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

October 1, 2015

Mr. Paul Fessler
Senior Vice President and
Chief Nuclear Officer
DTE Electric Company
Fermi 2 – 210 NOC
6400 North Dixie Highway
Newport, MI 48166

SUBJECT: FERMI, UNIT 2 - REPORT FOR THE AUDIT REGARDING IMPLEMENTATION OF MITIGATING STRATEGIES AND RELIABLE SPENT FUEL POOL INSTRUMENTATION RELATED TO ORDERS EA-12-049 AND EA-12-051 (TAC NOS. MF0770 AND MF0771)

Dear Mr. Fessler:

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A262), DTE Electric Company (the licensee) submitted its OIP for Fermi, Unit 2 (Fermi) in response to Order EA-12-049. By letters dated August 26, 2013, February 27, 2014, August 28, 2014, and February 23, 2015 (ADAMS Accession Nos. ML13239A121, ML14059A350, ML14241A298, and ML15056A067, respectively), the licensee submitted its first four six-month updates to the OIP. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Fermi interim staff evaluation (ISE) on November 25, 2013 (ADAMS Accession No. ML13220A133), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A285), the licensee submitted its OIP for Fermi, Unit 2 in response to Order EA-12-051. By email dated June 29, 2013 (ADAMS Accession No. ML13210A220), the NRC staff sent a request for additional information (RAI). By letters dated August 19, 2013, August 26, 2013, February 27, 2014, August 28, 2014, and February 23, 2015 (ADAMS Accession Nos. ML13231A233, ML13239A118, ML14059A277, ML14241A288, and ML15056A067, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff issued

the Fermi ISE and RAI on November 21, 2013 (ADAMS Accession No. ML13309B129). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audits allow the NRC staff to review open and confirmatory items from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions. Additionally, the NRC staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents/Final Integrated Plans while identifying additional information necessary for the licensee to supplement its plan and staff potential concerns.

In support of the ongoing audit of DTE's OIPs, as supplemented, the NRC staff conducted an onsite audit at Fermi from June 22 - 25, 2015, as discussed in the audit plan dated May 5, 2015 (ADAMS Accession No. ML15114A445). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

The enclosed audit report provides a summary of the activities for the onsite audit portion. Additionally, this report contains an attachment listing all open audit items currently under NRC staff review.

If you have any questions, please contact me at 301-415-1544 or by e-mail at Stephen.Monarque@nrc.gov.

Sincerely,

Stephen R. Monarque, Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No.: 50-341

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO ORDERS EA-12-049 AND EA-12-051 MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS AND RELIABLE SPENT FUEL POOL INSTRUMENTATION

DTE ELECTRIC COMPANY

FERMI, UNIT 2

DOCKET NO. 50-341

BACKGROUND AND AUDIT BASIS

On March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design-Basis External Events" and Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation," (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12054A736 and ML12054A679, respectively). Order EA-12-049 directs licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a beyond-design-basis external event (BDBEE). Order EA-12-051 requires, in part, that all operating reactor sites have a reliable means of remotely monitoring wide-range SFP levels to support effective prioritization of event mitigation and recovery actions in the event of a BDBEE. The orders require holders of operating reactor licenses and construction permits issued under Title 10 of the *Code of Federal Regulations* Part 50 to submit for review, Overall Integrated Plans (OIPs) including descriptions of how compliance with the requirements of Attachment 2 of each order will be achieved.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A262), DTE Electric Company (DTE, the licensee) submitted its OIP for Fermi, Unit 2 (Fermi) in response to Order EA-12-049. By letters dated August 26, 2013, February 27, 2014, August 28, 2014, and February 23, 2015 (ADAMS Accession Nos. ML13239A121, ML14059A350, ML14241A298, and ML15056A067, respectively), the licensee submitted its first four six-month updates to the OIP By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). This audit process led to the issuance of the Fermi interim staff evaluation (ISE) on November

Enclosure

25, 2013 (ADAMS Accession No. ML13220A133), and continues with in-office and onsite portions of this audit.

By letter dated February 28, 2013 (ADAMS Accession No. ML13063A285), the licensee submitted its OIP for Fermi, Unit 2 in response to Order EA-12-051. By email dated June 29, 2013 (ADAMS Accession No. ML13210A220), the NRC staff sent a request for additional information (RAI). By letters dated August 19, 2013, August 26, 2013, February 27, 2014, August 28, 2014, and February 23, 2015 (ADAMS Accession Nos. ML13231A233, ML13239A118, ML14059A277, ML14241A288, and ML15056A067, respectively), the licensee submitted its RAI responses and first four six-month updates to the OIP. The NRC staff issued the Fermi ISE and RAI on November 21, 2013 (ADAMS Accession No. ML13309B129). By letter dated March 26, 2014 (ADAMS Accession No. ML14083A620), the NRC notified all licensees and construction permit holders that the staff is conducting in-office and onsite audits of their responses to Order EA-12-051 in accordance with NRC NRR Office Instruction LIC-111, as discussed above.

The ongoing audits allow the NRC staff to review open (OI) and confirmatory items (CI) from the mitigation strategies ISE, RAI responses from the spent fuel pool instrumentation (SFPI) ISE, the licensee's integrated plans, and other audit questions (AQs). Additionally, the NRC staff gains a better understanding of submitted and updated information, audit information provided on ePortals, and preliminary Overall Program Documents (OPDs)/Final Integrated Plans (FIPs) while identifying additional information necessary for the licensee to supplement its plan and address staff potential concerns.

In support of the ongoing audit of the licensee's OIPs, as supplemented, the NRC staff conducted an onsite audit at Fermi from June 22 - 25, 2015, as discussed in the audit plan dated May 5, 2015 (ADAMS Accession No. ML15114A445). The purpose of the onsite portion of the audit was to provide the NRC staff the opportunity to continue the audit review and gain key insights most easily obtained at the plant as to whether the licensee is on the correct path for compliance with the Mitigation Strategies and SFPI orders. The onsite activities included detailed analysis and calculation discussion, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

Following the licensee's declarations of order compliance, the NRC staff will evaluate the OIPs, as supplemented; the resulting site-specific OPDs/FIPs; and, as appropriate, other licensee submittals based on the requirements in the orders. For Order EA-12-049, the NRC staff will make a safety determination using the Nuclear Energy Institute (NEI) developed guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" issued in August 2012 (ADAMS Accession No. ML12242A378), as endorsed, by NRC Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-01 "Compliance with Order EA-12-049, 'Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events'" (ADAMS Accession No. ML12229A174). For Order EA-12-051, the NRC staff will make a safety determination using the NEI developed guidance document NEI 12-02, Revision 1, "Industry Guidance for Compliance with NRC Order EA-12-051, 'To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12240A307), as endorsed, with exceptions and clarifications, by NRC ISG JLD-ISG-2012-03 "Compliance with Order EA-12-051, 'Reliable

Spent Fuel Pool Instrumentation'" (ADAMS Accession No. ML12221A339) as providing one acceptable means of meeting the order requirements. Should the licensee propose an alternative strategy for compliance, additional NRC staff review will be required to evaluate the alternative strategy in reference to the applicable order.

AUDIT ACTIVITIES

The onsite audit was conducted at Fermi from June 22 - 25, 2015. The NRC staff that participated in this audit was as follows:

Title	Team Member	Organization
Lead Project Manager	Stephen Monarque	NRR/JLD
Technical Support – Electrical	Prem Sahay	NRR/JLD
Technical Support – Reactor Systems	John Lehning	NRR/JLD
Technical Support – Balance of Plant	Garry Armstrong	NRR/JLD
Technical Support –SFPI	Duc Nguyen	NRR/JLD
Technical Support – Containment	Brian Lee	NRR/JLD

The NRC staff executed the onsite portion of the audit pursuant to the three part approach discussed in the May 5, 2015, plan, to include conducting a tabletop discussion of the site's integrated mitigating strategies compliance program, a review of specific technical review items, and discussion of specific program topics. Activities that were planned to support the above included detailed analysis and calculation discussions, walk-throughs of strategies and equipment laydown, visualization of portable equipment storage and deployment, staging and deployment of offsite equipment, and physical sizing and placement of SFPI equipment.

AUDIT SUMMARY

1.0 Entrance Meeting (June 22, 2015)

At the audit entrance meeting, the NRC staff introduced itself followed by introductions from the licensee's staff. The NRC staff provided a brief overview of the audit's objectives and anticipated schedule.

2.0 Integrated Mitigating Strategies Compliance Program Overview

As an introduction to the site's program, DTE provided a presentation to the NRC staff titled "NRC Fukushima MS/SFPI Audit Fermi 2 Conformance Overview,' June 22, 2015." The licensee discussed its strategy to implement the Phases 1, 2, and 3 of the FLEX program, the installation of the spent fuel pool level instrumentation, its evaluation of the external hazards, the implementation of the Emergency Preparedness Communications Program, the design and location of the FLEX equipment storage facility, and the access routes to the plant.

3.0 Onsite Audit Technical Discussion Topics

Based on the audit plan, and with a particular emphasis on the Part 2 "Specific Technical Review Items," the NRC staff technical reviewers conducted interviews with the DTE staff, conducted site walk-downs, and reviewed documents supporting items listed in the audit plan. Results of these technical reviews and any additional review items needed from the licensee are documented in the audit item status table in Attachment 3, as discussed in the Conclusion section below.

3.1 Reactor Systems Technical Discussions and Walk-Downs

a. The NRC staff reviewed DTE's plans to provide alternate sources of instrument readings in the event of a seismic impact to the primary sources. The licensee has procedures for making local instrument readings, using a meter to measure a signal (e.g., voltage, current), repowering instrumentation loops with a Fluke-type meter, making measurements of instrumentation signals, and making physical measurements of parameter using sensors by connecting to test lines. The specific locations are identified for each of these options, and the basis for conversion from the measured signal to the desired measurement units are provided. In some cases, both mechanical and electrical means are provided, which gives flexibility to operators, since some may be more qualified to use one or the other. The NRC staff had no further questions and ISE CI 3.1.1.3.A was closed.

b. The NRC staff examined DTE's strategy for maintaining the collapsed water level above the top of active fuel and maintaining the cooldown rate for the reactor within its Technical Specification limit. The licensee intends to respect the Technical Specification cooldown rate limit as applicable, but noted that there are circumstances under which existing Emergency Operating Procedures direct a more rapid cooldown to preserve the containment function. For example, in two analyzed ELAP scenarios (B1 and C1), rapid depressurization in stages of approximately 200 psi would occur as directed by the Emergency Operating Procedures due to repeated exceedance of the heat capacity limit (HCL) for the suppression pool. At the times these staged depressurizations occur, the water level in the vessel is sufficiently high that there is no concern about fuel being uncovered. Furthermore, the reaction of the two-phase mixture to depressurization is to swell. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE CI 3.2.1.1.B was closed.

c. The NRC staff verified that DTE's Modular Accident Analysis Program (MAAP) 4 analysis was in accordance with Sections 4.1, 4.2, 4.3, 4.4, and 4.5 of the June 2013 position paper. The licensee stated that the calculations for Fermi were performed in accordance with the cited sections of the position paper. The NRC staff had no further questions and ISE CI 3.2.1.1.C was closed.

d. In using MAAP4, DTE was requested to identify and justify the subset of key modeling parameters cited from Tables 4-1 through 4-6 of the "MAAP4 Application Guidance, Desktop Reference for Using MAAP4 Software, Revision 2" (Electric

Power Research Institute Report 1 020236). The licensee provided its analysis and the NRC staff had no further questions; therefore, ISE CI 3.2.1.1.D was closed.

e. The NRC staff discussed with the licensee a number of questions concerning the plant-specific MAAP analyses for Fermi. These questions dealt with leakage rate assumptions, the closure of suction and discharge valves for the recirculation pumps, the potential for short cycling in the suppression pool between the FLEX discharge location and the HPCI suction point, and the pressure control assumed in the MAAP calculations. The licensee addressed these questions satisfactorily.

   The NRC staff asked a further question concerning the licensee's plan to discharge steam at high pressure to the condenser hotwell via the main steam drain lines during the ELAP flooding scenario. In essence, the hotwell would be flooded with additional condensate and serve as a suppression volume for the steam discharged from the reactor. The licensee stated during the audit that the configuration used for steam discharge to the hotwell is used during startup and would not involve unanalyzed loads (e.g., condensation oscillation, jet impingement, water hammer) being applied to the condenser or drain line piping. During the audit, the licensee developed a corrective action to write a procedure to use this strategy to mitigate the ELAP flooding scenario.

f. The licensee was requested to provide a discussion of the assumed pressure-dependence of the leakage rate, and clarify whether the leakage was determined to be single-phase liquid, two-phase mixture, or steam and discuss how mixing of the leakage flow with the drywell atmosphere was modeled. The licensee provided information about the modeling of leakage rate pressure dependence. A fixed break area was used and the leakage flow was allowed to decrease based on the critical flow modeling available in the MAAP code. The standard MAAP models were used for mixing of the leakage with the drywell atmosphere. The NRC staff did not find any discrepancies with DTE's analysis; therefore ISE OI 3.2.1.2.A was closed.

g. The licensee was requested to provide information regarding the impact of postulated seal leakage on Fermi's ability to maintain core cooling. The licensee assumed a leakage rate of 18 gallons per minute (gpm) / pump based on Updated Final Safety Analysis Report (UFSAR) 8.4.2.2, Station Blackout coping analysis. The value comes from NUMARC 87-00, R1, J-2. However, the NRC staff has found that the leakage rates in NUMARC 87-00 are not necessarily conservative with respect to the current state of knowledge and requested further justification from the licensee. The licensee stated that the reactor coolant pumps are Byron Jackson DVSS, with BW/IP International, Model N-7500 seals. Testing and analysis performed for these seals provide confidence that the leakage rate assumptions in the analysis will not be exceeded. In any event, the flow rate that could be provided by RCIC significantly exceeds the expected rate of seal leakage and any other expected plant leakage. The NRC staff did not find any discrepancies with DTE's analysis; therefore AQ 9 is closed.

h. During the audit, DTE was requested to define 'shifting from torus feed-and-bleed to core cooling' and explain how this is different than the strategy discussed for Phase 2 of Maintaining Core Cooling. The licensee was also requested to provide analysis to show that the Phase 2 FLEX pumps would be able to provide makeup to the reactor at the maximum reactor pressure that would exist after reactor core isolation cooling (RCIC) system is no longer able to provide makeup to the reactor.

   The licensee's plan is to switch the discharge of certain Phase 2 FLEX pumps (i.e., the Neptune in series with the Dominator) between the reactor vessel and torus at appropriate intervals that provide adequate cooling to both. FLEX injection to the reactor pressure vessel (RPV) would only be used after the RPV lacks the capability to produce adequate steam to support continuous operation of the steam-driven RCIC system. The licensee's hydraulic calculations demonstrating the efficacy of the Phase 2 FLEX pumps were performed with a PROTOFLO model. The licensee's hydraulic analysis showed that much of the Dominator's pressure boost is not necessary to ensure adequate flow to the reactor vessel and torus.

   Because the design pressure of the hose used by the licensee is relatively low (i.e., 175 psig), the NRC staff questioned whether a relief valve should be installed downstream of the Dominator pump. The licensee stated that the pressure boost provided by the Dominator tops out at about 180-185 psi, and the relief valve for the Neptune pump is set at 180 psi. For this reason, DTE stated that it is reasonable to conclude that the burst pressure of the FLEX hose (400 psi) would not be exceeded, even in the event of significant operator error in controlling the Dominator pump. The NRC staff agreed with the conclusion that the specified hose burst pressure would not be exceeded but suggested that installation of a relief valve downstream of the Dominator pump would be good engineering practice to avoid unnecessarily challenging the integrity of the hose. Based on the discussion above, no discrepancies were identified with DTE's conclusions; therefore, AQs 14 and 31 are closed.

i. The NRC staff questioned whether the location of the suction and discharge points associated with the circulating water reservoir could result in the potential for short-cycling the discharged hot water back to the suction of FLEX pumps drawing on the circulating water reservoir. Although this potential had not been analyzed by the licensee, the NRC staff concluded that the issue could be closed based on (1) the licensee's analysis assumes a conservative value for the circulating water reservoir temperature and (2) even if short-cycling prevents the success of the feed-and-bleed method, the containment hardened vent would still be available to prevent overpressurization of containment.

j. The NRC staff's audit review identified that the licensee is using strainers for raw water sources with openings that have a clearance comparable to the openings in fuel assembly lower tie plates. Furthermore, the licensee stated that reactor vessel water level will be maintained above the minimum level necessary to ensure downflow through the steam separators. As such, even if blockage occurs at the core inlet, downflow may still occur through larger openings at the fuel assembly

outlets. As such, the NRC staff concluded that the licensee has taken reasonable precautions to minimize the impacts of suspended debris impacting the cooling of the reactor core.

k. The NRC staff toured inside and outside the plant and observed aspects of human factors in making connections and hauling equipment. The NRC staff discussed other human factors questions during interviews. These ranged from operator actions under challenging conditions associated with an ELAP event to the effects of the mitigating strategies planning on the current plant operations. The NRC staff had no further questions and SE No. 8 was closed.

l. The NRC staff discussed with DTE the impact of a flooding scenario it considered bounding. The licensee informed the NRC staff that the National Weather Service would provide more than 48 hours warning before the arrival of flooding. At that time DTE would implement its shut down procedure at Fermi. The licensee expected that the reactor would be tripped within 4 hours, and that cold shutdown would be achieved within 10 hours of receipt of the flood warning. The licensee stated that the 10-hour time line for achieving cold shutdown was based on experience from the past 3 shutdowns for refueling outages, which followed an aggressive cooldown rate of approximately 100°F per hour. This allowed DTE to develop the time validation to Mode 4 for the ELAP flooding scenario. The NRC staff noted that the licensee's thermal-hydraulic calculations for this scenario assumed a decay time of 48 hours, for calculating core decay heat, whereas a value of 44 hours would appear more appropriate. However, the NRC staff did not expect this discrepancy to affect the overall mitigation strategy based on the observations that (1) decay heat is not changing rapidly approximately two days after shutdown and (2) sufficient margin appeared to be available to address the discrepancy. The licensee entered the issue into its corrective action program.

The licensee assumed a 21-hour time frame for deploying the the Dominator and Neptune FLEX pumps in the flooding scenario. The NRC staff questioned the licensee's capability to deploy these pumps promptly following the recession of floodwaters due to the presence of mud or standing water on the site. The licensee responded that these pumps will remain on a concrete apron adjacent to the building where they are stored. Hoses will be deployed from the trucks to span the distance between suction sources and discharge connection points. The flow manifold trailer is the only item from the FLEX buildings that will need to leave the concrete porches. A bulldozer is stationed inside the protected area fence and is available to move the flow manifold trailer into position, if necessary. The NRC Staff has no further questions. As such, SE No. 9 is closed.

3.2 Electrical Technical Discussions and Walk-Downs

a. The NRC staff questioned DTE on its reliance on alternating current (ac) power to mitigate internal flooding. The licensee's analysis states that FERMI 2 Seismic Category I applies to safety related structures, systems, and components. Seismic Category II/I applies to non-safety related items in a safety related envelope. The

licensee does not rely on a dam to maintain water inventory for FLEX and is not susceptible to dam failures. All major piping systems within Reactor and Auxiliary Buildings are either Seismic Category I or II/I, and all large volume tanks are either Seismic Category I or II/I. Therefore, the Reactor and Auxiliary Buildings are not susceptible to large internal flooding from non-seismic sources. For the Reactor and Auxiliary Buildings, DTE does not rely on ac power to mitigate groundwater (GW) flooding in critical locations since the Seismic Category I structures are designed to protect against GW in leakage. For the Turbine Building, should GW in-leakage occur, this would prevent access to the high pressure coolant injection (HPCI) / General Service Water (GSW) crosstie valve operator. Containment heat removal would then occur by venting through the torus hardened vent. The Basement may be flooded in this event, which would prevent operation of HPCI/GSW crosstie valve. This would prevent containment heat rejection to circulating water pond. However, the containment heat can be rejected by venting through torus hardened vent. Although it is not credited, DTE stated that the RCIC room sump pump would be available at 4 hours into the extended loss of ac power (ELAP) event and that operations would be monitoring the RCIC room water level. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE OI 3.1.1.3.B is closed.

b. The licensee provided the loading analyses for the Phase 2 and 3 portable diesel generators (DGs). In Design Calculation DC -6583, Volume 1, "FLEX AC Calculations," DTE stated that the 550KW Diesel Generators (2) provide adequate capacity for the required FLEX 480V generator loading during Phase 2 operation. DTE stated that the above calculation evaluated the FLEX equipment and circuits used with existing electrical distribution system equipment and circuits as part of FLEX strategy. Additionally, Calculation DC-6583 describes loading and energizing of 480VAC and 120VAC loads, which have been identified as part of the strategy to mitigate a FLEX event. The licensee stated that the Fermi Strategies will restore power to the battery chargers from FLEX portable generators in 2 to 3 hours (non-flood event) and in 10-18 hours (flooding event).

   Regarding the review of the capacity and capability of the Phase 3 Portable DGs, DTE analyzed the loading requirements for the Phase 3 equipment in Technical Evaluation TE-K11-14-007, "FLEX Phase 3 Emergency Response 4160 VAC Generators," and TE-K11-14-015, "FLEX Phase 3 Emergency Response 480 VAC Generator for Communication Building," and concluded that two 1.0 MW, 480V DGs capacity would be adequate to provide power during Phase 3 operation. These DGs will be provided by SAFER for Phase 3 operation. The licensee stated the above analyses verifies successful operation of required loads and the conditions under which optional loads may be operated such that the FLEX strategy is maintained. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE OI 3.2.4.8.B is closed.

c. During the audit, the NRC staff observed that the FLEX electrical system runs from the 'N' and 'N+1' FLEX DGs to a single transfer switch, located inside FLEX Building No. 1. The electrical system then runs from this transfer switch, through a

single circuit in an underground trench, to the battery chargers in the Auxiliary Building. As a result, the primary and alternate methods share a common connection and circuit. The NRC staff identified this as an alternative to JLD-ISG-2012-01, NEI 12-06, Revision 0 and DTE needs to request approval to use an alternative method; therefore, SE No. 13 will remain open.

d. The NRC staff reviewed DTE's strategy for maintaining low levels of hydrogen in the battery rooms. The licensee stated it will not employ the use of portable vent fans for hydrogen mitigation for the dc battery areas to maintain hydrogen concentration below 1 percent. Fermi UFSAR Section 9A.5 sets the design battery room hydrogen concentration level at or below 2 percent. The licensee, in Design Calculation DC-6586, "Loss of HVAC – Room Environment Analysis in Support of FLEX: Battery Room Temperature and Hydrogen Concentration," provided an analysis for maintaining the hydrogen concentration level below 2 percent for 72 hours following an ELAP event. After 72 hours, if necessary, DTE can restart the reactor building (RB) ventilation. The NRC staff did not find any discrepancies with DTE's analysis; therefore, AQ 37 is closed.

e. The NRC Staff reviewed the conclusion and summary of the Calculation DC-6584 Vol 1, Rev. 0. DTE's calculation reflected that the extended life of the batteries with load sheds for the Instantaneous (non-flood) case (the worst case coping time of 130V battery 1A) is 12.3 hours while coping time of 130V battery 2B is 24 hours for flood scenario. The licensee's analysis determined that the batteries could maintain the defined critical functions for a minimum of 12.3 hours in Instantaneous (non-flood) scenario and 24 hours for flood scenario. Procedure 29.ESP.ExtSBO [station blackout] Strategy specifies implementing partial load shedding until FLEX Generator(s) can supply power to the 480 VAC supply panel to repower Battery Chargers. Operator actions for dc load stripping are performed in the dc MCC rooms on the Auxiliary Building 3rd floor (adjacent to the Control Room) and the Relay Room on the Auxiliary Building 2nd floor (accessible from the Control Room). Actions consist of opening breakers and switches at dc distribution equipment to isolate power to the non-essential loads. The NRC staff had no further questions; therefore, SE No. 3 is closed.

f. During the site audit, the NRC Staff questioned whether there was a procedure that specified use of the 29.FSG.Toolbox RBHVAC Local Operation and 29.FSG.Toolbox Ventilation and Building Heat control Procedures during ELAP condition. The NRC staff's review of 29.400 (FLEX Flowchart) and 29.400.1, FLEX did not find specific directive references to use these procedures. 29.400.01 does have ventilation mitigating action section (section 12) that opens some of the doors directed to be opened in 29.FSG.Toolbox Ventilation and Building Heat Control. DTE provided Corrective Action No. 15-24397 to further evaluate this condition. This Corrective Action will evaluate a design change request (DCR) to both 29.400/29.400.01 to include to follow these toolbox procedures. The NRC staff had no further questions; therefore, AQ 22 is closed.

g. During the site audit, the NRC Staff requested the licensee to provide an evaluation to confirm that temperatures and pressures within containment will not exceed the equipment qualification of electrical equipment that is being relied upon as part of their FLEX strategies. The licensee needed to ensure that the qualified profile of the required electrical equipment remained bounding for the entire duration of the event. Based on its evaluation, DTE confirmed that there is reasonable assurance that the equipment required will perform its expected functions under the ELAP scenarios with regards to environmental conditions such as temperature, pressure, radiation, and humidity for an indefinite period of time. The NRC staff had no further questions; therefore, SE No.2 is closed.

h. During the site walkdown, the NRC staff had two follow up questions: A) Describe the program that ensures the underground FLEX cable installed between fuel storage facility #1 and the Auxiliary Building maintains its functional requirements, B) Verify that the FLEX cable is installed for the environment that it is designed for both flooding and instantaneous scenarios. The licensee provided Corrective Action No. 15-24381 to evaluate this issue, which will posted on the ePortal. The NRC staff had no further questions; SE No.12 is closed.

3.3 Balance of Plant Technical Discussions and Walk-Downs

a. The NRC staff reviewed DTE's strategy for providing bottled gas for the operation of valves required to support torus and drywell instrumentation. The licensee referenced Engineering Design Package (EDP)-37114, which describes how the maintaining of the FLEX indication of Wetwall Level and Drywell pressure by providing a pneumatic supply to instrument isolation valves. This document also discussed the use of operators opening the isolation valves remotely from the HVCS panel by using the nitrogen bottles. The modification was made to the HVCS panel to support this feature for ELAP. The design calculations reviewed by the NRC staff concluded that the nitrogen bottles are sized for 7 day supply for the HVCS. The NRC staff was able to verify this modification during the walkdown with DTE. The NRC staff had no further questions; therefore, ISE OI 3.2.1.6.A is closed.

b. The NRC staff reviewed DTE's strategy for ensuring that loss of condensate storage tank (CST), from a missile strike, concurrent with RCIC operability will not cause a loss of suction. The licensee also provided Technical Evaluation TE-E41-13-040, "Evaluation of HPCI CST Level Instrumentation Failure from Tornado Missile Flooding," to describe the impact of the loss of CST onto the RCIC. The Fermi UFSAR describes the automatic switchover of the RCIC suction from the CST to the Torus as a current design-basis function, and the ELAP will not cause any new failure mechanisms that would impact the current feature. The licensee concluded, in its technical evaluation, the failure of the CST and corresponding instrumentation, due to a missile strike, would result in a successful RCIC suction transfer to the Suppression Pool since the trip relays would become de-energized and open the RCIC Torus Suction isolation valves. The NRC staff reviewed the above documents to confirm that DTE performed an adequate analysis of the RCIC

operation due to the failure of the CST after an ELAP event. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE OI 3.2.1.8.A is closed.

c. The NRC staff confirmed whether or not the freezing of piping or instrument lines has been addressed (heat tracing). The licensee indicated that heat tracing is not considered as part of the ELAP response since none of the systems will rely on heat tracing for operation. The licensee stated that the installed plant equipment and instrument lines are within the Reactor and Auxiliary Buildings. The ventilation in both of these buildings is designed to maintain temperatures greater than 65 °F. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE CI 3.2.4.3.A is closed.

d. The NRC staff reviewed the design of the two FLEX buildings, in which, the ventilation is designed to maintain the interior temperature above 40 °F in both buildings. The NRC staff also walked down the two FLEX buildings to confirm that the two buildings will provide adequate temperatures for the equipment needed during ELAP. The NRC staff did not find any discrepancies with DTE's analysis or the design of the FLEX buildings; therefore, AQ 23 is closed.

e. While on site the NRC staff reviewed DTE's strategy for developing a diesel fuel management plan. The licensee described its overall ELAP refueling strategy in documents 29.FSG.17, "FLEX Fuel Management," and DC-6540 Vol. I, "FLEX Phase 2 Diesel Consumption Calculation." The four fuel oil storage tanks on site have a capacity of 35,280 gallons, which is capable of maintaining the required fuel consumption needed for all FLEX equipment to be used (for a total of 23,700 gallons) for at least 7 days. Procedure 29.FSG.17 also provides the refueling times required for the FLEX equipment along with the consumption rate. The licensee also provided two Chemistry Surveillance procedures 74.000.18 and 74.000.19, which address the monitoring of new fuel oil on site and the fuel oil within the emergency diesel generator storage tanks, respectively. The FLEX building will include a refueling truck with fuel transfer pump to obtaining fuel from the storage tanks on site. The quality of fuel oil in FLEX equipment will also be maintained under Preventive Maintenance Documents AA44, "Obtain Fermi 1-CTG Fuel Oil Sample for Analysis, " and AA46, "Obtain Fuel Oil Sample-Auxiliary Boiler Storage Tank." The NRC staff walked down the fuel oil storage locations to confirm accessibility to the tanks will be available for ELAP events. The NRC staff did not have any additional questions; therefore, ISE CI 3.2.4.9.A is closed.

f. The NRC staff reviewed DTE's FLEX pump analysis to determine whether these pumps can supply adequate flow. The licensee indicated that the FLEX pumps being deployed are capable of supplying make up water to all the locations (SFP, Torus, and RPV) at one time. All of the make-up water is being fed through the RHR system piping. However, the licensee indicated that for FLEX strategy purposes, no more than two locations will receive make up water. The licensee designed a FLEX flow control trailer (the satellite pump) to distribute flow to RHR piping with the flowmeter on each of the branch lines. The licensee referenced 29.FSG.02, "FLEX Water Supply Deployment," which described how this

distribution will be performed once the FLEX pumps are deployed and operational. DTE also provided to the NRC staff 29.FSG.12, "FLEX SFP Injection," 29.FSG.11, "FLEX RPV Injection," and 29.FSG.05, "Containment Cooling." These procedures describe the instructions for operators to provide FLEX connections for makeup water to the SFP, RPV, and Torus through RHR. The NRC staff did not find any discrepancies with DTE's analysis; therefore, AQ 32 is closed.

3.4 Containment System and Walk-Downs

a. The NRC staff reviewed DTE's plans for preventing the over-pressurization of RB-5, which is the refueling floor in the reactor building. The licensee revised its strategy and is no longer relying on blow away panels to prevent over-pressurization of RB-5. The licensee's current strategy is to open the crane entry door in the stairwell between the reactor building and the auxiliary building (AB) and the AB stairwell to the AB roof door at 6 hours, to provide a vent path for RB-5 generated steam and heat. In addition, all four corner doors from the RB side will be opened for temperature control and venting. The licensee stated that all actions for deployment of SFP spray equipment will be conducted after RBHVAC is restored. Procedure 29.FSG.Toolbox Ventilation and Heat Control provides steps to open doors to establish ventilation of RB fifth floor. The NRC staff had no further questions; therefore, ISE OI 3.2.2.A is closed.

b. The NRC staff reviewed DTE's plans for ensuring that there is sufficient minimum free volume in the circulating water pond. The licensee's strategy is to utilize the circulating water pond as its source for implementation for feed (water supply for FLEX pumps) and bleed (rejection for hot water from the torus). The overall inventory of the 5.5 acre CW pond is 23×10^6 gallons. The NRC staff had no further questions; therefore, ISE OI 3.2.3.A is closed.

c. The licensee was requested to complete a post ELAP extended environmental response analysis for ventilation and equipment operation in the RCIC and HPCI rooms. The licensee performed a GOTHIC analysis, DC-6587, Vol 1, which showed a timeline of environmental temperature, pressure, relative humidity and flooding levels for the HPCI and RCIC rooms during an ELAP. The HPCI and RCIC rooms are especially susceptible to flooding due to postulated water leaks from the pump seals and barometric condenser and have stringent limits on the maximum acceptable water levels (12" for the RCIC room and 21" for the HPCI room). For the RCIC room, the GOTHIC analysis assumes that the door between the torus room and the RCIC room would need to be opened at 11 hours to mitigate flooding. In 29.FSG.Toolbox, "Ventilation and Building Heat Control," operators are directed to open the RCIC door to the torus room between 3 to 6 hours following and ELAP. The results of the GOTHIC analysis showed that the maximum temperature over 72 hours is 147.6 °F, the maximum relative humidity is 78.2 percent and the maximum room pressure is 2.1 psig. Though it's not credited, DTE indicated that the RCIC room sump pump would be available at 4 hours into the event and that operations would monitor RCIC room water level.

For the HPCI room, the results of the GOTHIC analysis show the maximum temperature over 72 hours is 151.7 °F, the maximum relative humidity is 58.1 percent and the maximum room pressure is 2.1 psig. For SBO, HPCI has been previously evaluated by the licensee to successfully operate at 180 °F. Based on the SBO evaluation of HPCI at greater temperatures than the temperatures of concern for FLEX, it is reasonable to expect HPCI to function during an ELAP. In addition, DTE indicated that RB HVAC will be restored at 8 hours, which will reduce the temperatures and pressures in both RCIC/HPCI rooms. This is not credited into the licensee's strategy, but does provide defense in depth. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE CI 3.2.4.2.B is closed.

d. During the site audit, the NRC staff reviewed DTE's response on equipment operability in the HPCI/RCIC rooms. The licensee's analysis stated that the Battery Chargers, required for restoration of the HPCI/RCIC room conditions (barometric condenser), contains weak link electronic components. Digital electronic devices utilizing metal-oxide semiconductors (MOS) are currently the most sensitive piece of electronic equipment in the plant. The licensee indicated that a review of specification data for some common commercial grade electronic components, such as, silicon gate MOS devices determined that they are rated for at least 158 degree °F. The temperature range for commercial integrated circuit MOS devices during operation is between 32 degrees °F to 150 degrees °F.

   The licensee stated that operations will not take actions to open the battery room doors. Under a "door closed" condition the Division 2 battery charger room will reach a temperature of nominally 161 degrees based on Gothic analysis at 72 hours post ELAP. The time at which 150 °F will reach is 45 hours post ELAP initiation. This assumes no mitigating actions taken. However, the operators have an option to start reactor building heating, ventilation and air conditioning (RBHVAC) to mitigate these temperatures.

   The NRC staff questioned whether there was a procedure that specified use of the 29.FSG.Toolbox "RBHVAC Local Restoration" and 29.FSG.Toolbox "Ventilation and Building Heat Control." The NRC staff's review of Procedures 29.400 "FLEX Flowchart" and 29.400.1, "FLEX," Revision 0 did not find specific directive references to use these procedures. Procedure 29.400.01 does have ventilation mitigating action section (section 12) that opens some of the doors directed to be opened in 29.FSG.Toolbox Ventilation and Building Heat Control. The licensee provided a Corrective Action No. 15-24397 to further evaluate this condition and determination of resolution. This Corrective Action will evaluate a DCR to both 29.400/29.400.01 to include to follow these toolbox procedures. The NRC Staff has no further questions; therefore, AQ 22 is closed.

3.5 <u>SFPI Discussions and Walk-Downs</u>

a. Regarding the projected dose rate impact and the Level 2 height, DTE responded that a Design Calculation DC-6543 was developed to determine the dose rate associated with varying SFP levels and considering both the storage of spent fuel and other equipment in the pool. The design calculation also determined a bounding

total dose for the SFP probe over a 40 year remaining plant life and a 6 hour drop in SFP level to the top of the fuel racks. Based on the calculation, Level 2 was selected as 18 feet above the top of the spent fuel racks (elevation 679'-1/8"). This water level corresponds to a dose rate to personnel on the refueling floor of 10 mR/hr. This allows personnel to be present on the refueling floor without significant dose consequences. The normal spent fuel pool level (level 1) is elevation 683' 6". The licensee's analysis states that the Level 2 elevation allows more than four feet of margin between normal pool level and a level where personnel dose considerations become significant. The NRC staff did not find any discrepancies with DTE's analysis; therefore, Spent Fuel Pool Level Instrumentation (SFPLI) RAI No. 1 is closed.

b. Regarding seismic and hydrodynamic loading, DTE stated that the SFPI probe was qualified by analysis to the requirement of Institute of Electrical and Electronic Engineers (IEEE) guidance IEEE 344-2004. The licensee verified the hydrodynamic loads using a separate GOTHIC analysis found to be acceptable. DTE stated these stresses were below the yield stress of the SFPI probe tube material. A site specific analysis was performed for Fermi 2, using the mounting configuration of the probe used at Fermi. Based on these reports, DTE states the SFPI is capable of withstanding seismic events beyond Fermi Design-Basis Earthquakes while maintaining its structural integrity. For the SFPI signal precessor and battery rack, DTE stated that Technical Report 1-0410-6 Rev. 1, "MOHR EFP-IL SFPI System Test Report" contains the results of seismic qualification tests of the SFP signal processor and battery pack. Two series of seismic qualification tests were performed. The licensee stated that these tests demonstrated that the SFPI signal processor and battery rack are seismically rugged to seismic loading beyond that of the Fermi design-basis earthquake. For the SFPI level indicator, the OTEK LBD-N23 Series Digital Panel Meter (SFP Level Indicator) was seismically tested by application of random multi-frequency vibrations at a level which enveloped the Fermi 2 operating basis earthquake/ safe shutdown earthquake horizontal and vertical response spectra provided. The indicator and its mounting hardware remained functional following testing. The NRC staff reviewed Calculation NAI 1791 009, Rev. 1, "Seismic Induced Hydraulic Response in the Enrico Fermi Power Plant 2 Spent Fuel Pool." The licensee has provided seismic qualification and sloshing analysis for the probe and the seismic qualification for the SFP level indicator. The seismic qualification for the electronic was reviewed by the NRC staff during vendor audit. The NRC staff did not find any discrepancies with DTE's analysis; therefore SFPLI RAI No 2 is closed.

c. The licensee stated that the requirements of Order EA-12-051 addressed the SFPI for remote monitoring of SFP levels during BDBEE consistent with conditions in the area of the SFPI equipment location. The SFPI system electronics are located outside of the SFP area, and, therefore, operate in the normal and ELAP beyond-design-basis (BDB) environment. The SFPI electronics and batteries are installed remotely from the SFP areas in various location in Auxiliary Building, Reactor Building, and Main Control Room each having different expected BDB environment conditions. Both the remote and primary level indication system are similar in design and are built around the MOHR EFI-IL SFPI system. The MOHR's SFPI system

electronic and batteries are housed in NEMA Type-4X metallic enclosures designed for installation. The licensee provided a table summarizing the environmental temperature and humidity that showed that the expected temperature and humidity conditions for the SFPI electronics and batteries installed at Fermi 2 are below the environmental qualification temperature and humidity of 131 °F and 95 percent RH, respectively. Two exceptions, however, were noted and documented in the station's correction action program, i.e, the temperature and humidity rating of the SOLA Power Conditioner and large component removal (LCR) Electronic Filters were found to be below the temperature and humidity values expected during the BDBEE conditions. The licensee provided the NRC staff with CARD's 15-23044, 15-23045, and 15-22196. These CARD will provide documentation of the maximum continuous temperature and humidity rating for these power line filters. The NRC staff reviewed Calculation DC-6585 Vol 1, "Loss of HVAC - Room Environmental Analysis" and verified that except SOLA power conditioner and LCR Electronic Filter, SFPI instrument environmental qualification were bound by the limits. The NRC staff did not find any discrepancies with DTE's analysis; therefore SFPLI RAI Nos. 5 and 6 are closed.

d. The licensee was requested to provide a list of procedures governing the operation, maintenance, testing, and inspection of the SFPI. DTE stated that for normal response, System Operating Procedure 23.708 has been revised to incorporate the SFP level instruments. This procedure provides direction for placing instrument in service and also provides direction for obtaining level readings in the even the instrument is using the battery backup power supply. For abnormal response, Extreme Damage Mitigation guidelines for SFP makeup and spray have been modified to direct the operator to monitor SFP level using the new SFP level instruments while adding water to the SFP. Similarly, Procedure 29.FSG.12 has been drafted to include monitoring SFP level using the new SFP Level Instruments when adding water to the SFP using the FLEX water supply. A system maintenance is performed every six months (including once within 60 days of a refueling outage). The conduct of this preventive maintenance is directed by steps placed in the automatically generated work order by the work planner using a work plan template. The NRC staff did not find any discrepancies with DTE's analysis; therefore SFPLI RAI No. 14 is closed.

e. The licensee provided information regarding the potential susceptibility of the SFP instruments to the electromagnetic interference (EMI)/radio frequency interference (RFI) interference. The components of the SFP signal processing instrumentation were installed at various plant locations, including the Main Control room (MCR), the AB, and the RB. An electromagnetic emission mapping of selected plant areas was conducted in support of the installation of the SFPI system. Based on the information presented in the vendor reports, the MOHR EFP-IL SFPI System and OTEK digital indicators meet EMI/RFI requirements for Non-Safety Related equipment. Based on the results of the high frequency conducted and radiated emission testing presented in the test report, the MOHR EFI-IL SFPI system meets the applicable requirements for the industry Guideline for EMI Testing of power plant equipment. A radiated electromagnetic emission mapping of selected plant areas

was performed based on the industry Guidelines for EMI testing of power plant equipment in support of SFPI installation. The licensee concluded that the SFPI system components met the applicable EMI/RFI testing requirements for the power plant equipment, as described above, and therefore, the SFPI system components are not susceptible to the EMI/RFI interference in their areas of installation. Following a discussion with the NRC staff, DTE initiated CARD 15-24386 to establish a restricted zone near SFPI instrument rack and/or probes. The NRC staff had no further questions and SE-4 is closed.

3.6 Other Technical Discussion Areas and Walk-Downs

a. The NRC staff met with DTE to discuss ISE CI 3.2.4.4.B Communications Assessment. The NRC staff conducted a walk through and observed that communications equipment had been implemented. FLEX Support Guideline 29 FSG.06, Revision 0, "Communications," describes the communications equipment that has been implemented. The NRC staff had no further questions and ISE 3.2.4.4.B is closed.

b. The NRC staff reviewed DTE's plan for utilizing offsite resources after a BDBEE. The SAFER Response Plan for ENRICO FERMI Nuclear Generating Station, AREVA, Revision 0, dated May 26, 2015, discusses the staging areas, transportation, and access routes to the staging area. This plan also discussed the acquisition of Phase 3 FLEX equipment. The NRC staff had no further questions and ISE CI 3.1.1.4.A and AQ 2 are closed.

c. The NRC staff reviewed DTE's strategy to clear ice and snow from haul pathways. DTE plans to use a Caterpillar D-6 bulldozer and two FLEX trucks to remove ice and snow. However, these three pieces of equipment are not credited to remove ice and snow. The licensee issued FBP-90, "Enrico Fermi Energy Center Snow Removal Plan," Revision 0, dated April 9, 2013. This plan provides a detailed plan to remove snow and ice. A contractor will be used to remove snow, as DTE has advanced warning of upcoming snow storms. The plan includes the use of security, shovels, and salt. The NRC staff had no further questions and ICE CI 3.1.4.2.A is closed.

d. The NRC staff evaluated DTE's plans for the deployment of portable equipment following a seismic event require a liquefaction study for the proposed route. The licensee stated in Design Calculation DC-6603, Volume Number 1 "Evaluation of Liquefaction of soil in the flex deployment path," that three zones at the site were analyzed for predicted post-earthquake settlement. The licensee stated that the results found settlement varied from 0 - 2 inches and no presence of liquid faction that would impede movement following a seismic event. The NRC staff did not find any discrepancies with DTE's analysis; therefore, ISE CI 3.1.1.2A and AQ 4 are closed.

e. The NRC staff reviewed DTE's strategy for providing portable lighting during an ELAP. In FERMI 2 Operations Conduct Manual MOP25, Revision 1 DRAFT B "Beyond-Design Basis Event Coping Strategies Program Document," Section 4.3

'Lighting' identifies emergency lighting to be used such as headlamps and flashlights. During the walkdown, the NRC staff observed battery powered portable lighting that will be used by DTE. The NRC staff had no further questions and ISE CI 3.2.4.4.A and AQ 24 are closed.

f. The NRC staff reviewed DTE's strategy for providing protective clothing and other equipment to the operators. The "FERMI 2 Safety Handbook," Section 7, 'Personal Protective Equipment,' discusses the protective clothing and equipment that will be used to protect the operators. The NRC staff had no further questions and ISE CI 3.2.4.6.A and AQ 26 are closed.

g. The NRC staff reviewed DTE's strategy for protecting FLEX equipment from snow, ice, and extreme cold. The licensee's Template for Preventive Maintenance specifies the draining of FLEX equipment after disconnection. The licensee's "Purchase Specification No. 3071-579-PUR-101, Revision A, "Detroit Edison Purchase Specification for FLEX Storage Facility Buildings and Foundations," specifies that the interior of the FLEX Buildings will be designed to maintain temperatures between 40 degrees °F and 105 degrees °F, limited to 90 percent humidity. The NRC staff had no further questions and AQ 3 is closed.

h. The NRC staff examined DTE's strategy for addressing an ELAP during shutdown and refueling at Fermi. The licensee is implementing NEI's "Position Paper: Shutdown / Refueling Modes," dated September 18, 2013. The NRC staff endorsed this NEI paper on September 30, 2013 (ADAMS Accession No. ML13267A382). The NRC staff had no further questions and AQ 13 is closed.

i. The NRC staff reviewed DTE's plan for providing maintenance and testing of electrical equipment that is credited for events that require mitigating strategies. The licensee stated that it plans to incorporate EPRI [Electric Power Research Institute] Report 3002000623, "Nuclear Maintenance Applications Center: Preventive Maintenance Basis for FLEX Equipment." The NRC staff reviewed Maintenance Strategy K1101S001A, which is for FLEX DG. This procedure specifies generator testing, including voltage and frequency, and inspection of hoses and gaskets and fluids. The NRC staff had no further questions and AQ 39 is closed.

j. The licensee's presentation to the NRC staff titled "NRC Fukushima MS/SFPI Audit Fermi 2 Conformance Overview,' discussed the two FLEX storage facilities. Both of the FLEX storage facilities will be made of concrete. One FLEX storage facility will be located outside the protected area and the other FLEX storage facility will be located inside the protected area. During a walkdown, the NRC staff observed the construction of the two storage facilities. Flex storage facility Number 1, located inside the protected area, will be installed with an HVAC system and have N and N+1 FLEX equipment. Flex storage facility Number 2, located outside the protected area, will be installed with an HVAC system and also have N and N+1 FLEX equipment.

4.0 Exit Meeting (June 25, 2015)

The NRC staff conducted an exit meeting with licensee staff following the closure of onsite audit activities. The NRC staff highlighted items reviewed and noted that the results of the onsite audit trip will be documented in this report.

CONCLUSION

The NRC staff completed all three parts of the May 5, 2015, onsite audit plan. Each audit item listed in Part 2 of the plan was reviewed by NRC staff members while on site. In addition to the list of NRC and licensee onsite audit staff participants in Attachment 1, Attachment 2 provides a list of documents reviewed during the onsite audit portion.

In support of the continuing audit process, as DTE proceeds towards Orders compliance for this site, Attachment 3 provides the status of all open audit review items that the NRC staff is evaluating in anticipation of issuance of a combined safety evaluation for both the Mitigation Strategies and Spent Fuel Pool Level Instrumentation orders. The five sources for the audit items referenced below are as follows:

a. ISE OIs and CIs

b. AQs

c. Licensee-identified OIP OIs

d. SFPLI RAIs

e. Additional Safety Evaluation (SE) needed information

The attachments provide audit information as follows:

a. Attachment 1: List of NRC staff and licensee staff audit participants

b. Attachment 2: List of documents reviewed during the onsite audit

c. Attachment 3: Fermi 2 MS/SFPI SE Audit Items currently under NRC staff review (licensee input needed as noted)

While this report notes the completion of the onsite portion of the audit per the audit plan dated May 5, 2015, the ongoing audit process continues, as discussed in the letters dated August 28, 2013, and March 26, 2014, to all licensees and construction permit holders for both orders.

Additionally, while Attachment 3 provides a list of currently open items, the status and progress of the NRC staff's review may change based on licensee plan changes, resolution of generic issues, and other NRC staff concerns not previously documented. Changes in the NRC staff review will be communicated in the ongoing audit process.

Attachments:
1. NRC and Licensee Staff Onsite Audit Participants
2. Onsite Audit Documents Reviewed
3. MS/SFPI Audit Items currently under NRC staff review

Onsite Audit Participants

NRC Staff:

Stephen Monarque	NRR/JLD
John Lehning	NRR/JLD
Garry Armstrong	NRR/JLD

Brian Lee	NRR/JLD
Prem Sahay	NRR/JLD
Duc Nguyen	NRR/JLD

DTE and Support Staff:

Steve Ward	Licensing Engineer
Kirti Amin	Supervisor-PSE-Electrical
Michael Annon	Fukushima Task Force Project
Kevin Burke	Manager – Industry Interface
James Davis	Manager - Training
Judy Ford	Director Organizational Effectiveness
Richard Glosup	Senior Engineer PSE- Mechanical
David Hemmele	Superintendent-Operations
Robert Keck	AECOM Engineering
Mark Kramer	Operations Shift Manager
John Louwers	Manager – Nuclear Quality Assurance
EJ Meyer	Supervisor – System Engineering
Glen Ohlemacher	Fukushima Task Force Project
Michel Philippon	Director – Production (Plant Manager)
Christopher Robinson	Manager - Licensing
Bruce Rumans	Program General Supervisor – Radiation Protection
Herb Torberg	Manager Security
Harold Yeldell	Manager - Maintenance
Ed Kokosky	Director – Nuclear Organization Effectiveness
Larry Peterson	Director - Engineering
Gregory Strobel	Manager - Operations
James May	Manager - Chemistry
Richard Laburn	Manager – Radiation Protection
George Piccard	Manager – System Engineering
Kendra Hullum-Lawson	Manager – Plant Support Engineering

Fermi, Unit 2 - Documents Reviewed

- Design Calculation DC-6583, Volume 1, Revision 0, "FLEX AC Calculations," dated May 11, 2015
- Technical Evaluation TE-K11-14-007, "FLEX Phase 3 Emergency Response 4160 VAC Generators," Revision 0, dated April 20, 2015
- TE-K11-14-015, "FLEX Phase 3 Emergency Response 480 VAC Generator for Communication Building," Revision 0, dated April 20, 2015
- Design Calculation DC-6586, "Loss of HVAC – Room Environment Analysis in Support of FLEX: Battery Room Temperature and Hydrogen Concentration," Revision 0, dated October 16, 2014
- Engineering Design Package EDP Continuation Sheet EDP-37114, Revision 0, dated September 25, 2014
- 29.FSG.13, "Containment Venting," Revision 0
- Design Calculation DC-6593, "Nitrogen Bottle Sizing Calculation for T50000F420B and T50000F421B," Revision A, dated April 28, 2015
- Technical Evaluation TE-E41-13-040, "Evaluation of HPCI CST Level Instrumentation Failure from Tornado Missile Flooding," Revision 0, dated September 19, 2013
- 29.FSG.17, "FLEX Fuel Management," Revision 0
- DC-6540 Vol. I, "FLEX Phase 2 Diesel Consumption Calculation," Revision A, dated February 16, 2015
- Chemistry Surveillance Procedure 74.000.18, "Chemistry Shiftly, 72 Hour and Situation Surveillances," Revision 54, issued November 17, 2014
- Chemistry Surveillance Procedure 74.000.19, "Chemistry Routine Surveillance," Revision 24, issued August 29, 2011
- Preventive Maintenance Document AA44, "Obtain Fermi 1-CTG Fuel Oil Sample for Analysis, " issued April 15, 2008
- Preventive Maintenance Document AA46, "Obtain Fuel Oil Sample-Auxiliary Boiler Storage Tank." issued April 15, 2008
- 29.FSG.02, "FLEX Water," Revision 0

- 29.FSG.12, “FLEX SFP Injection,” Revision 0
- 29.FSG.11, “FLEX RPV Injection,” Revision 0
- 29.FSG.05, “Containment Cooling,” Revision 0
- Design Calculation DC-0367, “FLEX RHR Injection Configuration-Pressure Drop Calculation,” Revision B, dated February 19, 2015
- 29.FSG.Toolbox” RBHVAC Local Restoration,” DRAFT
- 29.FSG.Toolbox “Ventilation and Building Heat Control,” DRAFT
- 29.400 “FLEX Flowchart,” DRAFT
- 29.400.1, “FLEX,” Revision 0
- Design Calculation DC-6543, Volume 1, “Total Integrated Radiation Dose to Spent Fuel Pool Level Probe and Dose Rates on the Refueling Floor for Reduced Pool water levels,” Revision 0, issued July 9, 2014
- Calculation NAI 1791 009, "Seismic Induced Hydraulic Response in the Enrico Fermi Power Plant 2 Spent Fuel Pool,” Revision 1
- Calculation DC-6585 Vol 1, "Loss of HVAC - Room Environmental Analysis in Support of FLEX: RB/AB/TB Temperature Profile,” Revision 0, issued October 21, 2014
- 29.FSG.12, “FLEX SFP Injection,” Revision 0
- Design Calculation DC-6587 Vol 1, “Loss of HVAC – Room Environment Analysis in Support of FLEX HPCI, RCIC Room Temperature and Water Level Analysis,” Revision 0, issued October 21, 2014
- FBP-90, “Enrico Fermi Energy Center Snow Removal Plan,” Revision 0, dated April 9, 2013
- Design Calculation DC-6603, Volume Number 1 "Evaluation of Liquefaction of Soil in the Flex Deployment Path,"
- FERMI 2 Operations Conduct Manual MOP25, Revision 1 DRAFT B “Beyond-Design Basis Event Coping Strategies Program Document,”

Fermi, Unit 2
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:

Audit Items Currently Under NRC Staff Review, Requiring Licensee Input As Noted

Audit Item Reference	Item Description	Licensee Input Needed
ISE CI 3.1.3.2.A	Validate key parametric values verses time, using the Fermi Station Time Critical Operator Action Validation\Verification Process once all procedures, training, and equipment have been implemented.	Licensee to complete its verification and validation analyses.
ISE CI 3.2.1.1.E	The specific MAAP4 analysis case that was used to validate the timing of mitigating strategies in the integrated plan must be identified and should be available for the NRC staff to review. Alternately, a comparable level of information may be included in the supplemental response. In either case, the analysis should include a plot of the collapsed vessel level to confirm that Top of Active Fuel (TAF) is not reached (the elevation of the TAF should be provided) and a plot of the temperature cool down to confirm that the cool down is within tech spec limits.	Licensee to demonstrate that RCIC (and HPCI, if credited) can continue to operate when the reactor vessel water level exceeds the main steam line elevation, as assumed in a credited MAAP calculation. Alternately, a different control strategy should be used that does not result in the vessel level exceeding the main steam line elevation during the time that operation of steam-driven systems is credited. The licensee should further provide on the e-portal its procedure for using the condenser hotwell as a suppression volume during the flooding event.

Audit Item Reference	Item Description	Licensee Input Needed
AQ 15	On page 10 of the overall integrated plan (OIP), DTE indicates that RCIC will be used to maintain core cooling by injecting into the RPV. The RCIC pump will take suction from either the condensate storage tank (CST), or the torus. The licensee is requested to provide adequate technical basis demonstrating RCIC pump operability with a suction temperature of 240°F. The NRC staff is aware of two boiling-water reactor (BWR) owners group (BWROG) reports on the subject, GE Task Report 0000-0143-0382-R0, "RCIC System Operation in Prolonged Station Blackout - Feasibility Study," dated January 2012, and 0000-0155-0154-R0, "RCIC Pump and Turbine Durability Evaluation - Pinch Point Study," dated February 2013, neither of which has been submitted for NRC review. The licensee is requested to address the applicability of the BWROG analyses on the subject and any procedural or plant modifications planned to facilitate the continued operation of RCIC. If the CST becomes unavailable, the possibility of loss of suction from the CST could exist. The licensee is requested to provide information showing that the loss of the CST will not cause a loss of suction source such that the RCIC would ingest gas before the switch over to the torus occurs.	The licensee to provide analyses demonstrating that the RCIC system can tolerate temperatures up to 250 °F. Alternately, the licensee may demonstrate that FLEX pumps would be ready to provide the required flow at the time the suppression pool heats up to a temperature that could jeopardize operation of RCIC.

Audit Item Reference	Item Description	Licensee Input Needed
AQ-28	On page 10 of the OIP, DTE indicates that HPCI will be employed to control reactor pressure so that the safety relief valves (SRVs) do not need to be operated. However, DTE does not supply any information on how this will be performed, nor does DTE discuss the pressure strategy for the RPV. The licensee is requested to supply information to clarify the pressure strategy for the RPV; will it be held at or near operating pressure and if so, for how long? At what point will the RPV pressure need to be lowered and at what rate? The licensee is requested to discuss how the HPCI system will be used to bleed steam off from the RPV. If the RPV is to be depressurized, DTE is requested to explain how the HPCI system can be controlled finely enough to meet and sustain the required depressurization rate. Also, DTE is requested to indicate which HPCI instrumentation is credited for the coping strategies to work.	Licensee to provide GOTHIC analyses for water accumulation in the HPCI and RCIC rooms during an ELAP event. What is the maximum operating temperature for HPCI? Is it above its maximum design temperature in certain ELAP scenarios, and if so what is the justification? Alternately, as appropriate confirm that in the scenarios where the HPCI design temperature may be exceeded that (1) safety-relief valves can be relied upon for reactor pressure control if HPCI fails, and (2) the containment vent can be relied upon for containment pressure control if HPCI fails.

Audit Item Reference	Item Description	Licensee Input Needed
E-7	a. Discuss the design of the suction strainers used with FLEX pumps taking suction from raw water sources, including perforation dimension(s) and approximate surface area. b. Provide reasonable assurance that the strainers will not be clogged with debris (accounting for conditions following, flooding, severe storms, earthquakes or other natural hazards), or else that the strainers can be cleaned of debris at a frequency that is sufficient to provide the required flow. In the response, consider the following factors: i. The timing at which FLEX pumps would take suction on raw water relative to the onset and duration of the natural hazard. ii. The timing at which FLEX pumps would take suction on raw water relative to the timing at which augmented staffing would be available onsite. iii. Whether multiple suction hoses exist for each FLEX pump taking suction on raw water, such that flow interruption would not be required to clean suction strainers.	Licensee to describe method for dealing with blockage of the strainer for the submersible stage of the Neptune pump – including backflushing or winching out the pump, cleaning its strainer, and re-deploying it. The licensee should clarify how long the process would take and confirm it can be performed in a manner that will not lead to uncovering the core.
E-13	FLEX electrical system runs from FLEX DG to a single transfer switch and from the transfer switch to the battery chargers in the Auxiliary Building, through a single circuit in an underground trench. The underground trench runs from FLEX Bldg. 1 to Auxiliary Bldg. The primary and alternate methods share a common connection and circuit.	The licensee to request alternative to NEI 12-06 and state why this is acceptable.

If you have any questions, please contact me at 301-415-1544 or by e-mail at Stephen.Monarque@nrc.gov.

Sincerely,

/RA/

Stephen R. Monarque, Project Manager
Orders Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No.: 50-341

Enclosure:
Audit report

cc w/encl: Distribution via Listserv

DISTRIBUTION:
PUBLIC
JOMB R/F
RidsNrrDorlLp3-1 Resource
RidsNrrPMFermi Resource
RidsNrrLASLent Resource
RidsAcrsAcnw_MailCTR Resource
RidsRgn3MailCenter Resource
SMonarque, NRR
JBowen, NRR

ADAMS Accession No. ML15245A287 ***via email**

OFFICE	NRR/JLD/JOMB/PM	NRR/JLD/LA	NRR/JLD/JERB/BC
NAME	SMonarque	SLent	JLehning
DATE	9/10/2015	09/10/15	09/21/15
OFFICE	NRR/JLD/JCBB/BC	NRR/JLD/JOMB/BC(A)	NRR/JLD/JOMB/PM
NAME	BTitus	MHalter	SMonarque
DATE	09/ 24/15	09/24/15	10/1/2015

OFFICIAL AGENCY RECORD