,000,000 to \$100,000,000, and withdrawal of TMI-1 from participation in the secondary layer of financial protection.

Footnote 1 of the attachment is deleted in its entirety and the following substituted therefor:

<sup>1</sup>As used in Indemnity Agreement No. B-64, "Licensee" means Exelon Generation Company, LLC, when referring to Three Mile Island Unit 1 or any obligation or liability pertaining to Unit 1; and "Licensee" means Metropolitan Edison Company, Jersey Central Power & Light Company, Pennsylvania Electric Company, and GPU Nuclear Inc. when referring to Three Mile Island Unit 2 or any obligation or liability of Unit 2. In Article II, paragraph 2 of Indemnity Agreement No. B-64, "licensee" refers only to the licensee owning a Unit that has caused insurance limits to be reduced.

Item 2a of the Attachment to the Indemnity Agreement is deleted in its entirety and the following substituted therefor:

Item 2 — Amount of financial protection

a. \$100,000,000 (From 12:01 a.m., January 21, 2021)

Footnote 2 of the Attachment to the Indemnity Agreement is deleted in its entirety.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

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Anthony Bowers, Chief  
Financial Analysis and International Projects Branch  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

Accepted \_\_\_\_\_, 2020

By \_\_\_\_\_  
Exelon Generation Company, LLC

Accepted \_\_\_\_\_, 2020

By \_\_\_\_\_  
Metropolitan Edison Company

Accepted \_\_\_\_\_, 2020

By \_\_\_\_\_  
Jersey Central Power & Light Company

Accepted \_\_\_\_\_, 2020

By \_\_\_\_\_  
Pennsylvania Electric Company

Accepted \_\_\_\_\_, 2020

By \_\_\_\_\_  
GPU Nuclear, Inc.