April 16, 2020

Margaret Doane
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Via email only to: Petition.Resource@nrc.gov

SUBJECT: FERMI UNIT 2 – PETITION PURSUANT TO 10 CFR § 2.206 SEEKING DEMANDS FOR INFORMATION ***(EXPEDITED RELIEF REQUESTED)***

Dear Ms. Doane:

On behalf of the organizations Beyond Nuclear and Don't Waste Michigan (Petitioners), I hereby submit the within Petition pursuant to 10 C.F.R. § 2.206, requesting that the U.S. Nuclear Regulatory Commission (NRC) take enforcement action in the form of issuing Demands For Information to DTE Energy, requiring immediate provision to the NRC of the information described in the Specific Actions Requested below. ***Petitioners request expedited treatment of this Petition because the information sought relates to possible seriously-elevated risks arising from unexecutted confirmatory actions related directly to the safe and error-free functioning of reactor core cooling features at the Fermi 2 Nuclear Power Plant near Monroe, Michigan. Fermi 2 is presently in cold shutdown for refueling and is expected to be returned to service the week of April 20, 2020.***

Statement of Interest

Petitioner Beyond Nuclear is a nonprofit, nonpartisan membership organization that aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abolish both to protect public health and safety, prevent environmental harms, and safeguard our future. Beyond Nuclear advocates for an end to the production of nuclear waste and for securing the existing reactor waste in hardened on-site storage until it can be permanently disposed of in a safe, sound, and suitable underground repository. For twelve years, Beyond Nuclear has regularly intervened in NRC licensing, relicensing, and other proceedings related to irradiated commercial nuclear power plant fuel matters. Beyond Nuclear has 100 members within a 50-mile radius of Fermi Unit 2.

Petitioner Don't Waste Michigan (DWM) is a 30-year-old grassroots association with 60 members in southern and central Michigan within 50 miles of Fermi Unit 2. DWM is located at 2213 Riverside Drive NE, Grand Rapids, Michigan 48505. DWM has opposed various incarnations of nuclear energy, from commercial nuclear power plants to policy and practical plans for disposal of radioactive waste, and engages in public education and legal and administrative advocacy in licensing proceedings. During the height of the opposition in the 1990's to initiation of a low level radioactive waste dump which targeted Michigan as a host state, Don't Waste Michigan turned out rallies of 3,000 to 5,000 persons on regular basis. Many of these persons identified themselves as Don't Waste Michigan members.

Specific Actions Requested

The Petitioners request that the NRC take enforcement action in the form of Demands For Information issued to DTE Energy requiring the company to respond with information related to three topics:

1. The results from a formal risk assessment of the torus coatings condition at Fermi Unit 2. The risk analysis would examine the potential risk implications of debris from unqualified coating above the normal water level in the torus, from qualified coating being applied below the normal water level in the torus, and from coatings on the internal surfaces of objects below the normal

water level in the torus collecting on the suction strainers and impairing the performance of the Emergency Core Cooling System and Reactor Core Isolation Cooling system pumps during design basis events.

2. Listings of tasks deferred since December 31, 2019, that remain active but not completed at Fermi Unit 2.

3. Answers to questions about how the COVID-19 pandemic countermeasures will alter the onsite response to declared nuclear emergencies or the evaluations/assessments that justify the lack of need for alterations.

These requested actions are described more fully in the attachment, which Petitioners drafted with the advisory assistance of David Lochbaum, retired nuclear engineer.

Kindly advise us immediately of any information and/or additional steps required of Petitioners to gain the NRC's immediate attention to, and responsive enforcement actions formulated to address the circumstances detailed in this Petition.

Sincerely,

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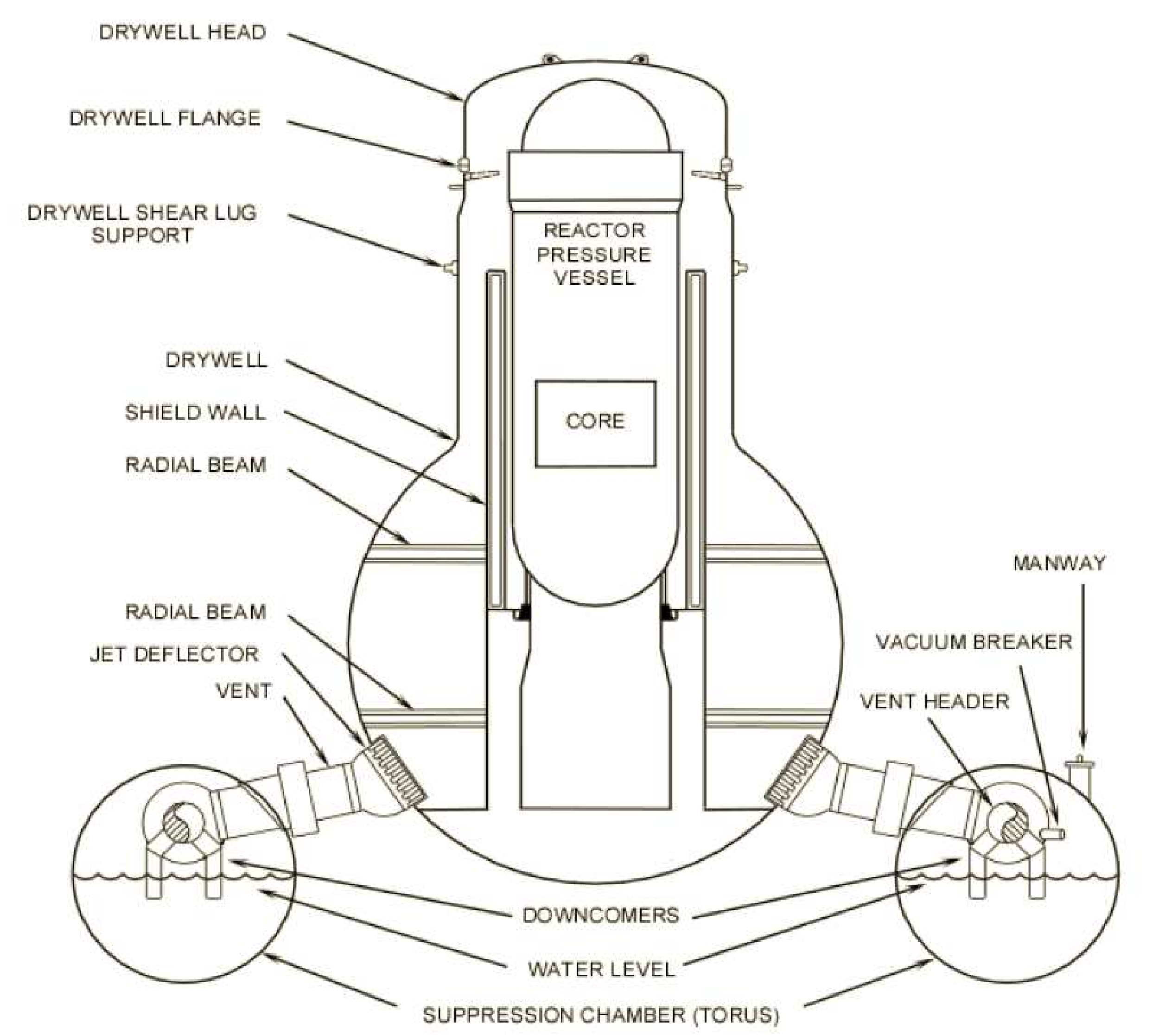
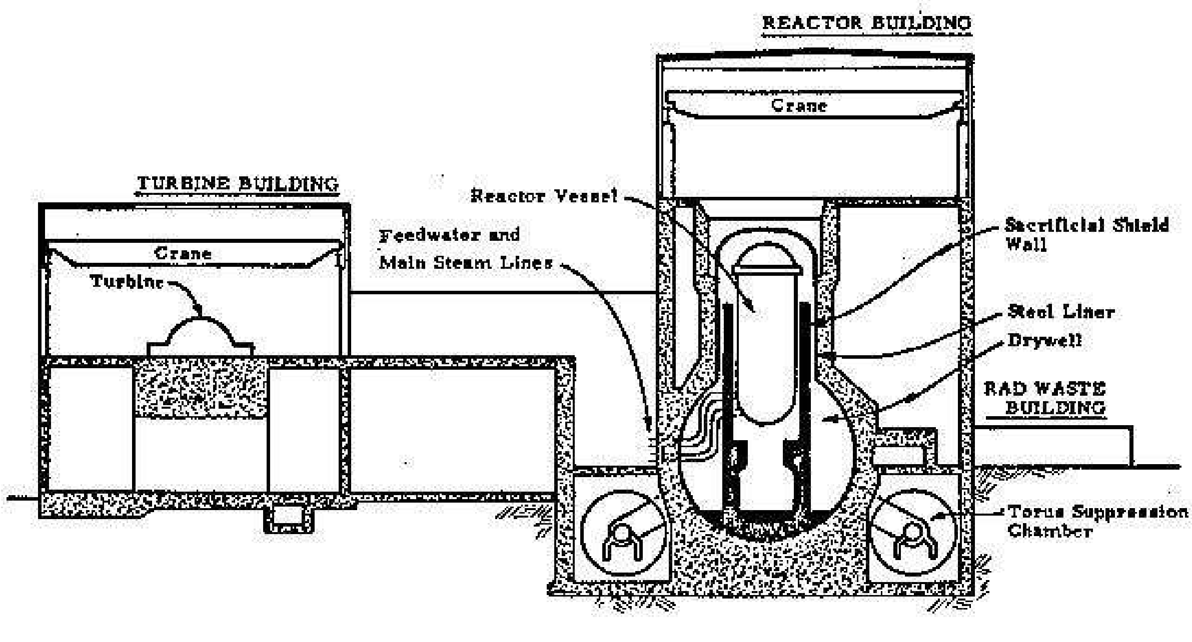
Requested Action No. 1: Formal Risk Assessment of Torus Coating Conditions

Fermi 2 features a boiling water reactor (BWR) with a Mark I pressure suppression containment design.[1] Its primary containment consists of an inverted lightbulb-shaped drywell that houses the reactor pressure vessel. A donut-shaped torus, also called wetwell or suppression chamber, connects to the drywell via eight vent lines.



Source: U.S. Nuclear Regulatory Commission. "General Electric Advanced Technology Manual, Chapter 6.2, Primary Containments." Figure 6.2-1, Mark I Containment. 2014. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML14140A181

[1] DTE Electric Company. "FERMI 2 UFSAR Revision 22." April 2019. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19128A089



Drywell-Torus Containment Arrangement for BWR Systems

The primary containment sits inside a secondary containment, also called the reactor building. Pipes carry steam from the reactor vessel to the turbine/generator in the turbine building and transport makeup feedwater back to the reactor vessel.

The torus serves four safety purposes:[1]

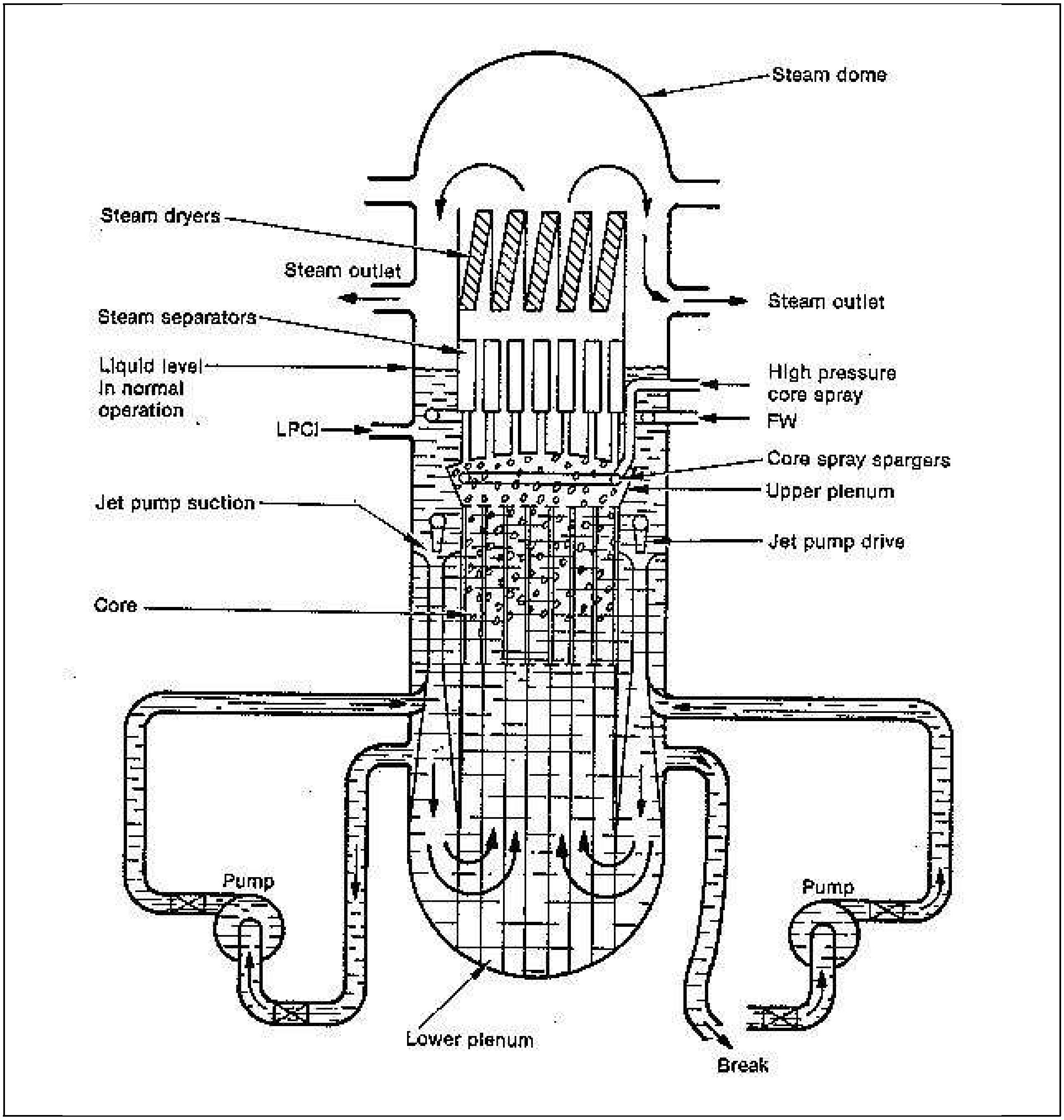
- A heat sink for steam discharged into primary containment during a loss of coolant accident
- A heat sink for steam discharged from safety/relief valve(s)
- A heat sink for steam exhausted from the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) turbines
- A source of water for the Residual Heat Removal (RHR), Core Spray (CS), HPCI, and RCIC systems

A brief summary of these four safety functions follows.

[1] U.S. Nuclear Regulatory Commission. "General Electric Advanced Technology Manual, Chapter 6.2, Primary Containments." 2014. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML14140A181

Heat Sink for Steam Released into Primary Containment

The pipes carrying steam from the reactor to the turbine/generator are at high pressure; over 1,000 pounds per square inch. For context, the atmospheric pressure at sea level if 14.7 pounds per square inch and the pressure inside a typical vehicle tire is about 30 pounds per square inch. Many other pipes connected to the reactor vessel contain high pressure water.



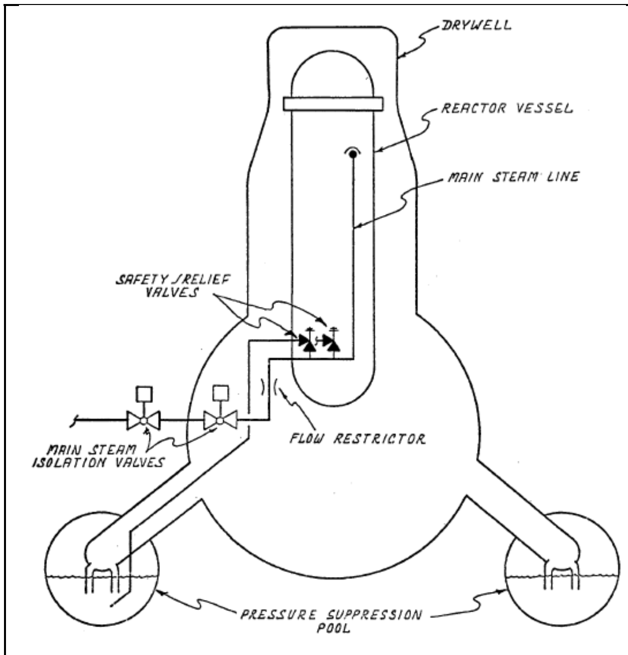
If one of these pipes breaks, high-pressure fluid jets from its broken ends into the drywell region of primary containment. The graphic shows a break in the piping to one of two external recirculation pumps, termed a large-break loss of coolant accident (LOCA). High-pressure water flashes to steam as its pressure drops. Steam quickly fills the drywell, increasing its pressure. The increasing pressure pushes steam through eight large-diameter vent lines connecting the drywell to the torus. The eight vent lines join inside the torus to form a vent header ringing the torus above its water surface. Metal pipes called downcomers project vertically downward from the vent header to discharge the steam beneath the water surface. The torus water cools the steam and condenses back into water.

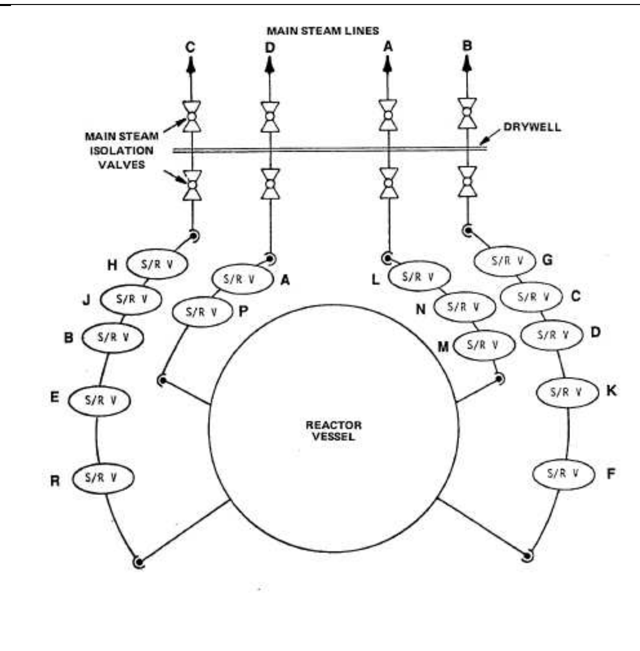
Newton's Third Law explains how the steam flowing out from the bottom ends of the vertical downcomers affects the torus water — for every action, there is an equal and opposite reaction. The downward steam flow causes the torus water to move upward. Termed "uplift," the movement of the water puts a sizeable force on the torus. The conditions within the torus are quite turbulent during design basis loss of coolant accidents.

<u>Heat Sink for Steam Discharged from Safety/Relief Valve(s)</u>

Four main steam pipes transport the steam produced in the reactor vessel to the turbine/generator in the turbine. A pair of Main Steam Isolation Valves (MSIVs) on each main steam pipe are located just outside and just inside the primary containment wall. The MSIVs close during certain transients and accidents to prevent cooling water inventory loss and the release of radioactivity from the primary containment.

A total of fifteen (15) safety/relief valves (SRVs) are installed on the main steam pipes between the reactor vessel and the inboard MSIVs. In the safety mode, SRV(s)[1] automatically open when pressure inside the main steam pipe(s) rises too high. Steam flows through the opened SRV(s) down pipes into the torus and discharges below the surface of the water. The steam cools and condenses back into water. The SRV(s) automatically reclose when pressure drops to an acceptable level. In the relief mode, SRV(s) can be manually or automatically opened to reduce the pressure inside the reactor vessel.

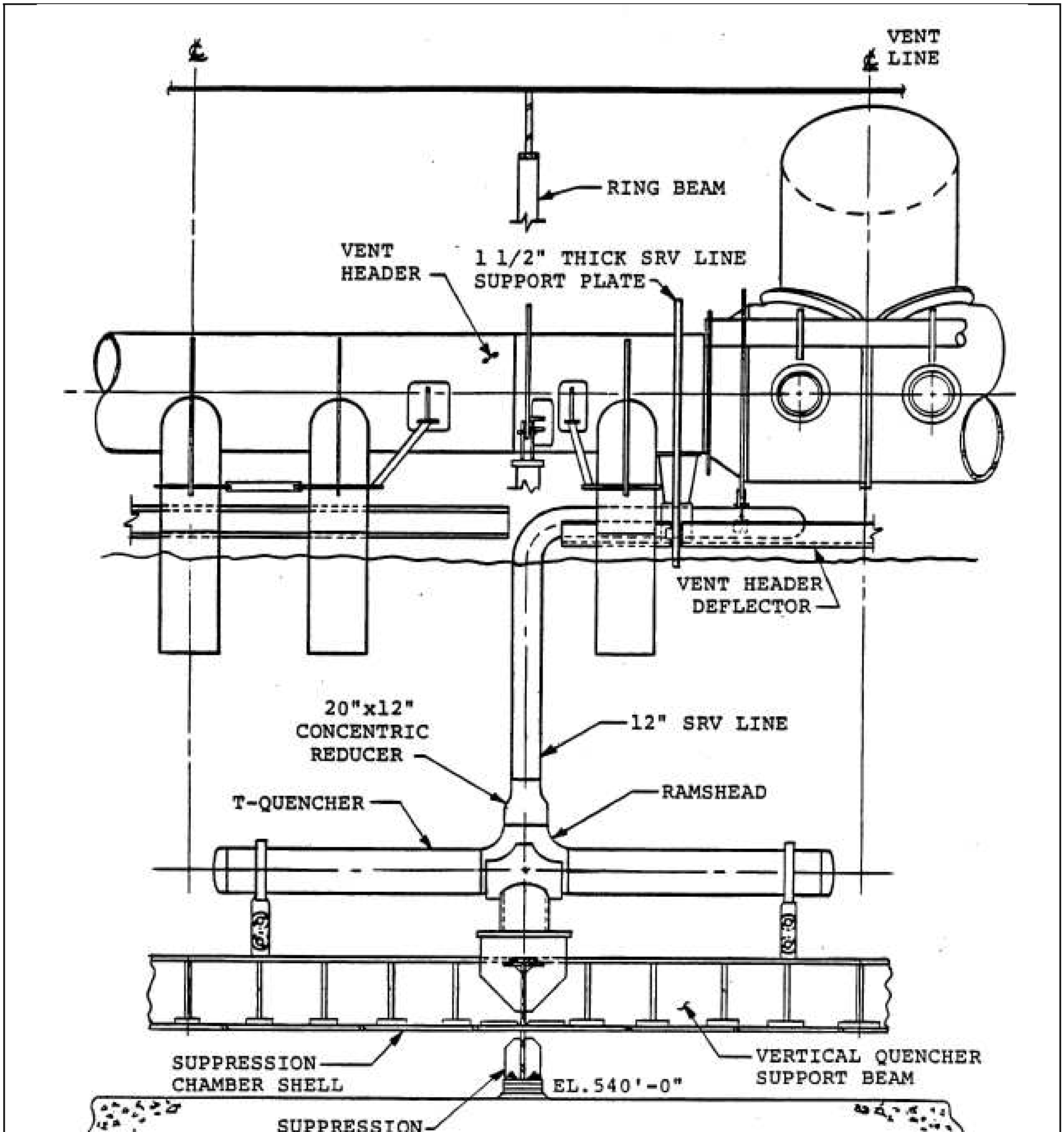




Sources: Fermi 2 UFSAR Figure 5.2-1d Fermi 2 UFSAR Figure 5.2-1e

[1] The SRVs have different opening pressure setpoints staggered to avoid having all fifteen open when only one or two can mitigate the pressure rise.

The SRV discharge pipe configuration inside the torus is misleading in Figure 5.2-1d. The amount of steam flowing through this pipe and its velocity require dissipation of this energy to hasten condensation of the steam and to lessen the impingement forces on surfaces struck by the high-pressure jet.

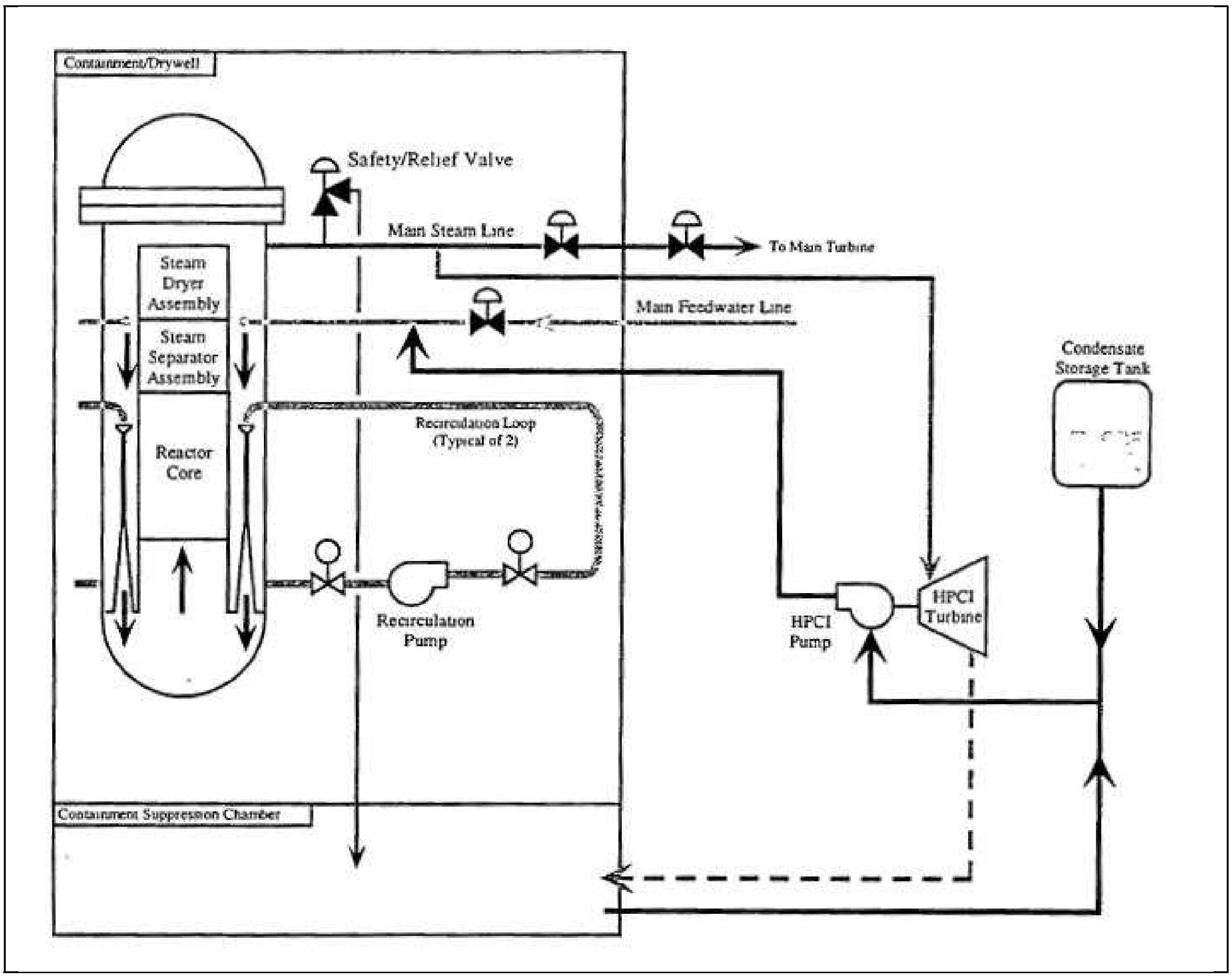


Source: Fermi 2 UFSAR Figure 5.2-7

Figure 5.2-7 shows a side view of the configuration inside the torus. The SRV line emerges from the vent line, turns downward, runs down to near the bottom of the torus, splits at the ramshead into two T-quencher sections. Each T-quencher section has many small-diameter perforations allowing the steam to “bubble” out into the torus water. Even with this routing design to diffuse the energy transferred into the torus by the SRV flow, the magnitude of the forces involved is reflected by the sturdy supports for the ramshead and T-quencher ends.

Heat Sink for Steam Exhausted from the HPCI and RCIC Turbines

The High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems feature steam turbines connected to pumps that transfer water from the torus or from the Condensate Storage Tank (CST) to the reactor vessel for core cooling. HPCI's safety role is to provide makeup in event a small pipe connected to the reactor vessel breaks. A small pipe break allows cooling water to escape, but does not lower the pressure within the reactor vessel to enable low pressure makeup pumps to replace the water being lost. RCIC's role is to take over should the normal feedwater makeup flow be lost. By using steam produced by the decay heat emanating from the reactor core even after its shut down, the HPCI and RCIC systems can function even when offsite power and onsite emergency diesel generators are unavailable.

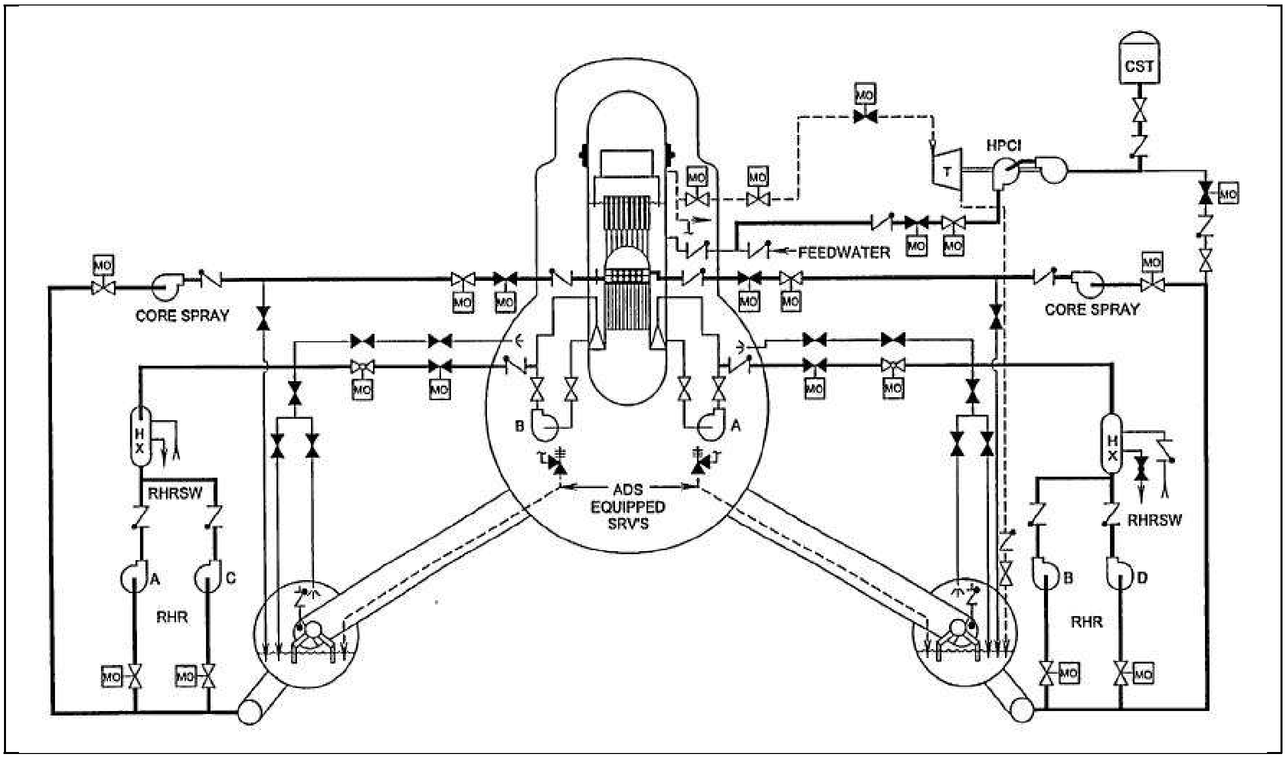


Regardless of where they get their water, both the HPCI and RCIC systems route the steam leaving their turbines to the torus (represented by the dashed line in the schematic of the HPCI system).

Source of Water for RHR, CS, HPCI and RCIC

The operating license issued by the NRC for Fermi 2 requires at least 905,738 gallons of water to be maintained in the torus. This volume provides a sizeable "energy sponge" to absorb the energy transferred to the torus during a loss of coolant accident, SRV opening, and/or HPCI/RCIC system operation.

In addition, this volume provides the emergency core cooling systems (ECCS) with water for makeup to the reactor vessel and core cooling. The motor-driven Residual Heat Removal (RHR) and Core Spray pumps as well as the steam-driven High Pressure Coolant Injection (HPCI) pump can transfer water from the Condensate Storage Tank (CST) or torus to fulfill this safety function.



Some pumps normally get water from the torus while others use the CST as their primary source. When the CST empties of water, all ECCS pumps turn to the torus for their supply of water if not already using it. Each ECCS pump is capable of providing thousands of gallons of makeup flow to the reactor vessel. Collectively, the ECCS are intended to prevent reactor core damage from overheating during design basis accidents.

Three Against One

The first three safety functions of the torus have the unintended consequence of potentially incapacitating the fourth. Steam rushing down the vent lines and downcomers, SRV discharge lines, and HPCI/RCIC turbine exhaust pipes into the torus is energetic. The inside surface of the metal torus walls are coated with a material for protection against rusting and degradation. While the protective coating is relatively thin, the torus is relatively large — more than 10,000 pounds, or five tons, of coating is involved.

FERMI 2 UFSAR

TABLE 6.2-8 PRIMARY AND SECONDARY CONTAINMENTS SURFACE COATING SCHEDULE PRIMARY CONTAINMENT

Type of Coating	Location	Average DFT[a] (mils)	Total Surface (ft^2)	Approx. Dry Film Density (lb/ft^3)	Total Volume (ft^3)	Total Mass (lb)
Carbo Zinc 11	Drywell interior steel Interior structural steel hangers and supports	7	125,000	217	73	15,841
Plasite 7155[bc]	Torus interior	12	67,000	150	66.9	10,035
Ameron 66 and Surfacer[b]	RPV support pedestal Drywell concrete floors Drywell concrete walls	1/16 in. plus10 mils	7,380	125	44.6	5,575

Source: Fermi 2 UFSAR Table 6.2-8

The steam entering the torus and the water movement it induces applies force to the torus coatings. This "scouring" effect can dislodge the coating, creating debris. In addition, water pooling on the drywell floor from a broken pipe flows through the vent lines into the torus, carrying along debris from the drywell. Debris in the torus water can collect on the mesh screens (called suction strainers) protecting the ECCS pumps from becoming clogged. While the suction strainers are quite large, the water flow tends to spread the debris evenly, allowing even a small amount of debris to cause a lot of blockage.

It is not overly speculative that debris could collect on suction strainers and block flow to an ECCS pump, considering that it has already happened. The Limerick nuclear plant in Pennsylvania is a boiling water reactor similar to Fermi 2. According to the NRC:[1]

> *On September 11, 1995, Limerick Unit 1 was being operated at 100-percent power when control room personnel observed alarms and other indications that one safety relief valve (SRV) was open. Emergency procedures were implemented. Attempts to close the valve were unsuccessful, and a manual reactor scram was initiated. Prior to the opening of the SRV, the licensee had been running the "A" loop of suppression pool cooling to remove heat being released into the pool by leaking SRVs. Shortly after the manual scram, and with the SRV still open, the "B" loop of suppression pool cooling was started. Operators continued working to close the SRV and reduce the cooldown rate of the reactor vessel. Approximately 30 minutes later, fluctuating motor current and flow were observed on the "A" loop. Cavitation was believed to be the cause, and the loop was secured. After it was checked, the "A" pump was successfully restarted and no further problems were observed.*
>
> *After the cooldown following the blowdown event, a diver was sent into the suppression pool at Unit 1 to inspect the condition of the strainers and the general cleanliness of the pool. Both suction strainers in the "A" loop of suppression pool cooling were found to be almost entirely covered with a thin "mat" of material, consisting mostly of fibers and sludge.*

The opening of just one SRV created sufficient turbulence to deposit debris onto the suction strainers and block flow to an ECCS pump. Torus coating degradation has been a recurring problem at Fermi 2. Last

[1] U.S. Nuclear Regulatory Commission (NRC). "Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors," NRC Bulletin 96-03. May 6, 1995. Online at https://www.nrc.gov/reading-rm/doc-collections/gen-comm/bulletins/1995/bl95002.html

year, the NRC's Design Basis Assurance Inspection[2] identified problems that prompted the NRC to dispatch a Special Inspection Team[2] to the site that in turn resulted in the NRC issuing a Confirmatory Action Letter[3] to DTE Energy documenting remediation measures to be completed during the refueling outage scheduled for spring 2020. The remediation plan was revised in March 2020. The current 21st century plan to fix this 20th century safety problem is:

> *DTE commits to mitigate the degraded coating in the submerged portion of the torus by removing all coating in the submerged portion of the torus and applying a qualified coating capable of withstanding design basis accident conditions. Removal of coating and application of qualified coating will also be performed for torus internals in the submerged portion of the torus with the exception of the internal surfaces of the downcomers and the internal surfaces of process piping. The internal surfaces of the submerged portion of the downcomers and the coated internal surfaces of the submerged portion of process piping will be inspected and degraded coating, if any, will be removed during the next refueling outage. This DTE commitment will be completed prior to resuming power operation following the next refueling outage; the next refueling outage will begin no later than April 30, 2020.*[4]

Even if this commitment is 100% satisfied, it leaves less than 100% assurance that the necessary safety function of the torus being a source of water to the ECCS and RCIC systems will be satisfied. There are three reasons for the assurance reduction:

1. The commitment is to remove "…*all coating in the submerged portion of the torus and applying a qualified coating capable of withstanding design accident conditions*." If the torus water remained pond-like or stagnant during design conditions, remediating only the submerged portion might be sufficient. But it is well known that the hydrodynamic forces during design basis accidents cause significant forces on and within the torus. For example:

    > *Consequently, in February and April 1975, the NRC transmitted letters to all utilities owning BWR facilities with the Mark I containment system design, requesting that the owners quantify the hydrodynamic loads and assess the effect of these loads on the containment structure. The February 1975 letters reflected NRC concerns about the dynamic loads from SRV discharges, while the-April 1975 letters indicated the need to evaluate the containment response to the newly identified dynamic loads associated with a postulated design-basis LOCA.*[5]

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[1] U.S. Nuclear Regulatory Commission. "Fermi Power Plant, Unit 2 – Design Basis Assurance Inspection (Teams) Inspection Report 05000341/2019012." July 29, 2019. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19211B289

[2] U.S. Nuclear Regulatory Commission. "Fermi Unit 2 – Special Inspection Reactive Report 05000341/2019050." January 31, 2020. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20031D253

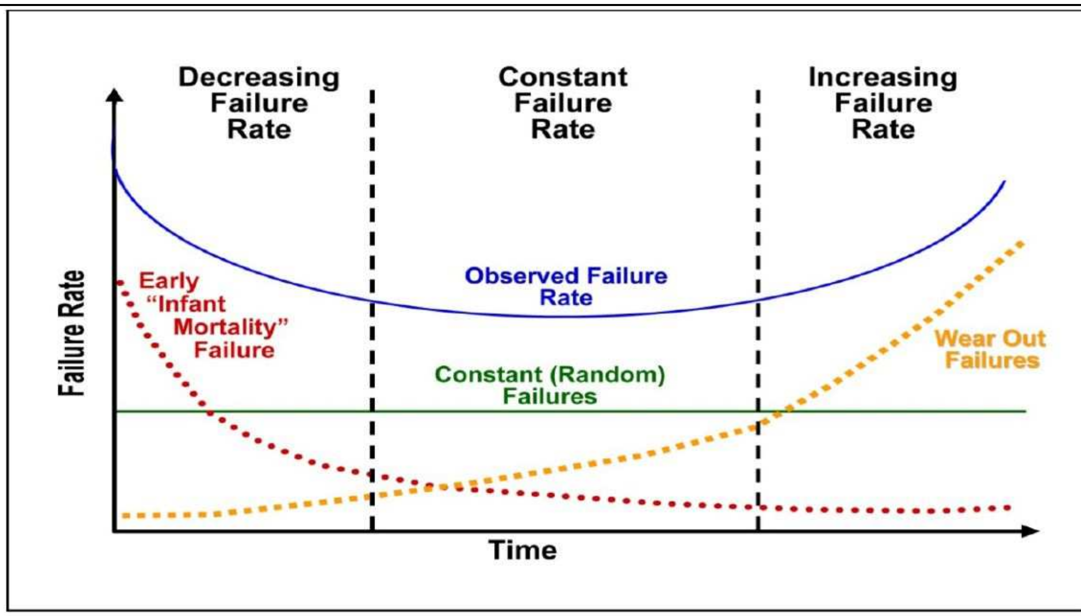
[3] U.S. Nuclear Regulatory Commission. "Confirmatory Action Letter (EA-19-097) – Fermi Power Plant Unit 2 – Commitment to Address Degraded Torus Coatings." Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19280D881

[4] John Giessner, Acting for U.S. Nuclear Regulatory Commission Regional Administrator. "Revision to Confirmatory Action Letter – Fermi Power Plant, Unit 2 Commitment to Address Degraded Torus Coatings." March 27, 2020. (ML2008L769). Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20087L769

[5] U.S. Nuclear Regulatory Commission. "Safety Evaluation Report Mark I Containment Long-Term Program," NUREG-0661. July 1980.

Extensive modifications were made to the original torus designs across several years to enable them to withstand the forces encountered during design basis accidents. The coatings applied to the torus above its normal water level will be more than splashed a bit during design basis accidents. The qualified coatings to be applied below the waterline are intended to withstand design basis forces — the unqualified coating above the waterline presumably cannot meet this intention. DTE Energy has not committed to even inspecting the condition of the coatings above the torus waterline.

2. The qualified coating to be applied below the torus waterline is stated to be capable of withstanding design basis accident conditions. Some of the older, unqualified coating will remain in the torus above its waterline. This situation involves both ends of the "bathtub curve" of failure rate versus time:



Source: Nuclear Regulatory Commission

The older, unqualified coating above the torus waterline are heading towards, if not already within, the Increasing Failure Rate region on the right. The newly applied qualified coatings below the torus waterline are solidly within the Early "Infant Mortality" Failure[1] region on the left. Right or left, the chances of the coating failure are elevated (i.e., not zero.)

Compounding the problem, DTE Energy has not committed to even inspecting the aging, unqualified coatings above the waterline in the torus. If that coating degrades, the turbulent forces associated with design basis accidents can both dislodge coating material and deposit it on the suction strainers.

3. DTE obtained the NRC's permission to change the scope of re-coating work during the 2020 refueling outage: "*… internal surfaces of the submerged portion of the downcomers and the coated internal surfaces of the submerged portion of process piping will be inspected and degraded coating, if any, will be removed."* Thus, DTE will inspect the internal surfaces of these

[1] Examples of "Infant Mortality" failure modes include, but are not limited to, imperfect application and defective materials.

torus objects and only remove coating identified as being defective. The NRC's Special Inspection Team last year reported abundant reason to question just how adequately DTE can find torus coating problems and then even fix problems that are found:

> *To date, the licensee has performed 11 torus coating inspections. Nine of these inspections identified torus coating embrittlement and/or changes in torus coating blister size or density.* ***These observations were not documented in the licensee's Corrective Action Program for seven of these inspections and no evaluation was provided to the SIT to demonstrate the licensee had verified that no dynamic coating failure mechanisms were present****. In addition, 5 of 11 coating inspection reports, and the most recent coating suitability review, recommended performing coating adhesion testing, evaluating changes in coating brittleness, or performing aggressive and larger scale coating repair.* ***These recommendations, made by the licensee's qualified coating consultants, were not implemented by the licensee****.* [1] [**Boldfacing** and underlining added for EMPHASIS]

It is due entirely to this long history of ineffective torus coating inspections and corrective actions that the NRC issued a Confirmatory Action Letter (CAL) last fall — had these inspections and associated corrective actions been adequate, the CAL would not have been necessary. Hence, it is unreasonable to assume that the inspections of the internal surfaces of objects below the torus waterline will find and fix deficient coating after so many passed efforts failed to do so for many years.

The petitioners request that the NRC take Enforcement Action in the form of a Demand For Information (DFI) issued to DTE Energy seeking the analysis, or summary thereof, for the potential that debris within the torus during design basis events blocks the suction strainers for the ECCS and RCIC pumps and increases the risk of reactor core damage. In other words, the DFI should ask DTE Energy to answer how much the baseline core damage frequency at Fermi 2 is increased by torus coating issues.

DTE Energy not only possesses this analytical capability but has already applied it to ECCS performance impairment caused by debris blocking the suction strainers in the torus:

> *The Fermi 2 PRA Full Power Internal Events (FPIE) models are highly detailed and include a wide variety of initiating events, modeled systems, operator actions, and common cause events.The Fermi 2 FPIE model of record and supporting documentation has been maintained as a living program, with periodic updates to reflect the as-built, as-operated plant* [Slide 13]
>
> *Develop strainer failure probabilities for all break locations*
>
>> *Strainer failure is defined as any debris load greater than the design basis debris load (loss of NPSH)*
>>
>> *Conservatively assume core damage for every non-isolated outboard break (between isolation valves)* [Slide 14]

[1] U.S. Nuclear Regulatory Commission. "Fermi Unit 2 – Special Inspection Reactive Report 05000341/2019050." January 31, 2020. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20031D253

For risk calculation, the specific LOCA initiating event frequency for size and location is multiplied by the associated ECCS suction strainer failure probability and conservatively assumed to lead directly to core damage [Slide 14]

Δ Core Damage Frequency (#/year) for Min-K

Break Location	ΔCDF
Inboard Breaks	0
Penetration Breaks	7.22E-07
Total	7.22E-07

Source: DTE Energy Slide 18[1]

The NRC's Special Inspection Team reviewed DTE Energy's risk assessment of ECCS performance degradation due to debris loading on the torus suction strainers and found it lacking:

> *The licensee's second torus coating debris size distribution (49.51 percent fines, 9.43 percent small chips, and 41.06 percent large chips) was equivalent to the size distribution of a coating tested at a different nuclear power plant. Although the tested coating was an epoxy coating like Fermi's, the tested epoxy differed because it was properly cured and only detached because the primer was applied improperly and failed. The tested epoxy also exhibited no known flaws or deficiencies in and of itself. In contrast, Fermi's torus coating degradation was solely within the epoxy itself as it was improperly cured. Lastly, the tested epoxy was in a pressurized water reactor containment and had not experienced immersion service. In contrast, the improperly cured torus coating at Fermi had been submerged for approximately 30 years, and the licensee believed it was experiencing osmotic pressure degradation. Based upon this information, **the SIT concluded it was not appropriate to assume that Fermi's brittle epoxy coating would perform like the tested epoxy**. In addition**, the SIT found no evidence from previous coating inspection reports to support the assumption of 41.06 percent large chips**. The **SIT believes** it would be more appropriate to assume Fermi's epoxy would generate more fines and/or small chips than the tested epoxy, and **that this would result in a greater transport factor than used in the licensee's operability evaluation**.*
>
> ***The SIT performed a sensitivity analysis and determined a transport factor increase of five percent would exceed the licensee's operability threshold.** The SIT presented this information to the licensee to demonstrate the uncertainty in their transport factor value. **The licensee continued to use the two methodologies described above and did not resolve the items highlighted by the SIT**.* [2] [**Boldfacing** and underlining added for EMPHASIS]

[1] Christopher Vukonich, Kendra Hullum-Lawson and Jason Haas, DTE Energy. "Fermi-2 Risk Assessment of ECCS Strainer Performance." February 19, 2019. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19045A269

[2] U.S. Nuclear Regulatory Commission. "Fermi Unit 2 – Special Inspection Reactive Report 05000341/2019050." January 31, 2020. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20031D253

Consider the implications of what the NRC's Special Inspection Team found — no evidence supporting the assumption of 41.06 percent large chips and only a five percent increase in the transport factor for debris would render DTE Energy's operability determination invalid. In other words, the Special Inspection Team described GIGO – garbage in, garbage out. DTE Energy has <u>not</u> properly analyzed the risk of ECCS performance impairment due to debris loading on the torus suction strainers during design basis accidents.

Proper and prudent risk-informed regulation would support **<u>properly</u>** using this available tool with **<u>valid assumptions</u>** to analyze the **<u>real risk</u>** of the torus coating situation at Fermi 2. [**Boldfacing** and <u>underlining</u> added for EMPHASIS]

NRC Management Directive 8.11[1] directs petitions be screened out unless they "*provide information that could reasonably lead the NRC to take an enforcement action (not necessarily the action requested)*. The public's access to probabilistic risk analyses methods and results was limited before 9/11 and has become even more constrained since that tragedy. The petitioners therefore cannot "turn the crank" to evaluate the effect of debris loading on the torus suction strainers on core damage frequency. Thus, the petitioners request that the NRC issue a DFI to obtain information otherwise unattainable.

With regard to whether the information being sought "*could reasonably lead*" to an enforcement action is also out of reach, but at least closer to be reached. After all, the findings from NRC's inspections identified deficiencies in how DTE Energy was "handling" the torus coatings problem, leading to the enforcement action-like issuance of the Confirmatory Action Letter. Furthermore, 10 CFR §50.9 requires that information submitted to the NRC by its licensees be complete and accurate in all material respects. If DTE Energy were to respond to the DFI with risk analysis results as flawed as reported by the Special Inspection Team, a *prima facie* case of violating 10 CFR § 50.9 would seem to exist. See also In *Virginia Electric & Power Co.* (North Anna Power Station, Units 1 & 2), CLI-76-22, 4 NRC 480 (1976), the Commission affirmed the Appeal Board's rulings *supra* and, in addition, held that silence (omissions) as to material facts regarding issues of major importance to licensing decisions is included in the Section 186 phrase "material false statement" since such an interpretation will effectuate the health and safety purposes of the Act. Thus, the sanctions of Section 186 apply not only to affirmative statements but to omissions of material facts important to health and safety.

The NRC issued a Yellow finding[2] to the owner of the Davis-Besse nuclear plant for "… *deficient containment coatings, uncontrolled fibrous material and other debris* … [that] *could result in the inability of the emergency core cooling system sump to perform its safety function under certain accident scenarios due to potential clogging of the sump screen.*" While the petitioners are not asserting that Fermi 2's condition rivals the extensive degradation at Davis-Besse, enforcement action would be an option for less extensive degradation (*i.e.*, result in a Green or White finding instead).

While the petitioners can point to no evidence that conditions at Fermi 2 rise (or drop) to the level at Davis-Besse leading to the Yellow finding, we also can point to no evidence that conditions at Fermi 2 would not and could not result in a violation warranting at least a Green finding. In other words, while

[1] U.S. Nuclear Regulatory Commission (NRC). "Management Directive 8.11, Review Process for 10 CFR 2.206 Petitions." March 1, 2019. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML18296A043

[2] U.S. Nuclear Regulatory Commission (NRC). "Final Significance Determination for a Yellow Finding (NRC Inspection Report 50-346/03-15) – Davis-Besse Potential Clogging of the Emergency Sump Following a Loss of Coolant Accident." October 7, 2003. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML032801706

conditions might not be so bad, they also might not be so good as to preclude formal analysis of the risk involved.

The petitioners cite NRC Regulatory Guide 1.174[1] as further supporting the need for the risk analysis sought by requested DFI. On page 4, the Reg Guide states:

> *The use of PRA technology should be increased in all regulatory matters to the extent supported by the state of the art in PRA methods and data and in a manner that complements the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy.*

Page 5 of the Reg Guide explains when its guidance is to be applied:

> *One significant activity undertaken in response to the policy statement is the use of PRA to support decisions to modify an individual plant's licensing basis. Such modifications are related to changes to a plant's design, operation, or other activities that require NRC approval.*

The resolution of torus coating problems at Fermi 2 clearly falls under this scope since the NRC issued a Confirmatory Action Letter (CAL) about the proposed fixes and later approved DTE Energy's request to alter the method of implementing those fixes.

Reg Guide 1.174 establishes five principles to be considered in risk-informed decision-making. The information sought by the petitioners is relevant to two of the five principles. Specifically, Principle 3 states that "*The proposed licensing basis change maintains sufficient safety margins*" and Principle 4 states that "*When proposed licensing basis changes result in an increase in risk, the increases should be small*." The petitioners seek to have DTE Energy properly analyze the risk consequences from the proposed torus coating fixes at Fermi 2.

Absent a formal analysis, the petitioners cannot fathom how we, DTE, or NRC could reasonably conclude that doing absolutely nothing – not even inspections – of the aging, unqualified coatings applied above the waterline in the torus cannot possibly result in the turbulent forces present in the torus during design basis accidents dislodging debris that blocks suction strainer(s) and impairs ECCS performance, thus increasing the core damage frequency.

The formal analysis results sought by the petitioners and only those results can quantify the amount of the risk increase. When the results show the risk to be negligible, the soundness of the proposed fixes will be confirmed. But if the results show the risk not to be negligible, NRC enforcement action might be appropriate.

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[1] U.S. Nuclear Regulatory Commission (NRC). "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decision on Plant-Specific Changes to the Licensing Basis," Regulatory Guide 1.174, Rev. 3. January 2018. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML17317A256

Requested Action No. 2: Lists of Deferred Tasks

The COVID-19 countermeasures could put restraints on both the plant staff at Fermi 2 and the availability of offsite contractors. The labor constraints could result in tasks being deferred. Each deferral could have been justified in isolation without consideration of how many other known safety maintenance/restoration tasks have also been put off. In other words, each deferral relied on an assumption that no other deferrals existed.

How reliable is this important assumption?

The petitioners request that the NRC take Enforcement Action in the form of a Demand For Information (DFI) issued per paragraph 2.3.6 of the NRC's Enforcement Policy[1] to DTE Energy asking that the company provide the agency with listing(s) of all the following items deferred since December 31, 2019, for Fermi 2 that remain open:

- Condition Assessment Resolution Documents (CARDS) and Corrective Action Program tasks
- Approved modification packages (i.e., not modification packages proposed or under development but only modifications approved and awaiting installation)
- Preventative maintenance tasks

Simple listings of these deferred items should not be an undue burden on DTE because these processes are computer-based facilitating quick and easy searches and printouts. The listings are similar to the information routinely requested by the NRC for its inspection efforts. For example, the NRC requested:[2]

- *A list of temporary modifications that were installed since April 1, 2017*
- *A list of degraded/non-conforming conditions. Include the CARD number*
- *A data table (or similar format) showing the total number of CARDs generated per year since 2013 sorted by department*
- *A list of CARDs initiated for inadequate or ineffective corrective actions*

The information from the listings would allow the petitioners, and the NRC, to assess whether DTE Energy has been properly justifying deferral of tasks. Hopefully, the requested information will not reveal that the company has been unduly, unwisely, or otherwise improperly putting off tasks essential to maintaining prescribed safety performance levels.

As for the guidance in NRC Management Directive 8.11 about screening out petitions that cannot lead to subsequent enforcement action, the NRC has frequently issued findings, albeit mostly of low safety significance (i.e., Green), for violations of the requirements in Appendix B to 10 CFR Part 50 that safety problems be found and fixed in the timely and effective manner. The information sought by the petitioners is unavailable by any other means. The petitioners have no guarantee that the information will reveal one or more Appendix B violations. By the same token, neither the NRC nor the company have any guarantee that all the deferred tasks are properly justified. Hence, the response to the requested DFI will ascertain whether conditions at Fermi 2 are copasetic or complicit.

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[1] U.S. Nuclear Regulatory Commission (NRC). 2020. "NRC Enforcement Policy." January 15. Page 25. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19352E921

[2] Eric Duncan, NRC. 2019. "Information Request to Support Upcoming Problem Identification and Resolution Inspection at the Fermi Power Plant, Unit 2." June 7. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19158A441

Requested Action No. 3: Answers About COVID-19 Implications on Emergency Planning

The coronavirus (COVID-19) constitutes a pandemic outbreak within the United States according to numerous sources such as the Centers for Disease Control and Prevention.[1] COVID-19 could affect the resources and capacities of offsite organizations to handle a nuclear plant accident on top of the pandemic burden.

NRC Manual Chapter 1601 addresses offsite emergency preparedness planning for nuclear power plant accidents.[2] Paragraph 03.02 recognizes that a pandemic among the events that could adversely affect the effectiveness of offsite emergency response capability:

> *03.02 This manual chapter should be implemented consistent with the agreements in the Memorandum of Understanding (MOU) between the NRC and FEMA. In this regard, FEMA Headquarters, Radiological Emergency Preparedness (REP) Branch, will inform NRC promptly if any of the following conditions exist:*
>
> - *An event occurs that significantly impacts the area around an NRC-licensed nuclear power reactor to an extent that FEMA questions the adequacy of offsite EP response capabilities and functions; or*
>
> - *A* ***pandemic outbreak****, or other events occur or are anticipated that may impact the ability to effectively implement offsite EP plans and procedures.* [**boldfacing** and underlining added for EMPHASIS]

FEMA's procedure[3] for Disaster Initiated Reviews also explicitly includes pandemics as a factor warranting review of emergency preparedness plans:

> *The purpose of a DIR is to determine the capability of offsite emergency response infrastructure following electric grid blackouts, malevolent act,* ***pandemic****, or natural disaster (e.g., hurricane, tornado, flood, and earthquake) in the vicinity of commercial Nuclear Power Plants (NPPs).* [**boldfacing** and underlining once again added for EMPHASIS]

FEMA's review does not pre-ordain whether emergency preparedness is or is not adversely impacted. It also does not suggest that inadequate emergency preparedness cannot be remedied by appropriate compensatory measures:

> *If the status of offsite emergency preparedness is inadequate, it is imperative that appropriate compensatory measures are developed and implemented to ensure public health and safety. These compensatory measures may be the responsibility of the offsite response organizations (ORO) or the NRC Licensee. Compensatory measures required from the NRC Licensee should be coordinated through the NRC.*

FEMA has conducted Disaster Initiated Reviews following hurricanes and storms that potentially degraded the emergency response infrastructure. FEMA notified the NRC in writing the results of its assessments. Among many such examples:

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[1] Online at https://wwwnc.cdc.gov/travel/notices/warning/coronavirus-global

[2] U.S. Nuclear Regulatory Commission. "Inspection Manual Chapter 1601 – Commission and Coordination Protocol for Determining the Status of Offsite Emergency Preparedness," August 27, 2013. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML13137A326

[3] Federal Emergency Management Agency (FEMA). "FEMA Standard Operating Guide , Disaster Initiated Review." July 2011. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML112580528

- 09/06/2019: FEMA completed its Preliminary Capabilities Assessment of emergency preparedness planning for the St. Lucie nuclear plant (FL) following Hurricane Dorian concluded that a fuller Disaster Initiated Review was not necessary and the emergency plan remained adequate.[1]

- 09/20/2018: FEMA notified NRC that its Disaster Initiated Review of emergency preparedness planning for the Brunswick nuclear plant (NC) following Hurricane Florence concluded that the plant could be restarted.[2]

- 09/01/2012: FEMA completed its Disaster Initiated Review of emergency preparedness planning for the River Bend (LA), Waterford (LA), and Grand Gulf (MS) nuclear plants following Hurricane Isaac and concluded the storm's damage did not render the plans inadequate.[3]

- 05/28/2010: FEMA notified NRC that it was conducting a Disaster Initiated Review of emergency preparedness planning for Vermont Yankee (VT) following a severe storm that disabled communications systems. The NRC notified the plant's owner that the reactor could not be restarted until FEMA confirmed the adequacy of offsite emergency preparedness.[4]

- 10/26/2007: FEMA notified NRC that its Disaster Initiated Review of emergency preparedness planning for San Onofre (CA) following numerous wildfires that destroyed several thousand structures and forced the evacuation of more than one million persons led to its recommendation that the NRC could authorize restart of the nuclear plant.[5]

Clearly, FEMA's reviews have found times when impairments do not compromise emergency preparedness plans and also have found times when nuclear reactors should not operate until impairments are corrected and/or compensated for. Whether FEMA concluded "Fine" or "Fix," the important part is that FEMA answered the question "have emergency preparedness plans been adversely affected?" When FEMA determined that plans had been impaired, such as for Vermont Yankee, the plant could not be restarted until the impairments corrected or compensated for. When FEMA determined the plans remained sufficient, the plants were good to go.

COVID-19's potential impairments are not limited to offsite emergency preparedness plans. The precautionary measures to control and contain COVID-19 (including but not limited to 6-feet social distancing, monitoring individual temperatures, and face masks) could impair resources and capabilities of onsite emergency planning, too.

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[1] Federal Emergency Management Agency (FEMA). "Results of the Preliminary Capabilities Assessment (PCA) for the St. Lucie Power Plant." September 6, 2019. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML19253C792

[2] Federal Emergency Management Agency (FEMA). "Final Disaster Initiated Review Findings for Brunswick Site." September 20, 2018. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML18263A308

[3] U.S. Nuclear Regulatory Commission (NRC). "Update: Region IV Response to Hurricane/Severe Weather on Gulf Coast," PNO-IV-12-006B. September 5, 2012. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML12249A305

[4] U.S. Nuclear Regulatory Commission (NRC). "Loss of Normal Communications / Storm Impact Offsite at Vermont Yankee," PNO-I-10-002. May 28, 2010. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML101480148

[5] Federal Emergency Management Agency (FEMA). "Disaster Initiated Review for San Onofre Unit 2." Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML073090551

DTE Energy maintains a Radiological Emergency Response Preparedness Plan[1] for Fermi 2. Among other things, the plan describes the facilities and staffing employed in the response to a nuclear plant emergency:

> *In the event of an emergency at Fermi 2, the Emergency Response Organization is activated. The normal complement of shift personnel is augmented according to the emergency classification. The Nuclear Generation Organization provides the majority of the personnel required to staff the organization. Additional DTE Energy personnel are called upon to provide specific expertise as required.*
>
> *During an emergency, the Emergency Response Organization is located in the Control Room and the three Emergency Response Facilities (ERFs) described in Section H of this plan: Operational Support Center (OSC); Technical Support Center (TSC); and Emergency Operations Facility (EOF). It is DTE Energy's intent to activate the ERFs based on the emergency classification*
>
> *Table B-1 shows the minimum staffing for the Fermi 2 Emergency Response Organization according to functional area, ERF, and emergency classification. Table B-1 reflects DTE Energy's intent to achieve 60-minute and 90-minute augmentation times.*

If the emergency is declared outside day-shift on a normal work day, designated workers will be summoned to the site to staff the Emergency Response Organization within the 60-minute and 90-minute times. Many plant sites have imposed COVID-19 measures that can slow down the ingress of workers. For example, Limerick takes the temperatures of persons arriving at the site to screen out those who may have COVID-19. And workers passing the temperature screening slowly make their way through the few metal detectors and explosives detectors to enter the protected area.

Sustaining the COVID-19 precautions throughout an emergency could result in some responders being sent back home due to elevated temperatures and slow the progress of responders with acceptable temperatures from staffing the Emergency Response Organization within the time goals.

Suspending the COVID-19 precautions during an emergency could expose responders to the deadly disease, trading one emergency condition for another.

According to Section 7.8.2.4 of the Fermi 2 Updated Final Safety Analysis Report, the Technical Support Center has an area of approximately 5,000 square feet. But nearly 2,075 square feet of the TSC is devoted to records storage and other equipment, leaving about 2,925 square feet for occupants. To maintain the 6-feet social distancing spacing, TSC staffers would be within 12-feet diameter circles. Thus, each TSC person would occupy πR^2 square feet or 3.14159×6^2 or 113.1 square feet. If the TSC occupants are spaced equidistant, it can hold no more than 26 persons – unless social distancing is ignored. As Figure 7.8-4 from the Fermi 2 Updated Final Safety Analysis shows, satisfying the 6-feet social distancing COVID-19 guideline might be challenging, at best, in the TSC at even its minimal emergency staffing level.

NRC Manual Chapter 1601 and FEMA's Disaster Initiated Review procedure clearly reflect that pandemic can undermine the efficacy of offsite emergency response plans. The petitioners seek to have DTE Energy describe how it can effectively implement COVID-19 countermeasures while still fulfilling all its obligations should an Alert or higher emergency be declared at Fermi 2. It is vital to worker and

[1] DTE Energy. "Fermi 2 Radiological Emergency Response Preparedness Plan," Rev. 39. January 13, 2020. Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20013G526

public safety that both challenges be met; DTE Energy, its workers, and the community around Fermi 2 must not face the dilemma of one challenge being met and the other short-changed.

The petitioners request that the NRC take Enforcement Action in the form of a Demand for Information (DFI) issued to DTE Energy seeking responses to the following questions:

1. What COVID-19 countermeasures (*i.e.*, social distancing, temperature checking, etc.) will be applied to workers during emergencies?

2. If no COVID-19 countermeasures will be applied, what evaluation or assessment has DTE conducted or located to justify not using them?

3. What COVID-19 countermeasures have been adopted at Fermi 2 during non-emergencies that will be terminated or lessened during emergencies?

4. If current COVID-19 countermeasures will be terminated or lessened during emergencies, what evaluation or assessment has DTE conducted to justify the changes?

5. What evaluation or assessment has DTE conducted of the potential impact of the applicable COVID-19 countermeasures on the effectiveness of the Fermi 2 Radiological Emergency Response Plan?

6. Are the available personal protection equipment supplies adequate for workers to cope with both radiological exposure and COVID-19 exposure hazards?

Returning to the guidance in NRC Management Directive 8.11 about screening out petitions requesting actions that could not lead to subsequent enforcement actions, the petitioners observe that many of the Greater-than-Green findings issued by the NRC in recent years involved violations of emergency planning requirements. Again, the petitioners lack solid evidence that violations exist at Fermi 2. But the response to this requested DFI is our only means to obtain the information as to whether it is or is not the case. Because the matter involves regulatory requirements specifically intended to protect our lives and our communities, reaching that understanding is essential to us.

TABLE B-1

STAFFING FOR FERMI 2
EMERGENCY RESPONSE ORGANIZATION

Major Functional Area	Major Tasks	Locations	Emergency Response Organizational Title	On Shift	Alert (or higher) +60 min	Alert (or higher) +90 min
Plant Operations and Assessment of Operational Aspects	Plant Operations and Assessment, Accident Mitigation, Corrective Actions, Damage Assessment	CR	Control Room Supervisor	1		
		CR	Licensed Nuclear Operator	3		
		CR	Non-Licensed Operator	5		
Emergency Direction and Control		CR	Emergency Director	1		
		TSC	Emergency Director		1	
Notification/ Communication	Notify ERO, State, Local and Federal Authorities, Maintain Communications	CR	Communicator	1*		
		TSC	Communicator		1	
		EOF	Communicator			2
Radiological Accident Assessment and Support of Operational Accident Assessment	Emergency Officer	EOF	Emergency Officer			1
	Offsite Dose Assessment	CR/OSC	Chemistry Technician	1*		
		TSC	Radiation Protection Advisor		1	
		EOF	Radiation Protection Coordinator			1
	Offsite Surveys	OSC	RET Sampler or RP Technician		2	
		EOF	RET Sampler or RP Technician			2
	Onsite (out of plant) Surveys	OSC	RET Sampler or RP Technician		2	
	In plant Surveys	OSC	RP Technicians	2	2	
	Chemistry/Radiochemistry	OSC	Chemistry Technician	1		
Plant System Engineering, Repair and Corrective Actions	Technical Support	CR	Shift Technical Advisor	1		
		TSC	Technical Engineer or Nuclear Safety Advisor		1	
		TSC	Support Engineer		1	
		OSC	OSC Coordinator		1	
	Repair and Corrective Actions	OSC	Damage Control and Rescue Team Members	2	5	
Protective Actions (In Plant)	Radiation Protection: 1. Access Control 2. HP coverage for repair, corrective actions, search and rescue, first-aid and fire-fighting 3. Personnel monitoring 4. Dosimetry	OSC	RP Technicians	2*	4	
Fire Fighting		OSC	Fire Brigade	UFSAR		
Rescue Operations and First Aid		OSC	Damage Control and Rescue Teams	2*		
Site Access Control and Personnel Accountability	Security and Personnel Accountability	Per Security Plan	Nuclear Security Force	Per Security Plan		
			Total	16	21	6

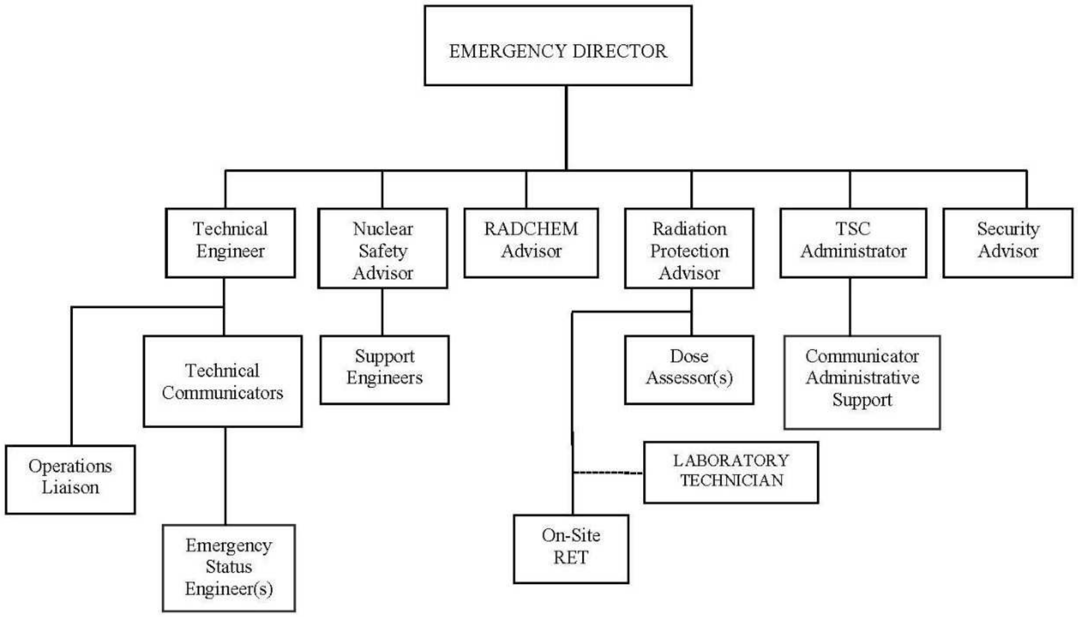
*** May be provided by shift personnel assigned other functions and not included in the total.**

The Technical Support Center (TSC) is to be staffed by at least 5 persons and the Operational Support Center (OSC) by at least 16 persons within 60 minutes of declaration of an Alert, Site Area Emergency or General Emergency.

Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20013G526

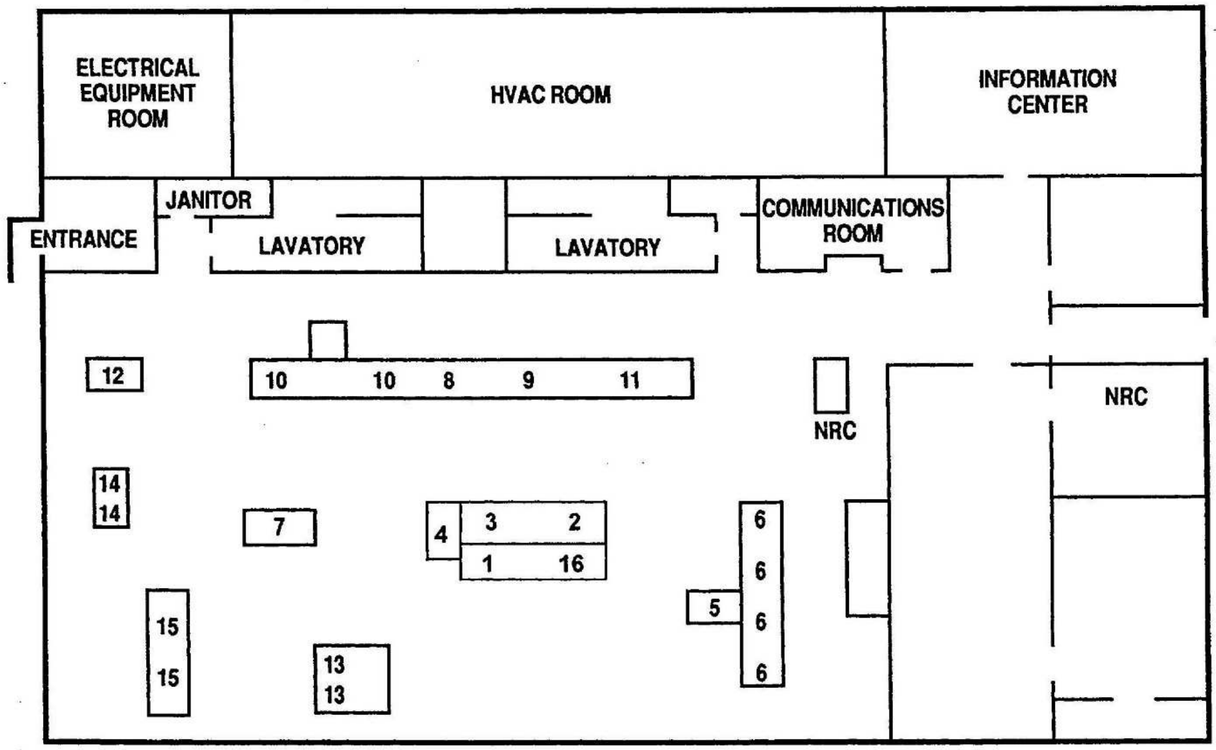
Figure B-4

TECHNICAL SUPPORT CENTER (typical)



If each position (box) in the TSC is filled by only one person, there will be 15 people in the room. With four of the boxes being plural, at least 19 and likely more people will populate the TSC.

Online at https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML20013G526



LEGEND

1. Emergency Director
2. Technical Engineer
3. Technical Communicator
4. Typist
5. Nuclear Safety Advisor
6. Engineering Support
7. TSC Administrator
8. Radiation Protection Advisor
9. Assistant Radiation Protection Advisor
10. Dose Assessor
11. Radchem Advisor
12. Security Advisor
13. Status Boards Clerk
14. Clerical Support
15. Communicator
16. Operations Liaison

Fermi 2

UPDATED FINAL SAFETY ANALYSIS REPORT

FIGURE 7.8-4

TECHNICAL SUPPORT CENTER FLOOR PLAN FOR EMERGENCY RESPONSE ORGANIZATION POSITIONS

REV 10 11/00