

**UNITED STATES OF AMERICA NUCLEAR
REGULATORY COMMISSION**

BEFORE THE COMMISSION

In the Matter of:)	Docket No. 50-320-LT;
TMI-2-Solutions, LLC.)	NRC-2022-0156
)	
(Three Mile Island Nuclear)	November 4, 2022
Station, Unit 2))	

**ERIC JOSEPH EPSTEIN’S PETITION FOR LEAVE
TO INTERVENE AND HEARING REQUEST**

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Eric Joseph Epstein
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Harrisburg, PA 17112

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I. Introduction.

Eric Joseph Epstein (“Epstein,” “Mr. Epstein” or “the Petitioner”) is filing a Petition for Leave to Intervene and a Hearing Request in the above captioned matter. In the License Amendment Application (“LAR”), the Applicant (“TMI-2 Solutions”) has asked the U.S. Nuclear Regulatory Commission (“NRC”) to approve Amending the Possession Only License (“POL”) No. DPR-73 (“License”) for Three Mile Island Nuclear Station, Unit 2. The proposed LAR will reduce safety margins, and increase the likelihood of “significant hazards” during Phase 1b and Phase 2 of the cleanup. This proposed amendment undermines the cleanup by deleting and modifying Technical Specifications for PDMS, surveillance requirements, and administrative controls, as well as several license conditions, allowing for the storage of high-level radioactive waste for an indefinite period of time on an island in the middle of the Susquehanna River.

According to the NRC, “the proposed license amendment request would revise the POL and the associated Technical Specifications (“TS”) to support the transition of TMI–2 from Post Defueled Monitoring Storage (“PDMS”) to that of a facility undergoing decommissioning. The proposed amendment would revise the POL and TS to support Phase 1b and Phase 2 decommissioning activities associated with achieving the removal of all debris material, its transfer to dry cask storage at an Independent Spent Fuel Storage Installation or to a “suitable waste storage area,” and the relocation of various requirements and the sealed sources TS to the TMI–2 Decommissioning Quality Assurance Plan (“DQAP”).” (Federal Register, Vol. 87, No. 161/Monday, August 22, 2022/Notices, p. 51455, p. 514545.)

This action would “normalize” the TMI-2 accident, and create a more relaxed cleanup protocol. "This amendment, if approved, would revise the POL and the associated TS to support the transition of TMI–2 from a PDMS condition to that of a facility undergoing radiological decommissioning using the DECON method pursuant to 10 CFR 50.82(a)(7)." (Federal Register Vol. 87, No. 161/Monday, August 22, 2022/Notices, p. 51454.)

The Applicant wants to rewrite history, and create an “apples to apples approach” for decommissioning by “normalizing” the damaged reactor. TMI-2 Solutions fails to recognize the unique status of TMI-2. The LAR “normalization” process has been the original intent of TMI-2 Solutions prior to the license transfer from FirstEnergy. This nuclear shell game should have been front-loaded, and included in the Direct License Transfer Application filed on November 12, 2019.

In order for the NRC to approve the LAR, they have to support TMI-2’ Solutions big lie that: “TMI-2’s current PDMS status has been analogous to SAFSTOR for several decades.” This erroneous assertion is the foundation of the License Amendment Request. “This amendment, if approved, would revise the POL and the associated TS to support the transition of TMI–2 from a PDMS condition to that of a facility undergoing radiological decommissioning using the DECON method pursuant to 10 CFR 50.82(a)(7)." (Federal Register, Vol. 87, No. 161/Monday, August 22, 2022/Notices, p. 51455.)

The Applicant is trying to back door the “normalization” process for TMI-2 that they began campaigning for in 2020. TMI-Solutions told the NRC during a presentation that they wanted to normalize TMI-2 (Slide, 15). **“We don’t want it to look like apples to oranges. We want to keep it consistent. License footprint is identical [to TMI-1.]”** TMI-Solutions clearly stated to the NRC that they want TMI-2 to look, “Like any other plant at the end of its life” after Phase 1. (Transcript, Environmental Regulatory Approach to TMI-2 Decommissioning, GPU Nuclear and TMI-2 Solutions, (February 20, 2020.)”

The "apples to apples” scheme by the Applicant is at the core of their revisionist argument. This ruse - to magically make TMI-2 into a normal operating plant – only works if the NRC approves the scheme. This is the site of a Loss Coolant Core Accident (“LOCA”), and the nation’s worst commercial nuclear accident. This community has endured the impacts of offsite radiation releases, despite the industry and NRC’s assertion that a TMI-type accident was “non-credible.”

This action, if approved to by the NRC would condemn TMI to become a high-level waste site for an “indefinite” period of time at an undisclosed area on site. “Upon issuance, this proposed amendment will modify the 10 CFR part 50 license and the TS to support entry into DECON. TMI–2 Solutions intends to complete decommissioning of TMI–2 and release the site by 2037, except for an area set aside, as may be required.” (Federal Register, Vol. 87, No. 161/Monday, August 22, 2022/Notices, p. 51455.)

The relocation of the “debris,”⁽¹⁾ after the Applicant vacates Three Mile Island is highly speculative, and poses a “significant hazard” based on the inability of the federal government to locate a permanent waste site. Moreover, given the well documented history of TMI-2’s corroding casks as documented by the NRC’s Notice of Deviation on April 7, 2011 (“Preamture Degradation of Spent Fuel Cask Structures s and Components from Environmental Mositure,” NRC Information Notice , 2013-07) it is inexplicable that TMI-2 solutions did not explore “cocooning” the debris similar to the DOE’s strategy with the K Reactors along the Columbia River.

The principal justification for PDMS by the licensee - approved by the NRC - was to protect the public from aggressive and destructive decommissioning and decontamination processes associated with TMI-2’s “unique” state. Not only was the Applicant absent from the PDMS filings and proceedings, but none of these pivotal publications are referenced in the LAR actually support he License Amendment Request. The Applicant’s novel argument is that DECON has periods of storage, thus DECON is actually a rib of SAFSTOR. The problem with the Applicant’s position is that it fails to recognize or research the history of Three Mile Island Unit-2.

NUREG-0683, The Programmatic Environmental Impact Statement (“PEIS”) Related to Decontamination and Disposal of Radioactive Wastes Resulting from the March 28, 1979 Accident Three Mile Island Nuclear Station, Unit 2," evaluates the activities associated with the post-accident cleanup for

¹ Debris material is defined by the licensee by a subjective non-scientific term and refers to it “as pieces of spent nuclear fuel, damaged core material, and high-level waste collectively called, “Debris Materials.”

environmental impact, (2) and addresses the significant amount of decontamination and waste removal that would “normally” be part of a decommissioning plan, which were completed to achieve PDMS. (3)

TMI-2’s “uniqueness” was reaffirmed by the Applicant in its presentation to the NRC when they stated, **“TMI is a very unique situation and we want to take the uniqueness out of it.”** No other reactor building has a basement where the radiation is soaked into the concrete, as was acknowledged by the Applicant on February 20, 2020 in a presentation before the Nuclear Regulatory Commission. TMI-2 Solutions also acknowledged the unique status of TMI-2 in its Application, Attachment 1, p. 12, Attachment 1 on p. 209, and the Amended PSDAR (“Post Shutdown Decommissioning Activities Report.” (“PSDAR” on pp. 16 and the Affidavit of Russell G. Workman.)

Epstein’s Petition shows that TMI-2 remains “unique.” TMI-2 Solutions failed to plan or study for airplane crashes, explosions, fires or intentional attacks, despite TMI’s history of security vulnerabilities, and proximity to an international airport, major rail line, and two shorelines in three counties. Another accident could release radioactive emissions and leaks which may be directly harmful to the Petitioner. These injuries would be redressed by a ruling that disallowed the license renewal application.

The facts on the ground concerning the “unique condition” of TMI-2 are indisputable, as established in the initial PEIS in 1981. The Applicant dismisses, ignores, and plays down: 1) TMI-2 is treacherous terrain inhabited by numerous radioactive hot spots; 2) The Applicants' are “bound,” that is dependent on past studies - without the benefit of a current, in-depth, on-site survey; 3) The lack of contemporary dedicated site studies can not be supplanted by drones; and, 4) The Applicant will encounter unforeseen conditions that could overwhelm, impede, and delay the cleanup as been well documented during the defueling stage. (4)

2 U.S. Nuclear Regulatory Commission, Three Mile Island Nuclear Station, Unit No. 2 Possession Only License, Docket No. 50-320 (Sept. 1993) (ADAMS Legacy #9405190046).

3 Decommissioning definitions and standards for TMI-2 were outlined in the Environmental Impact Statement INUREG-0683, March, 1981, 2.2 Decommissioning and Appendix U, and summarized in PEIS, NUREG-0683, Supplement No. 3, pp. 2.32 p. 233.)

4 For example, the inability of the cork seam in an Auxiliary Building joint to contain the spread of radioactive contamination was reported on October 22, 1993. Dr. Michael Masnik told Mr. Epstein: “...weren’t sure of the extent of the

II. Background.

TMI-2 Solutions is a limited liability corporation based in Utah and formed by EnergySolutions, Inc. (“EnergySolutions”) to decommission TMI-2, and to manage Debris Material until acceptance by the U.S. Department of Energy (“DOE”). EnergySolutions’ is a wholly-owned subsidiary of EnergySolutions, LLC. EnergySolutions will serve as a limited counterparty during Phase 1.

TMI-2 was a pressurized water reactor located within three miles of the Harrisburg International Airport. Due to equipment failure and operator negligence, 40% of the core was destroyed. The waste site is next to Three Mile Island Island, Unit 1, which is separately owned and operated by Constellation.

The Applicant assumes, “Approximately 99% of the original core inventory was removed...with an estimate for residual U O₂ of 1097 kg (-1.2% of initial inventory).” (5) Much of the damaged core was shipped to DOE’s Idaho National Laboratory (“INL”) pursuant to a contract with DOE for “Transportation, Storage, and Disposal Services for TMI-2 Reactor Core.” (5) DOE now has title to and possession of the removed fuel and damaged core material at the TMI-2 Independent Spent Fuel Storage Installation (“ISFSI”) in Idaho. (6)

As part of the fuel storage agreement with the Department of Energy, GPU produced the Distenfeld Study. The NRC staff approved GPU’s Safety Evaluation Report Dr. Distenfeld estimated there were 1,322 kilograms of fuel remaining in TMI-2. GPU tried to determine how much fuel was left at by subtracting the amount of fuel used when TMI-2 began operation from the amount of fuel remaining. The difference was supposed to be in DOE’s possession.

4 (Continued) contamination...conflicting information...came to a head within the last couple of weeks. I have a better understanding. It is going to be a PDMS issue. No way they’re going into PDMS with water [500 gallons] in crack.” (Refer to RAI 7: Cork Seams.) (Refer to page 10 for Dr. Masnik’s biography.)

5 **TMI-2 Solutions believes it has “reduced the possibility of an inadvertent criticality under static or accident conditions.”** (“License Amendment Request – Three Mile Island, Unit 2, 1.2.2. Status of TMI-2, February 19, 2021.)The Applicant did not consider airplane crashes, explosions, abnormal fire scenarios or terrorist attacks in their analysis.

6 The Applicant sites the DOE Contract Nos. DE-SC07-83ID12355 and DE-SC07-84ID12355 (“Reactor Core Contract”); and DE-SC07-85ID12554 (“Abnormal Waste Contract”), but omits critical details and post-storage safety challenges which create “significant hazards.” The contract is fluid, and subject to modification based on the revised DOE and Idaho Agreement, 2019.

GPU hired Norman Rasmussen to review Dr. Distenfeld's study. Rasmussen concluded there were 935 kilograms of fuel remaining at the bottom of TMI-2. Rasmussen's critique acknowledges that super-criticality could result with the removal of the neutron "poison" (borated water.) **This scenario is unlikely, but possible during an explosion, fire or crash.**

The DOE is the licensed owner and operator of that ISFSI, and DOE is responsible for maintaining the ISFSI and for the ultimate disposition of the removed fuel and damaged core material. Importantly, neither DOE's ISFSI license nor the material stored there are part of this LTA. (7) Additionally, DOE is **not** obligated to accept and dispose of the remaining Debris Material at TMI-2. (8)

In February, 1996, TLG Services completed the first TMI-2 site specific decommissioning cost estimate for GPUN. The TLG estimates were updated in 2004 based upon defueling, relevant industry decommissioning projects, availability of low level radioactive waste ("LLRW") and high level radioactive waste ("HLRW") sites, and site remediation requirements.

It is expected that there will be some wastes, (GTCC waste) generated in the decommissioning of TMI-2 that are not suitable for shallow land burial and therefore cannot be shipped for disposal until a high level waste repository is made available by DOE. Although the material is not classified as high-level waste, the DOE has indicated they will accept this waste for disposal at the future high-level waste repository. However, the DOE has not developed an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements. For purposes of the cost estimate, it is assumed that

7 The Applicant relies on the LTA at 12 (referencing Standard Contract DE-CR01-83NE44477 ("TMI-2 Standard Contract"), but failed to acknowledge or plan for the Agreement between Idaho and the Department of Energy. "This new agreement also keeps in place the requirements of the 1995 agreement for the removal of spent fuel from Idaho by 2035." (ANS, "Nuclear News, December, 2019 pp. 40-41). This amended Agreement potentially undermines the Agreement currently in place. (Three Mile Island Unit-2 Independent Spent Fuel Storage Installation; Licensee: United States Department of Energy; License No.: SNM-2508; Docket No.: 072-00020.)

8 "Three Mile Island Unit-2 Independent Spent Fuel Storage Installation Application for 10 CFR 72 Specific License Renewal Special Nuclear Material License Number SNM-2508 (Docket- No. 72-20) Prepared for the United States Department of Energy-Idaho Office by Orano Federal Services, LLC."

GTCC waste will be packaged and disposed of as high-level waste, at a cost of \$25,000 per cubic foot (in 2008 dollars). It is also assumed that the DOE will accept the GTCC material in a timely manner so as not to affect the TMI-2 decommissioning schedule. No additional costs are included for the temporary storage of GTCC material.

More disconcerting is the Applicant's failure to acknowledge or study the impact of the TMI-2 fuel condition and debris currently stored in Idaho. DOE is "...not authorized to add additional fuel" as a licensing condition, and the (9) degradation of Three Mile Island Unit-2 Horizontal Storage Modules is a clear and present danger.

Three Mile Island, Unit 2 ISFSI is at the Idaho National Laboratory Site, and uses NUHOMS-12T horizontal storage modules ("HSMs"). The HSMs were delivered to the Idaho National Laboratory site in 1999 as precast concrete IN 2013-07 Page 3 of 5 components. The storage system consists of an external rectangular reinforced concrete vault (i.e., HSM) with a storage canister resting horizontally on internal rails inside the HSM. The prefabricated modules consist of a body and a roof joined together by anchor bolts. All sections were a minimum of 0.6-meters (2- feet) thick. In 2000, the licensee noted cracks in the HSMs, and concluded they were cosmetic and insignificant.

However, in 2007, the licensee observed continued cracking, crazing and spalling as well as increased efflorescence on the HSM surfaces. The efflorescence was a solid, whitish crystalline material which was determined through sampling and analysis to be calcium carbonate.

The licensee performed an evaluation in 2007, during which it determined that the HSMs were capable of performing their design basis functions. In 2008, the licensee noted that 28 of the 30 HSMs had cracks, mostly emanating from the anchor bolt block out holes with widths up to 0.95 centimeters (0.38 inches).

At that time, the licensee determined that the HSMs appeared to be prematurely deteriorating and that continued crack growth could impact the ability of the HSMs to fulfill their originally planned 50-year design service life. Subsequent evaluations by the licensee initiated the development of an annual inspection plan for the HSMs and base mat as well as an examination of the inside of the HSMs.

9 Three Mile Island Unit-2 Independent Spent Fuel Storage Installation Application for 10 CFR 72 Specific License Renewal Special Nuclear Material License Number SNM-2508 (Docket- No. 72-20)

Subsequent freeze and thaw cycles initiated the crack formation. These conditions are also present at Three Mile Island. Repetition of the process resulted in both continued crack growth and the efflorescence growth identified in 2007. In addition to identifying the root cause of the cracking, the report also suggested repairs (injecting resin into the cracks), preventative actions (e.g., installing caps over the anchor bolt block out holes), and monitoring (use of crack gauges). The licensee incorporated the suggested corrective actions.

III. Mr. Epstein Has Standing on His Own Behalf.

The general requirements for standing are set forth in 10 CFR 2.309(d)(1): (a) the name, address and telephone number of Petitioner; (b) the nature of Petitioner's right under the Act to be made a party to the proceeding; (c) the nature and extent of Petitioner's property, financial or other interest in the proceeding; and (d) the possible effect of any decision or order that may be issued in the proceeding on Petitioner's interest. These will be addressed seriatim.

a) The name, address and telephone number of the petitioner:

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b) The nature of the petitioner's right under the Act to be made a party:

Mr. Epstein has the right to intervene in this proceeding because his interests "may be affected by the proceeding." Section 189(a) of the Atomic Energy Act of 1954, as amended (the "AEA"), 42 U.S.C. § 2239(a)(1)(A). Section 189(a) provides in pertinent part:

In any proceeding under this chapter for the granting, suspending, revoking, or amending of any license ... the Commission shall grant a hearing upon the request of any person whose interest may be affected by the proceeding, and shall admit any such person as a party to such proceeding. (42 U.S.C. § 2239(a)(1)(A).

To qualify for standing a Petitioner must allege (1) a concrete and particularized injury, (2) that is traceable to the challenged action, and (3) that will be redressed by a decision favorable to the Petitioner. See, e.g., *Steel Co. v. Citizens for a Better Environment*, 523 U.S. 83, 102-04 (1998). The requisite injury may be either actual or threatened, e.g., *Wilderness Society v. Griles*, 824 F.2d 4, 11 (D.C. Cir. 1987), and must arguably lie within the “zone of interests” protected by the statutes governing the proceeding – here, either the AEA or the National Environmental Policy Act (“NEPA”). See *Yankee Atomic Electric Company (Yankee Nuclear Power Station)*, CLI-98-21, 48 NRC 185, 195-96 (1998); *Quivira Mining Co. (Ambrosia Lake Facility, Grants, New Mexico)*, CLI-98-11, 48 NRC 1, 6 (1998).

This Petition shows that Mr. Epstein will suffer actual, concrete, particularized, and imminent injuries directly resulting from granting the challenged LAR, and that the injuries are likely to be prevented by a decision favorable to Epstein. This Petition shows, inter alia, that the License Amendment Request will result in adverse health and safety risks to Mr. Epstein by dismantling the safety in depth protocol present during Post-Defueling Monitored Storage (“PDMS”) as mandated by the Nuclear Regulatory Commission. (10)

TMI-2 Solutions plans to weaken the design and management of the equipment for a badly damaged reactor and its corpse. The lack of real time emergency preparedness, fire protection, and radiation monitoring programs, make Mr. Epstein and the community vulnerable in the event of an airplane crash, explosion, fire or terrorist attack causing radioactive releases. The Petition therefore shows that Mr. Epstein has a real stake in the outcome of the proceeding.

10 Masnik, M. T. (NRC) to Long, R. L. (GPU Nuclear) letter, "Issuance of Amendment No. 45 for Facility Operating License No. DPR-73 to Possession Only License for Three Mile Island Nuclear Station Unit 2 (TAC No. ML69115)," dated September 14, 1993.

In 1982, Dr. Masnik was appointed as the Technical Assistant to the Director of the Three Mile Island Unit 2 Program Office for the NRC. He provided technical oversight on all aspects of the TMI-2 cleanup through 1985. He made over 15 containment entries at TMI-2, conducted numerous inspections and surveys, develop custom technical specifications for TMI-2, and oversaw the preparation of three supplements to the program environmental impact statement on the cleanup. Dr. Masnik also served as the Designated Federal Officer of the NRC sponsored TMI-2 Advisory Panel. During his tenure, the panel held over 65 meetings in the Harrisburg area.

Commission case law provides that, in making a standing determination, a presiding officer is to “construe the petition in favor of the petitioner,” Georgia Tech, CLI- 95-12, 42 NRC at 115; Atlas Corporation (Moab, Utah Facility), LBP-97-9, 45 NRC 414, 424 (1997). Further, “even minor radiological exposures resulting from a proposed licensee activity can be enough to create the requisite injury in fact.” (General Public Utilities Nuclear Corp. (Oyster Creek Nuclear Generating Station), LBP-96-23, 44 NRC 143, 158 (1996); Atlas, LBP-97-9, 45 NRC at 425.)

c) The nature and extent of the Petitioner’s interest.

Eric Joseph Epstein (“The Petitioner,” “Mr. Epstein” or “Epstein”) is a resident of Lower Paxton Township, Pennsylvania, and operates a business in “close proximity,” i.e., 12 miles northeast of the Three Mile Island Nuclear Generating Station in Lower Paxton Township. Mr. Epstein has taught, worked, and raised a family in the Harrisburg area dating back to 1982. Mr. Epstein has lived within twelve miles of TMI continuously since 1990, and his personal and professional obligations pierce the five mile veil around TMI on a regular basis.

Epstein’s personal health and his economic stake as a business owner, homeowner, and taxpayer are immediately impacted by the proposed LAR. This action weakens the cleanup by deleting and modifying Technical Specifications for PDMS, surveillance requirements, and administrative controls, as well as several license conditions, including the storage of high-level radioactive waste for an indefinite period of time on an island in the middle of the Susquehanna River.

Mr. Epstein’s connection to the community and Three Mile Island predates the Accident. He was born and raised in the area, and attended parochial and public school near the plant when it was being built. Later, he became the president of Historic B’Nai Jacob Synagogue in Middletown.

As an adult, he has monitored the cleanup, and was an active participant in the NRC’s TMI Advisory Panel. He has a vested interest in making sure the TMI-2 decommissioning fund is adequate to complete a full and complete decommissioning. TMI-2 is the site of a defueling process that was brought to abrupt halt in 1993 despite public opposition as evidenced at the Nuclear Regulatory Commission’s TMI Advisory Panel meetings.

Mr. Epstein has served as the Chairperson and Spokesperson for Three Mile Island Alert continuously since 1984 through 2022. TMIA monitors Peach Bottom, Susquehanna, and Three Mile Island nuclear generating stations. A description of the organization can be found at: <http://www.tmia.com>

Epstein is also the Coordinator of the EFMR Monitoring group, a nonpartisan community based organization established in 1992. EFMR monitors radiation levels at Three Mile Island nuclear generating stations, invests in community development, and sponsors remote robotics research.

In September, 1992, GPU and the NRC agreed to a negotiated settlement on the Post-Defueling Monitored Storage (“PDMS”) of TMI-2 with Eric Epstein. The Agreement stipulates GPU Nuclear will provide equipment and resources to independently monitor radioactive levels at TMI-2; \$700,000 for remote robotics research to assist in the cleanup and minimize worker exposure; and, guarantees that TMI-2 will never operate or serve as a radioactive waste repository for any radioactive waste generated off the Island.

EFMR has also undertaken educational activities relating to energy production and use in Pennsylvania, initiated advocacy actions on behalf of the safety of nuclear plant neighbors, including the evacuation of day care centers in emergency preparedness plans, and the distribution of potassium iodide pills to the general public. The group has also intervened at the Pennsylvania Public Utility Commission to protect the economic interests of Pennsylvania rate payers.

EFMR has worked with Carnegie-Mellon University, Dickinson College, Exelon, the Environmental Protection Agency, GPU Nuclear, Los Alamos National Laboratories (SWOOPE Program), the Nuclear Regulatory Commission, Peach Bottom REMP Program, Pennsylvania Center for Environmental Education, and the University of Tennessee, as well as other national and international organizations. A description of the organization can be found at: <https://www.efmr.org>

Eric Epstein was a school board director for the Central Dauphin School District from 2013-2021. Central Dauphin School District has 98,000 residents and 12,500 students. The school district is the 9th largest school district in the Commonwealth and is the largest of the 10 school districts located in the county. Encompassing an area of 118.2 square miles, the district is comprised of three boroughs (Dauphin, Paxtang and Penbrook) and four townships (Lower Paxton, Middle Paxton, Swatara and West Hanover). Students attend one of thirteen elementary schools, four middle schools and two high schools, and are transported from urban, suburban and rural areas.

As the Commission has applied this standard, an individual demonstrates an interest in a reactor licensing proceeding sufficient to establish standing by showing that his or her residence is within the geographical area that might be affected by an accidental release of fission products. This "proximity approach" presumes that the elements of standing are satisfied if an individual lives within the zone of possible harm from the source of radioactivity. *See Virginia Elec. And Power Co.*, 9 NRC 54, 56 (1979) ("close proximity [to a facility] has always been deemed to be enough, standing alone, to establish the requisite interest" to confer standing).

The Commission's "rule of thumb" in reactor licensing proceedings is that "persons who reside in or frequent the area within a 50-mile radius of the facility" are presumed to have standing. *Sequoyah Fuels Corp.*, 40 NRC 64. 75 n.22 (1994); *See also, Duke Energy Corp.*, 48 NRC 381, 385 n.1 (1998).

In *Georgia Power Co. (Vogtle Electric Generating Plant, Units 1 and 2)*, LBP-93-5, 37 NRC 96 (1993), *aff'd*, CLI-93-16, 38 NRC 25 (1993), the Nuclear Regulatory Commission approved standing for a petitioner living 35 miles from the plant one week per month. In the CFC Logistics proceeding, the Atomic Safety and Licensing Board (ASL&B) "hasten[ed] to add...that the 'obvious potential' aspect of 'proximity-plus' standing is not a concept that can be applied with engineering or scientific precision..." (NRC 475, 485 (2004), p. 487.) Mr. Epstein has established an immediate, proximate and long standing stake in the Three Mile Island community.

"[A] minor exposure to radiation, even one within regulatory limits, is sufficient to state an injury in fact" for standing purposes. *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility)*, LBP-01-35, 54 NRC 403, 417 (2001), *rev'd* on other grounds, CLI-02-24, 56 N.R.C. 335 (2002) (citing *Yankee Atomic Electric Co. (Yankee Nuclear Power Station)*, CLI- 96-7, 43 NRC 235, 247-48 (1996)); *see also id.* at 420 (standing inquiry does not require precision regarding probability of petitioner receiving unwanted dose of radiation). The asserted harm – injury to the health and safety – is clearly encompassed by the health and safety interests protected by the Atomic Energy Act. *Id.* at 417; *see also* 42 U.S.C. § 2013. Radiation exposures and releases are not hypothetical for those who live and work around Three Mile Island. The issue is not if are residents will be exposed to radiation, but when, where and for how long. (10) (Footnote on following page.)

The standing requirements for Nuclear Regulatory Commission adjudicatory proceedings derive from the Atomic Energy Act which requires the NRC to provide a hearing "upon the request of any person whose interest may be affected by the proceeding." (42 U.S.C. 2239(a)(1)(A).

Mr. Epstein has compiled over thirty five years of experience in publishing, researching, and actively intervening before the Pennsylvania Public Utility Commission, the Nuclear Regulatory Commission, and the Susquehanna River Basin Commission on the cleanup, defueling and decommissioning of Three Mile Island. Clearly, the Petitioner's participation would add insight, institutional memory and perspective.

10 Columbia University's Health Study (Susser-Hatch) published results of their findings in the American Journal of Public Health. (June, 1991) The study actually shows a more than doubling of all observed cancers after the accident at TMI-2, including: lymphoma, leukemia, colon and the hormonal category of breast, endometrium, ovary, prostate and testis. The study found "a statistically significant relationship between incidence rates after the accident and residential proximity to the plant."

A study by the University of North Carolina-Chapel-Hill, (August, 1996) authored by Dr. Steven Wing, reviewed the Susser-Hatch (Columbia University) study released in June 1991. Dr. Wing reported "...there were reports of erythema, hair loss, vomiting, and pet death near TMI at the time of the accident...Accident doses were positively associated with cancer incidence. Associations were largest for leukemia, intermediate for lung cancer, and smallest for all cancers combined...Inhaled radionuclide contamination could differentially impact lung cancers, which show a clear dose-related increase."

A study carried out by researchers at Penn State College of Medicine in July, 2017 has concluded a type of thyroid cancer caused by radiation exposure was more common among thyroid cancer patients who were near Three Mile Island during the partial meltdown in 1979. The findings were consistent with observations from other radiation-exposed populations. These data raise the possibility that radiation released from TMI may have altered the molecular profile of TC in the population surrounding TMI.

Mr. Epstein should be granted standing because his participation may reasonably be expected to assist in developing a sound record (See, 10 C.F.R. § 2.309 (e), as he has demonstrated by his participation in numerous NRC proceedings over the past thirty five years.

Pursuant to 10 C.F.R. § 2.309(f), Mr. Epstein has standing and should be granted leave to intervene because his “interest[s] may be affected by the proceeding.” Those interests will not be adequately represented in this action if he is denied intervention.

In Pebble Springs, (4 NRC at 614-617. See *Infra*, § II. A.5.) the Commission also held that even if a Petitioner for intervention could not satisfy the strict judicial standing test, intervention could still be allowed as a matter of discretion.

Mr. Epstein also qualifies for the presumption of injury-in-fact for persons residing within that zone (see *Houston Lighting & Power Co. (South Texas Project, Units 1 & 2)*, LBP-79-10, 9 NRC 439, 443 (1979); *Detroit Edison Co. (Enrico Fermi Atomic Power Plant, Unit 2)*, LBP-79-1, 9 NRC 73, 78 (1979); and *Entergy Nuclear Generation Co. & Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station)*, LBPO6-23, 64 NRC 257, 270 (2006). That presumption is well-founded here.

Mr. Epstein, as a private citizen has an indisputable interest in ensuring that TMI-2 is not approved for the License Amendment Request. This action undermines the cleanup by deleting and modifying Technical Specifications for PDMS, surveillance requirements, and administrative controls, as well as several license conditions, including the storage of high-level radioactive waste for an indefinite period of time on an island in the middle of the Susquehanna River.

For the above stated reasons and supporting evidence, Eric Joseph Epstein satisfies the NRC’s proximity, presumption of injury-in-fact requirements, and because his participation will assist in developing a sound record.

d) The possible effect of any decision or order that may be issued in the proceeding on the petitioner’s interest.

A decision by the Commission allowing the License Amendment Request would subject Mr. Epstein to the health and safety risks set forth in detail in this petition. This petition shows, *inter alia*, that the LAR will result in adverse health and safety risks to the Petitioner. The proposed LAR weakens the cleanup by deleting and modifying Technical Specifications for PDMS, surveillance requirements, and administrative controls, as well as several license conditions, including the storage of high-level radioactive waste for an indefinite period of time on an island in the middle of the Susquehanna River.

The following points address the four factors for allowing discretionary intervention set forth in 10 CFR 2.309(e), while incorporating by reference the elements set forth in Section 2.1 above: (a) the extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record; (b) the availability of other means whereby the petitioner's interest will be protected; (c) the extent to which the requestor's/petitioner's interest will be represented by existing parties; and, (d) the extent to which the requestor's/petitioner's participation will inappropriately broaden the issues or delay the proceeding. Mr. Epstein requests discretionary standing in the event if he is denied standing as of right, or in the event none of his contentions are admitted.

a. The Petitioner's participation may reasonably be expected to assist in developing a sound record:

Epstein's participation in the proceeding will assist the Commission in developing a sound record because the Petitioner will be presenting evidence concerning the local environment, health, and safety, created by the LAR. Epstein will provide local insight, information and evidence that cannot be provided by the Applicant or other parties.

b. Other means are not available whereby the Petitioner's interest will be protected.

There are no other means available whereby the interests of Mr. Epstein will be protected.

c. The Petitioner's interest will not be represented by existing parties.

The interests of Epstein are localized, and will not be represented by the existing parties.

d. The Petitioner's participation will not inappropriately broaden the issues or delay the proceeding.

Epstein is not raising inappropriate issues; therefore, his participation in the proceeding will not inappropriately broaden the issues or delay the proceeding. Mr. Epstein also meets Prudential Standing requirements. In addition, Courts have created a prudential standing requirement that a plaintiff's interests fall within the "zone of interests" protected by the statute on which the claim is based. *Bennett v. Spear*, 520 U.S. 154, 162 (1997). Mr. Epstein should be accorded standing in the above captioned proceeding.

IV. Statutory and Regulatory Framework.

This proceeding is governed by the AEA and NEPA. The AEA sets minimum standards for the safe and secure operation of nuclear facilities. NEPA requires NRC to consider and attempt to avoid or mitigate significant adverse environmental impacts. Although the statutes have some overlapping concerns, they establish independent requirements. *Limerick Ecology Action v. NRC*, 869 F.2d 719, 729- 30 (3rd Cir. 1989). NEPA goes beyond the AEA, requiring the consideration of alternatives to reduce or avoid adverse environmental impacts. *Id.*, citing 10 C.F.R. § 51.71 (d).

Atomic Energy Act.

The AEA prohibits the NRC from issuing a license amendment to operate a nuclear power plant if it would be “inimical to the common defense and security or to the health and safety of the public.” 42 U.S.C. § 2133(d). TMI-2’ License Amendment Request may not be granted unless and until the NRC finds that TMI-Solutions has satisfied the safety requirements of 10 C.F.R. 54.

National Environmental Policy Act.

This proceeding is also governed by the National Environmental Policy Act, 42 U.S.C § 4321, et seq. (“NEPA”). NEPA mandates that federal agencies involved in activities that may have a significant impact on the environment must complete a detailed statement of the environmental impacts and project alternatives. NEPA requires, in pertinent part, that all agencies of the Federal Government, including the NRC take a “hard look” at environmental impacts of proposed actions

^[]_[SEP]NEPA “places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action,” and “ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision making process.” *Baltimore Gas & Elec. Co. v. Natural Res. Def. Counsel, Inc.*, 462 U.S. 87, 97 (1983).

“NEPA was created to ensure that agencies will base decisions on detailed information regarding significant environmental impacts and that information will be available to a wide variety of concerned public and private actors.” *Morongo Band of Mission Indians v. Federal Aviation Administration*, 161 F.3d 569, 575 (9th Cir. 1998) (quoted in *Mississippi River Basin Alliance v. Westphal*, 230 F.3d 170, 175 (5th Cir. 2000)).

Thus, the fundamental goal of a NEPA evaluation is to require the responsible government agency to undertake a careful and thorough analysis of the need for the project and its impacts before proceeding. Agencies must consider environmentally significant aspects of a proposed action, let the public know that the agency's decision-making process includes environmental concerns, and decide whether the public benefits of the project outweigh the environmental costs. *Baltimore Gas & Elec. Co. v. Natural Resources Defense Council*, 462 U.S. 87, 97, 76 L. Ed. 2d 437, 103 S. Ct. 2246 (1983); *Utahns For Better Transportation v. United States Dept. of Transp.*, 305 F.3d 1152, 1162 (10th Cir. 2002); *Illinois Commerce Com. v. Interstate Commerce Com.*, 848 F.2d 1246, 1259 (D.C. Cir. 1988).

V. Three Mile Island Unit-2 Is Unique and Warrants A Hearing.

This proceeding is unique in that so much of the community has already been exposed to radiation releases from meltdown. As such, Mr. Epstein has been exposed to radiation consistently since 1979. These releases also occurred during refueling, and are likely to continue if the LAR is approved based on the elimination of PDMS safety measures. The LAR is a flawed plan which relies on “passive boundaries” and weakened oversight erodes any real or perceived notion of safety in depth.

The principal justification for PDMS in the licensee and owners submissions approved by the NRC, as well as their testimony before the NRC’s TMI Advisory Panel, was to protect the public from aggressive and destructive decommissioning and decontamination process associated with TMI-2’s “unique” state. Not only was the Applicant absent from the filings and proceedings, but none of these pivotal publications were referenced in support the LAR. The Applicant’s reductionist argument is that DECON has periods of storage, thus DECON is actually a rib of SAFSTOR. The problem with the Applicant’s position is that it fails to recognize prior studies supporting PDMS, and has a convenient, fluid, and subjective relationship to Three Mile Island Unit-2’s “uniqueness.”

NUREG-0683, "The Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from the March 28, 1979 Accident Three Mile Island Nuclear Station, Unit 2," Supplement 3 (“PEIS”) discusses the activities performed to achieve the PDMS state at TMI-2.

The PEIS evaluates the activities associated with the post-accident cleanup for environmental impact, and addresses the significant amount of decontamination and waste removal that would normally be part of a decommissioning plan, which were completed to achieve PDMS. (10)

TMI-2's "uniqueness" was reaffirmed by the Applicant in their presentation to the NRC when they stated, "TMI is a very unique situation and we want to take the uniqueness out of it." No other reactor building has a basement where the radiation is soaked into the concrete, as was acknowledged by the Applicant on February 20, 2020 in a presentation before the Nuclear Regulatory Commission. TMI-2 Solutions also acknowledged the unique status of TMI-2 in their Application, Attachment 1, p. 12 and Attachment 1 on p. 209, and the Amended PSDAR ("Post Shutdown Decommissioning Activities Report" ("PSDAR" on pp. 16 and the Affidavit of Russell G. Workman.)

Epstein's Petition shows that TMI-2 is "unique", and airplane crashes, explosions, fires, or terrorist attacks could result in radioactive releases that would be directly harmful to the Petitioner. These injuries would be redressed by a ruling that disallowed the license renewal application, Mr. Epstein has demonstrated his standing to intervene.

The facts on the ground concerning the "unique condition" of TMI-2 are indisputable, as established in the initial PEIS in 1981. The Commonwealth for Pennsylvania's Department of Environmental Protection Secretary, Patrick McDonnell, reaffirmed TMI-2's "unique status" in a letter to Kristine L. Svinicki, Chairman of the U.S. Nuclear Regulatory Commission from April 6, 2020.

"Given my stated concerns, I hope you and your fellow Commissioners will thoughtfully consider the unique aspects of the severely damaged TMI Unit 2 nuclear reactor and not approve a license transfer until all parties are satisfied that the decommissioning can be done safely."

This Petition shows, *inter alia*, that the LAR will result in adverse health and safety risks to Mr. Epstein. The LAR truncates the cleanup by deleting and modifying Technical Specifications for PDMS, surveillance requirements, and administrative controls, as well as several license conditions, including the storage of high-level radioactive waste for an indefinite period of time on an island in the middle of the Susquehanna River.

The Applicant dismisses, ignores, and plays down that: 1) TMI-2 is treacherous terrain inhabited by numerous radioactive hot spots; 2) The Applicants' are "bound," dependent on past studies without the benefit of an in-depth, site survey; 3) The lack of contemporary dedicated site studies can supplant research; including but not limited to the PEIS, EIS, SER; et al; and, 4) The Applicant will encounter – as history has demonstrated -unforeseen conditions that could overwhelm, impede, and delay the cleanup.

The Petition shows that Mr. Epstein has a real stake in the outcome of the proceeding. Commission case law provides that, in making a standing determination, a presiding officer is to "construe the petition in favor of the Petitioner," Georgia Tech, CLI- 95-12, 42 NRC at 115; Atlas Corporation (Moab, Utah Facility), LBP-97-9, 45 NRC 414, 424 (1997). Further, "even minor radiological exposures resulting from a proposed licensee activity can be enough to create the requisite injury in fact." General Public Utilities Nuclear Corp. (Oyster Creek Nuclear Generating Station), LBP-96-23, 44 NRC 143, 158 (1996); Atlas, LBP-97-9, 45 NRC at 425.

VI. Contentions and Admissibility Standards.

To grant the Petition, the Commission must find that Petitioners have submitted at least one proposed contention that satisfies all six admissibility criteria in 10 C.F.R. § 2.309(f)(1). Petitioners have not done so here. Accordingly, the Petition must be denied.

Petitions to intervene must “set forth with particularity” the contentions a Petitioner seeks to have litigated in a hearing. (11) The requirements for an admissible contention are set forth in 10 C.F.R. § 2.309 (f)(1)(i)-(vi) and also described in the Hearing Opportunity Notice. (12) The Commission’s contention admissibility seeks “to ensure that NRC hearings serve the purpose for which they are intended: to adjudicate genuine, substantive safety and environmental issues placed in contention by qualified intervenors.” (13) To warrant an adjudicatory hearing, the NRC requires proposed contentions to have “some reasonably specific factual or legal basis.” (14) The Petitioner bears the burden to meet the standards of contention admissibility. (15)

Under 10 C.F.R. § 2.309(f)(1), a Petitioner must explain the basis for each proffered contention by stating alleged facts or expert opinions that support the Petitioner’s position and on which the Petitioner intends to rely in litigating the contention at the hearing. (16) To be admissible, the issue raised must fall within the scope of the proceeding and be material to the findings that the NRC must make with respect to the Application. (17)

11 *PPL Susquehanna, LLC* (Susquehanna Steam Elec. Station, Units 1 & 2), CLI-15-8, 81 NRC 500, 503-04 (2015) (quoting 10 C.F.R. § 2.309(f)(1)); *Susquehanna Nuclear, LLC* (Susquehanna Steam Elec. Station, Units 1 & 2), CLI-17-4, 85 NRC 59, 74 (2017).

12 See TMI-2 Solutions, LLC; Three Mile Island Station, Unit No, 2, 87 Fed. Reg. 51,454, 51,454-63 (Aug. 22, 2022) (providing notice of opportunity to request a hearing and file petitions for leave to intervene regarding the license amendment application.

13 *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 213 (2003) (quoting *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 334 (1999)) (emphasis added) (internal citation omitted).

14 *Millstone*, CLI-03-14, 58 NRC at 213).

15 See *Entergy Nuclear Operations, Inc.* (Palisades Nuclear Plant), CLI-15-23, 82 NRC 321, 325, 329 (2015) (“[I]t is Petitioners’ responsibility . . . to formulate contentions and to provide ‘the necessary information to satisfy the basis requirement’ for admission”) (internal citation omitted).

16 10 C.F.R. § 2.309(f)(1)(ii), (v).

17 *Id.* § 2.309(f)(1)(iii)-(iv); *Susquehanna*, CLI-17-4, 85 NRC at 74.

A contention also must provide sufficient information to show a genuine dispute with the Applicant on a material issue of law or fact. (18) The contention must refer to the “specific portions of the Application. . . that the Petitioner disputes,” along with the “supporting reasons for each dispute; or, if the petitioner believes that an application fails altogether to contain information required by law, the Petitioner must identify each failure, and provide supporting reasons for the Petitioner’s belief.” (19)

Contention: Epstein, #1: The Applicants License Amendment Request Fails to Consider the Potential Harm to the Surrounding Area from Airplane Crashes, Explosions and Fires or Terrorist Attacks.

A) Brief Explanation of the Basis for the Contention.

TMI-2 Solutions License Amendment Request does not comply with the National Environmental Policy Act, 42 U.S.C. § 4321, et seq. (“NEPA”) because the License Amendment Request fails to consider the potential for harm that would result from an airplane crash, explosion, fire or terrorist attack. Despite TMI’s history of fires, security vulnerabilities, and proximity to an international airport, the Applicant ignored these safety challenges. Significant and reasonably foreseeable environmental harm could result in recriticality from an airline crash, explosion, fire or terrorist attack. An attack could result in radiation releases that could cause significant adverse environmental and health effects and property damage.

The failure to take account of these risks violates NEPA’s requirement that environmental decisions must contain an evaluation of those aspects of a proposed action that will affect the quality of the human environment “in a significant manner or to a significant extent not already considered.”(Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 374 (1989) (“Marsh”)). Similarly, The LAR fails to satisfy the Atomic Energy Act’s (“AEA”), 42 U.S.C. § 2233(d), fundamental requirement to ensure safe operation during back end of nuclear power production at Three Mile Island, Uni-2.

18 10 C.F.R. § 2.309(f)(1)(vi); *Susquehanna*, CLI-17-4, 85 NRC at 74.

19 *Susquehanna*, CLI-17-4, 85 NRC at 74 (citing 10 C.F.R. § 2.309(f)(1)(vi)). *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 & 2), CLI-89-3, 29 NRC 234, 240-41 (1989).

Nuclear accidents don't make reservations or comport to hypothetical arrangements as bounded by TMI-2 Solutions. The LAR was limited and did not analyze, calculate or plan for an airplane crash, fire or explosion, or terrorist attack. The analysis states that it is not credible to have 1200 kg U in an idealized configuration for criticality to occur during Phase 1b or Phase 2 of decommissioning. TMI-2 Solutions explains that there are no credible operational upsets to realize the ideal configuration. TMI-2 Solutions concludes that even if the upset occurred, "it would require fissile mass in excess of that analyzed, which is in excess of what could occur."

Rather than err on side of conservatism, "TMI-Solutions considers an exemption to 10 CFR 70.24 for a criticality monitoring system to be appropriate under DECON licensing basis..." based on a "calculation." (RAI, Response, op. 26).

Thus, the Applicant ignoring scenarios postulated by Dr. Kaku and Dr. Rasmussen. Rasmussen acknowledged that super-criticality could result with the removal of the neutron "poison" (borated water.) This scenario is unlikely but possible during an explosion, fire or crash.

After evaluating the Distenfeld and Rasmussen's studies, Dr. Kaku noted: "It appears that every few months since 1990, a new estimate is made of the core debris, often with little relationship to the previous estimate...estimates range from 608.8 kg to 1322 kg...This is rather unsettling, because there is significantly more than enough uranium debris to give critical mass. The still unanswered questions are therefore: precisely how much uranium is left in the core, and how much uranium can collect in the bottom of the reactor to initiate recriticality."

The NRC's Request for Additional Information placed a premium on accident analysis. Staff also commented on the frequency of fires at TMI-2:

Fire is arguably one of the largest risks at a nuclear facility (U.S. Department of Energy (DOE), 1994). Fire risk is a product of the likelihood of a fire occurring and the consequences if a fire were to occur. Though minor in impact, fires have occurred at nuclear reactors undergoing decommissioning (e.g., Crystal River, Ft. Calhoun, Indian Point). By the introduction of fuel and energy sources combined with the diverse activities that are necessary to complete decommissioning, the frequency of occurrence of fires has been higher during decommissioning than during operations or, in the case of TMI-2, PDMS." (RAI, Page, 4.)

On the following page 5, the NRC noted, “ Though not extensively studied , the importance of the ARF to accident risk analysis has been recognized...From examination of historical photos, some materials located within the reactor building are combustible. In addition, fuel and other combustible materials will be introduced to facilitate decommissioning. A critical assessment of materials present, and appropriate ARF's for those materials, may help support selection of ARF's or help determine if additional controls are necessary for certain materials.”

TMI-2 Solutions discarded the NRC's guidance, and argued that the NRC's suggestions were misguided. TMI-2 Solutions claimed that the NRC was making an “apples to apples” comparison, but TMI-2 Solutions changed directions and declared that this portion of the cleanup was still a rib of PDMS and applied asked for relief. When it suits the Applicant, they eschew “normalcy, and ask for an “apples to oranges” slice of the damaged reactor. (RAI Responses, Dated September 29, 2022, pp. 4-12.)

As noted in the response below, the 1E-3 ARF used in the original calculation was from SAND, 2019-12565J, 2019, and Battelle-Pacific Northwest Laboratories (BNWL)-1730 (1973), which were based on testing for scenarios that are evaluations whose intended purpose, accident scenarios, and contaminant chemical forms are not representative of the Reactor Building contaminants or Dry Active Waste (DAW) fire scenario applicable to the TMI-2 decommissioning. As noted in the Table below, the 1.5E-4 ARF is within the range applicable to DAW fires with non- combustible powers dispersed in the area and within the combustible DAW material. (TMI-2 Solutions response to the NRC's RAI.)

TMI-2 Solutions ignored historical studies based on visual evidence suggested by the NRC and supported by the NRC. TMI-2 Solutions postulated that a High Integrity Fire was the most significant challenge, and dismissed the dose exposures as inconsequential. TMI-2 Solutions stated that:

The results of this analysis indicate that a High Integrity Container (HIC) fire is the event that could occur during decommissioning with the potential of maximizing dose at the site boundary. The HIC fire event is postulated to occur either inside or outside of containment. Outside of containment the release involves an unfiltered, ground level release that takes no credit for the operation of any SSCs to mitigate the consequences of the event. The dose at the site boundary associated with the HIC fire occurring outside of containment bounds the dose from the HIC fire inside of containment with the containment engineered access equipment hatch open, as well as with

or without RB ventilation and purge system in operation, and does not exceed the requirements of 10 CFR 100.11 and the EPA PAGs. The HIC fire event does not impact existing Technical Specifications or require the addition of new Technical Specifications. (20)

A review of industry data was performed, the results of which indicate that spent ion exchange resins combusted in polyethylene HICs produce the highest off-site doses. (Attachment 1, page 5)

Earlier site studies were dismissed or disregarded by the NRC and TMI-2 Solutions.

B. This is a Valid Contention Pursuant to 10C FR 2.309.

The specific issue of fact and law to be controverted is whether TMI-2 Solutions License Amendment assesses the impacts of a potential terrorist attack. 10 C.F.R. §2.309(f)(1)(i). The LAR does not consider the potential impact of a terrorist attack. If such an attack were successful, it could result in a substantial off-site radiological release that could threaten public health and safety, and the environment. Therefore there is a genuine dispute with regard to the sufficiency of the license application.

This issue is also within this proceeding's scope. 10 C.F.R. § 2.309(f)(1)(iii), (f)(2)(for issues under NEPA, petitioner shall file contentions based upon the ER).

...and is within its scope, for at least two reasons: 1) the real potential for a terrorist attack is "significant and new" information given the successful attack carried out by terrorists on September 11, 2001; and 2) the impacts of a terrorist attack should have been considered as part of the Applicant's analysis. A terrorist attack on chemicals, damaged fuel, debris, diatomaceous earth, radioactive contaminated buildings could result in potentially significant off-site radiological releases that could cause significant adverse environmental public health effects and property damage. This issue is thus material to findings that must be made in this proceeding. 10 C.F.R. §2.309(f)(1)(iv). See *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. denied, 127 S. Ct. 1124 (2007)(holding that NEPA requires the NRC to study how its actions affect the risk of terrorism).

20 TMI-2 Solutions, submittal TMI2-RA-COR-2021-0002 to U.S. Nuclear Regulatory Commission, "License Amendment Request – Three Mile Island, Unit 2, Decommissioning Technical Specifications," February 19, 2021. (ML21057A04.)

C. Factual Allegations Supporting the Claim as Required by 10 CFR § 2.309(f)(1)(v).

The events of September 11, 2001, and after, demonstrate the importance of considering the potential impact of a terrorist attack on Three Mile Island. The 9/11 Commission Report (2004), at p. 32. Since September 11, the federal government has repeatedly acknowledged that there is a credible threat of intentional attacks on nuclear power plants, including the specific threat of an aircraft attack. For instance, in his 2002 State of the Union address, President Bush stated that “diagrams of American nuclear power plants” had been found in Afghanistan, suggesting that Al-Qaeda may have been planning attacks on those facilities. An Al-Qaeda affiliate was based in Perry County, and conducting terrorist trainings less than 15 miles from Three Mile Island.. In addition, on February 7, 1993, an intruder drove past TMI’s guarded entrance gate, crashed through a protected area fence, crashed through the turbine building roll-up door, and hid in a darkened basement of the plant for almost four hours before being apprehended by guards.

Additionally, on September 4, 2003, the United States General Accounting Office (“GAO”) issued a report noting that the nation’s commercial nuclear power plants are possible terrorist targets and criticizing the NRC’s oversight and regulation of nuclear power plant security. GAO, Nuclear Regulatory Commission: Oversight of Security at Commercial Nuclear Power Plants Needs to Be Strengthened, GAO-03-752 (2003).

“The results of an aircraft crash on a nuclear power plant are not limited to the effects of the impact of heavy parts (such as a jet engine) on civil engineering structures. Numerous systems are required in order to provide adequate long-term cooling of the core. Although many of these safety-related systems are well protected within hardened structures (containment system, auxiliary building), some are not.” Nuclear Regulatory Commission, NUREG/CR-2859, “Evaluation of Aircraft Crash Hazards for Nuclear Power Plants,” June 1982, at p. 50. According to the Union of Concerned Scientists, “[t]his study clearly, categorically, explicitly and undeniably refutes the fanciful notion that nuclear power plants are robust structures and describes numerous scenarios in which an aircraft crash could lead to significant reactor core damage.” “The NRC’s Revised Security Regulations,” Union of Concerned Scientists, Issue Brief, February 1, 2007, p. 2.

Similarly, a 1987 NRC study strongly suggests that the violence of an aircraft crashing into a nuclear plant structure can produce shaking that causes electrical relays to change positions, and this outcome alone -- without even considering the effect of fires, explosions or other consequences -- has a high likelihood of causing reactor core damage. *Id.* at p. 4, citing Nuclear Regulatory Commission, NUREG/CR-4910, "Relay Chatter and Operator Response After a Large Earthquake," August 1987. Additionally, an NRC Staff paper from 1997 concludes that fires represented a significant risk to the reactor core, and the most commonly identified plant areas with high fire vulnerabilities were the main control room, the electrical switchgear rooms, and the cable spreading rooms -- all are as located outside of the thick reinforced concrete containment walls. *Id.* at p. 5, citing N. Siu, J. T. Chen and E. Chelliah, Nuclear Regulatory Commission, "Research Needs in Fire Risk Assessment," Presentation at 25th Water Reactor Safety Information Meeting, Bethesda, Maryland, October 20-22, 1997.

Of particular concern are the potential widespread environmental impacts if a terrorist attack damaged the reactor core, spent fuel, the storage casks, or other areas. *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. denied, 127 S. Ct. 1124 (2007). The NRC has implicitly recognized the gravity of the consequences of a terrorist air attack by requiring applicants for certain new nuclear reactors to consider such attacks. See, e.g., 72 Fed Reg. 56,287 (October 3, 2007). This concern over the damage that could be caused by an aircraft impact is reflected in other NRC documents as well. See NRC, *Evaluation of Aircraft Crash Hazards Analyses for Nuclear Power Plants*, NUREG/CR-2859 (1982); NRC, *Relay Chatter & Operator Response After a Large Earthquake*, NUREG/CR-4910 (1987); NRC, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants*, NUREG-1738, at § 3.5.2 (2001); NRC: *Nuclear Power Plants Not Protected Against Air Crashes*, Associated Press (Mar. 28, 2002).

Other studies identify the threat as a significant issue. Ian B. Wall, *Probabilistic Assessment of Aircraft Risk for Nuclear Power Plants*, 15 *Nuclear Safety* 276 (1974); *Power Auth. of the State of N.Y. & Consol. Edison Co., Indian Point Probabilistic Safety Study*, at 7.6-3 to 7.6-6 (1982). In 2005, the National Academy of Sciences released a report from a study it conducted at the request of Congress, with the sponsorship of the NRC and the Department of Homeland Security, of the security risks posed by the storage of spent fuel at nuclear plant sites. See *Nat'l Acad. of Scis., Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* (2006). Based upon information provided by the NRC, the National Academy of Sciences judged that "attacks with civilian aircraft remain a credible threat." *Id.* at 30.

For the foregoing reasons, pursuant to 10 CFR § 2.309(f)(3), this Contention should be admitted in their entirety.

Contention: Epstein, #2: The Applicants License Amendment Request Report Fails to Consider the Potential Harm to the Surrounding Area from Recriticality Due to Airplane Crashes, Explosions and Fires or Terrorist Attack.

A) Brief Explanation of the Basis for the Contention.

TMI-2 Solutions License Amendment Request does not comply with the National Environmental Policy Act, 42 U.S.C. § 4321, et seq. (“NEPA”) because the LAR fails to consider the potential for harm that would result from an airplane crash, explosion, fire or terrorist attack despite TMI’s history of security vulnerabilities, and proximity to an international airport. TMI-2 does not possess dedicated on-site security, and relies on TMI-1’s security which may be only available every four hours. (RAI, #11, p. 32). Significant and reasonably foreseeable environmental harm that could result in recriticality from airline crash, explosion, fire or terrorist attack. An attack could result in radiation releases that could cause significant adverse environmental and health effects and property damage in one of the most densely populated areas of the country.

The failure to take account of these risks violates NEPA’s requirement that environmental decisions must contain an evaluation of those aspects of a proposed action that will affect the quality of the human environment “in a significant manner or to a significant extent not already considered.” (Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 374 (1989) (“Marsh”). Similarly, The LAR fails to satisfy the Atomic Energy Act’s (“AEA”), 42 U.S.C. § 2233(d), fundamental requirement to ensure safe operation of the back end of nuclear power production because the LAR erases Technical Specifications for PDMS, surveillance requirements, and administrative controls, as well as several license conditions, including the storage of high-level radioactive waste.

Nuclear accidents don’t make reservations or comport to hypothetical arrangements as bounded by TMI-2 Solutions. The LAR was limited and did not analyze, calculate or plan for an airplane crash, fire or explosion, or terrorist attack. The analysis states that it is not credible to have 1200 kg U in an idealized configuration for criticality to occur during Phase 1b or Phase 2 of decommissioning. TMI–2 Solutions explains that there are no credible operational upsets to realize the ideal configuration. TMI–2 Solutions concludes that even if the upset occurred, “it would require fissile mass in excess of that analyzed, which is in excess of what could occur.”

Thus ignoring scenarios postulated by Dr. Kaku and Dr. Rasmussen. Rasmussen acknowledged that super-criticality could result with the removal of the neutron “poison” (borated water.) This scenario is unlikely but possible during an explosion, fire or crash.

After evaluating the Distenfeld and Rasmussen’s studies, Dr. Kaku noted: “It appears that every few months since 1990, a new estimate is made of the core debris, often with little relationship to the previous estimate...estimates range from 608.8 kg to 1322 kg...This is rather unsettling, because there is significantly more than enough uranium debris to give critical mass. The still unanswered questions are therefore: precisely how much uranium is left in the core, and how much uranium can collect in the bottom of the reactor to initiate recriticality.”

TMI-2 Solutions ignores previous studies based on visual evidence, and postulated that a High Integrity Fire was the most significant challenge, and dismissed the dose exposures as inconsequential. Earlier studies were dismissed or disregarded by the NRC and TMI-2 Solutions.

Both the NRC and TMI-2 Solutions ignored the Commission’s review of the Tokai-Mura criticality accident, (April 2020.) The Nuclear Regulatory Commission (NRC) staff reviewed the available information, on the September 30, 1999, criticality accident at the Tokai-Mura fuel cycle facility, to identify lessons learned that could be applied to U.S. commercial fuel facilities, and to determine whether improvements in the NRC’s existing safety oversight programs were necessary.

TMI-2 Solutions submitted a calculation (Attachment 5 of its February 19, 2021, submittal, as supplemented on April 7, 2000.) that assesses increasing the Safe Fuel Mass Limit (SFML) from 42 kg to approximately 1200 kg. The analysis states that it is not credible to have 1200 kg U in an idealized configuration for criticality to occur during Phase 1b or Phase 2 of decommissioning. TMI-2 Solutions explains that there are no credible operational upsets to realize the ideal configuration. “TMI-2 Solutions concludes that even if the upset occurred, it would require fissile mass in excess of that analyzed, which is in excess of what could occur.”

However, in April 2000, the staff agreed “with the conclusions drawn by the investigations conducted by the Government of Japan that there were three general root causes involved with the Tokai-Mura criticality accident: (1) inadequate regulatory oversight; (2) the lack of an appropriate safety culture at the JCO facility; and (3) inadequate worker training and qualification. Each general root cause is discussed below.”

Compare this assertion to the highlighted text on the fourth page of the attached NRC document about the causes of the 1999 accident at Tokai-Mura on page 4.

The regulatory oversight program for the Tokai-mura fuel processing facility failed to establish and maintain an adequate safety margin. The licensing review incorrectly concluded that there was “no possibility of criticality accident occurrence due to malfunction and other failures.” Consequently, no criticality accident alarm was required or installed and the facility was not included in the National Plan for the Prevention of Nuclear Disasters. This conclusion relied heavily on the use of administrative controls that were subject to human error.

The resultant belief that a criticality accident was not credible complicated the recovery process. First, there was initial confusion as to whether a criticality had occurred, followed by further uncertainties as to whether the system was still in a critical state. This may have led to three emergency workers receiving an unplanned exposure during their response to the event and, under slightly different circumstances, could have led to recovery personnel being exposed to any subsequent criticality pulses that could occur. **Secondly, since the fuel processing facility was not included in the National Plan for the Prevention of Nuclear Disasters, there was a significant delay in development and communication of emergency protection measures for the public.** Several workers at a nearby lumber yard were not told to evacuate the area until approximately 3:00 p.m., although the event began at 10:30 a.m., and officials knew that the system was still critical and causing significantly elevated exposure rates near the facility.

The "non-credible" criticality sequence at Tokai-Mura caused the very real, and very horrible, deaths due to acute radiation sickness of two workers -- one 83 days later and the other about 221 days later. Moreover, from a personnel protection standpoint during decommissioning the predominant isotopes are Cs137 Sr90 and Co60. Waiting 50 years eliminates the Co and reduces Cs and Sr90 by 75+%. Criticality concerns remain unchanged as 50 yrs is short compared to U or Pu half-life's.

TMI-2 Solutions now suggests a revised inventory that dismisses the EIS, (NRC, 1981); PEIS, (NRC, 1981), GEND, (Bechtel, DOE; et al, 1983-1986; SER, (1985), TMI-2 Debris Grab Samples, (DOE; 1986); GEIS, (NRC, 1988 and 2002), PEIS, Supplement 3, NRC, 1989), and (PDMS/POL. NRC, 1993. TMI-2 supplants volumes of data and research with absolute “uncertainty” from focused drones that gives the company the “best available data.” However, the data the Applicant calls into question seeks to dismiss on RAI, pp. 14-15, the Applicant uses to support its “best available data” assertion on RAI, p. 16.

Still the Applicant admits that, “The capability to significantly reduce the 40% uncertainty [of core debris] would require characterizing the collected fuel debris in each container using sophisticated hot cell and laboratory facilities with the means to homogenize, sample, weigh, and analyze the contents of each container. Such facilities did not (and do not) exist at TMI-2. The results of the post-defueling survey reports were reviewed by the NRC in Reference 13 [in November, 1994.]” (RAI, p. 28).

These facilities are available, but an added expense for the Applicant which prefers “uncertainty.” TMI-2 Solutions now reverts to an “apples to oranges” paradigm, and seeks refuge and economic immunity in the NRC’s “Post Defueling Survey Report Reviews” dated November 4, 1994 (ML20078H309). At the same time TMI-2 Solutions seeks to supplant PDMS with the LAR, it also relies on this “state of the art” PDMS protocol to serve as crutch to avoid investing in facilities.

How uncertain? “Uncertainties associated with individual discrete estimates vary between 17-104% and weighted average a total of +/-40% uncertainty . Physical inventories have not occurred because they were exempted [in 1985].” (RAI, p. 29). However, the uncertainty will not be improved by the Applicant’s analytical review which will be predicated on the “SNM Accountability” research conducted in 1993. “These estimates for each dry canister will not improve in existing uncertainties.” (RAI, #10, p. 30). As such, the Applicant considers the SNM estimates to be “preliminary.” (RAI, #10, p. 31). “For SNM in dry cask storage, characterization will meet 10 CFR 74.15(a) requirements after completion of final status survey for TMI-2 per written procedure.” (RAI, #13, p. 34.)

Absent from the discussion are any lessons learned from the “Three Mile Island Unit-2 Independent Spent Fuel Storage Installation Application for 10 CFR 72 Specific License Renewal Special Nuclear Material License Number SNM-2508 (Docket- No. 72-20)” from 2019. Had the Applicant taken the time to review the ISFSI Study, they would have benefited from lessons learned, mined data, and research related to dust and exothermic hazards, and “changes in safeguards,” “content estimates,” “incorrect canisters,” “methods of criticality control, “repair of seals”, and “security related materials.”

In addition, estimates of the quantities of and form of SNM at TMI-2 provided by the Applicant indicate that the site may need more detailed plans for material control and accounting during decommissioning, compared to sites where SNM is generally restricted to undamaged spent fuel assemblies... (NRC, RAI, #10.) This is an acknowledgment of TMI-2’s unique status.

This is a glaring omission of data from the same core. Instead, TMI-2 Solutions sought to repudiate any chance of recriticality on their “considerable analyses” (RAI, p. 19; Reference, pp. 20-21) which features all seven references dated 1984-1986. The data in this period was sponsored and approved by the DOE and the NRC, and helped to guide the defueling of TMI-2. The Applicant can not turn back time, and reject research which are contrary to their expectations, but relay on the same data for exemptions.

B. This is a Valid Contention Pursuant to 10C FR 2.309.

The specific issue of fact and law to be controverted is whether TMI-2 Solutions sufficiently assesses the impacts of a potential terrorist attack. 10 C.F.R. §2.309(f)(1)(i). The LAR does not consider the potential impact of a terrorist attack. If such an attack were successful, it could result in a substantial off-site radiological release that could threaten public health and safety, and the environment. Therefore there is a genuine dispute with regard to the sufficiency of this License Amendment Request..

This issue is also within this proceeding’s scope. 10 C.F.R. § 2.309(f)(1)(iii), (f)(2)(for issues under NEPA, Petitioner shall file contentions based upon the ER).

...and is within its scope, for at least two reasons: 1) the real potential for a terrorist attack is “significant and new” information given the successful attack carried out by terrorists on September 11, 2001; and 2) the impacts of a terrorist attack should have been considered as part of the Applicant’s analysis. A terrorist attack on chemicals, damaged fuel, debris, diatomaceous earth, radioactive contaminated buildings could result in potentially significant off-site radiological releases that could cause significant adverse environmental public health effects and property damage. This issue is thus material to findings that must be made

in this proceeding. 10 C.F.R. §2.309(f)(1)(iv). See *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. denied, 127 S. Ct. 1124 (2007)(holding that NEPA requires the NRC to study how its actions affect the risk of terrorism).

C. Factual Allegations Supporting the Claim as Required by 10 CFR§ 2.309(f)(1)(v).

The events of September 11, 2001, and after, demonstrate the importance of considering the potential impact of a terrorist attack on Three Mile Island. The 9/11 Commission Report (2004), at p. 32. Since September 11, the federal government has repeatedly acknowledged that there is a credible threat of intentional attacks on nuclear power plants, including the specific threat of an aircraft attack. For instance, in his 2002 State of the Union address, President Bush stated that “diagrams of American nuclear power plants” had been found in Afghanistan, suggesting that Al-Qaeda may have been planning attacks on those facilities. An Al-Qaeda affiliate was based in Perry County, and conducting terrorist trainings less than 15 miles from Three Mile Island.. In addition, on February 7, 1993, an intruder drove past TMI’s guarded entrance gate, crashed through a protected area fence, crashed through the turbine building roll-up door, and hid in a darkened basement of the plant for almost four hours before being apprehended by guards.

Additionally, on September 4, 2003, the United States General Accounting Office (“GAO”) issued a report noting that the nation’s commercial nuclear power plants are possible terrorist targets and criticizing the NRC’s oversight and regulation of nuclear power plant security. GAO, Nuclear Regulatory Commission: Oversight of Security at Commercial Nuclear Power Plants Needs to Be Strengthened, GAO-03-752 (2003).

“The results of an aircraft crash on a nuclear power plant are not limited to the effects of the impact of heavy parts (such as a jet engine) on civil engineering structures. Numerous systems are required in order to provide reactor shutdown and adequate long-term cooling of the core. Although many of these safety-related systems are well protected within hardened structures (containment system, auxiliary building), some are not.” Nuclear Regulatory Commission, NUREG/CR-2859, “Evaluation of Aircraft Crash Hazards for Nuclear Power Plants,” June 1982, at p. 50. According to the Union of Concerned Scientists, “[t]his study clearly, categorically, explicitly and undeniably refutes the fanciful notion that nuclear power plants are robust structures and describes numerous scenarios in which an aircraft crash could lead to significant reactor core damage.” “The NRC’s Revised Security Regulations,” Union of Concerned Scientists, Issue Brief, February 1, 2007.

Similarly, a 1987 NRC study strongly suggests that the violence of an aircraft crashing into a nuclear plant structure can produce shaking that causes electrical relays to change positions, and this outcome alone -- without even considering the effect of fires, explosions or other consequences -- has a high likelihood of causing reactor core damage. *Id.* at p. 4, citing Nuclear Regulatory Commission, NUREG/CR-4910, "Relay Chatter and Operator Response After a Large Earthquake," August 1987. Additionally, an NRC Staff paper from 1997 concludes that fires represented a significant risk to the reactor core, and the most commonly identified plant areas with high fire vulnerabilities were the main control room, the electrical switchgear rooms, and the cable spreading rooms -- all areas located outside of the thick reinforced concrete containment walls. *Id.* at p. 5, citing N. Siu, J. T. Chen and E. Chelliah, Nuclear Regulatory Commission, "Research Needs in Fire Risk Assessment," Presentation at 25th Water Reactor Safety Information Meeting, Bethesda, Maryland, October 20-22, 1997.

Of particular concern are the potential widespread environmental impacts if a terrorist attack damaged the reactor core, spent fuel, the storage casks, or other areas. *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. denied, 127 S. Ct. 1124 (2007). The NRC has implicitly recognized the gravity of the consequences of a terrorist air attack by requiring applicants for certain new nuclear reactors to consider such attacks. See, e.g., 72 Fed Reg. 56,287 (October 3, 2007). This concern over the damage that could be caused by an aircraft impact is reflected in other NRC documents as well. See NRC, *Evaluation of Aircraft Crash Hazards Analyses for Nuclear Power Plants*, NUREG/CR-2859 (1982); NRC, *Relay Chatter & Operator Response After a Large Earthquake*, NUREG/CR-4910 (1987); NRC, *Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants*, NUREG-1738, at § 3.5.2 (2001); NRC: *Nuclear Power Plants Not Protected Against Air Crashes*, Associated Press (Mar. 28, 2002).

Other studies identify the threat as a significant issue. Ian B. Wall, *Probabilistic Assessment of Aircraft Risk for Nuclear Power Plants*, 15 *Nuclear Safety* 276 (1974); Power Auth. of the State of N.Y. & Consol. Edison Co., *Indian Point Probabilistic Safety Study*, at 7.6-3 to 7.6-6 (1982). In 2005, the National Academy of Sciences released a report from a study it conducted at the request of Congress, with the sponsorship of the NRC and the Department of Homeland Security, of the security risks posed by the storage of spent fuel at nuclear plant sites. See Nat'l Acad. of Scis., *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* (2006). Based upon information provided by the NRC, the National Academy of Sciences judged that "attacks with civilian aircraft remain a credible threat." *Id.* at 30.

VI. Conclusion.

This Petition is timely.

For the foregoing concerns, Eric Joseph Epstein's Request for Hearing and Petition for Leave to Intervene in the TMI-2-Solutions, LLC., License Amendment Request, In the Matter of Docket No. 50-320-LT; NRC-2022-0156.

Respectfully submitted,

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Dated: November 4, 2022.

United States Nuclear Regulatory Commission

In the Matter of)
)
TMI-2 Solutions, LLC)
Docket No. 50-320-LA-2)
) Docket No. 50—320-LA-2
(Licensing Amendment Request)
for Three Mille Island Nuclear)
Station, Unit 2))

Certificate of Service

I hereby certify that copies of Eric Joseph Epstein’s Petition for Leave to Intervene and Hearing have been served upon the following persons by Electronic Information Exchange.

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Dated at Harrisburg, Pennsylvania
this 4th day of November, 2022