

## **NRR-PMDAPEm Resource**

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**From:** Wall, Scott  
**Sent:** Monday, July 29, 2013 11:51 AM  
**To:** Alan I Hassoun  
**Cc:** Roque-Cruz, Carla; Chung, Pong; Dion, Jeanne  
**Subject:** Fermi 2 - Requests for Additional Information Regarding Overall Integrated Plan for Reliable Spent Fuel Pool Instrumentation (TAC MF0771)  
**Attachments:** Fermi 2 - Request for Additional Information - Order EA-12-051.pdf

Mr. Hassoun,

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13060A285), DTE Electric Company submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, Commission Order to modify licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order EA-12-051) for Fermi 2 Nuclear Power Plant. The NRC staff in the Balance of Plant Branch (SBPB) and the Instrumentation and the Controls Branch (EICB) have identified areas in which additional information is needed to complete the Technical Review. The staff's Request for Additional Information (RAI) is provided as an attachment to this email.

You may accept this as a formal request for additional information and respond to the questions by August 19, 2013. Alternatively, you may request to discuss the content of the RAIs with the NRC staff in a conference call, including any change to the proposed response date. Please let me know if you have any questions or concerns.

Sincerely,

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**REQUEST FOR ADDITIONAL INFORMATION**  
**OVERALL INTEGRATED PLAN IN RESPONSE TO**  
**ORDER EA-12-051 "RELIABLE SPENT FUEL POOL INSTRUMENTATION"**  
**DTE ELECTRIC COMPANY**  
**FERMI 2 NUCLEAR POWER PLANT**  
**DOCKET NO. 50-341**

**1.0 INTRODUCTION**

By letter dated February 28, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13063A285), DTE Electric Company submitted an Overall Integrated Plan (OIP) in response to the March 12, 2012, Commission Order modifying licenses with regard to requirements for Reliable Spent Fuel Pool (SFP) Instrumentation (Order Number EA-12-051; ADAMS Accession No. ML12054A679) for Fermi 2 Nuclear Power Plant. The NRC staff endorsed Nuclear Energy Institute (NEI) 12-02 "Industry Guidance for Compliance with NRC Order EA-12-051, To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," Revision 1, dated August 2012 (ADAMS Accession No. ML12240A307), with exceptions, as documented in Interim Staff Guidance (ISG) 2012-03 "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," Revision 0, dated August 29, 2012 (ADAMS Accession No. ML12221A339).

The NRC staff has reviewed the February 28, 2013, response by the licensee and determined that the following Request for Additional Information (RAI) is needed to complete its Technical Review. If any part of this information is not available within the 30-day response period for this RAI, please provide the date this information will be submitted.

**2.0 LEVELS OF REQUIRED MONITORING**

The OIP states, in part, that

Level adequate to support operation of the normal fuel pool cooling system-  
Level 1

Level 1 elevation for Fermi is 683' 6" based on the surface of the water maintained by scuppers (UFSAR section 9.1.2.2.1, Reference 9.7), which is consistent with the NEI 12-02 guidelines (Reference 9.4). The Fermi Spent Fuel Pool Instrumentation (SFPI) system Level 1 monitoring will meet or exceed the Level 1 monitoring requirement (a resolution of 1foot) provided in the NEI 12-02, Section 2.3, Figure 1 (Reference 9.4).

Level adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck - Level 2

ENCLOSURE

Level 2 elevation for Fermi is 671' 1/8", which is at 10 feet above the top of the fuel racks consistent with the NEI 12-02 guidelines (Reference 9.4). The Fermi SFPI system Level 2 monitoring will meet or exceed the Level 2 monitoring requirement (a resolution of 3.5 feet) provided in the NEI 12-02, Section 2.3, Figure 1 (Reference 9.4).

In addition to the spent fuel racks in the Spent Fuel Pool (SFP), the Fermi 2 SFP is also used to store materials that could affect radiation doses in the SFP area. Applicable plant procedures will be developed to address the stored radioactive material, the associated pool level monitoring, and personnel access requirements.

Level where fuel remains covered- Level 3

Level 3 elevation for Fermi is 661' 1/8" based on the elevation of the top of the Fermi 2 tallest fuel rack (Drawing # 2356, Reference 9.8), which is consistent with the NEI 12-02 guidelines (Reference 9.4).

#### **RAI-1**

Please provide the following:

- a) A clearly labeled sketch depicting the elevation view of the proposed typical mounting arrangement for the portions of instrument channel consisting of permanent measurement channel equipment (e.g., fixed level sensors and/or stilling wells, and mounting brackets). Indicate on this sketch the datum values (e.g., 661' 1/8") representing Level 1, Level 2, and Level 3 as well as the top of the fuel racks. Indicate on this sketch the portion of the level sensor measurement range that is sensitive to measurement of the fuel pool level, with respect to the Level 1, Level 2, and Level 3 datum points.
- b) A discussion regarding dose rates for stored spent fuel versus that of other material that may be stored in the pool and the potential impact on the elevation for level 2.

### **3.0 INSTRUMENTATION DESIGN FEATURES**

#### **3.2 Arrangement**

The OIP states, in part, that

The SFP level sensors (probes) will be installed near northwest and north east corners of the SFP to maintain separation within the spent fuel pool area. The sensors will be located as close to the corners as possible to maintain maximum separation and to provide best protection against a single missile damaging both channels. These locations will not interfere with SFP activities. The primary and backup channels' signal processors will be located in an area outside the SFP environment. The signal processors will be located in the Auxiliary Building 4th floor and the Reactor Building 3rd floor, respectively, and installed with seismic

supports. The primary channel and the backup channel remote displays will be located in the Control Room and Reactor Building 2nd floor and installed with seismic supports. The locations of the instruments within the Auxiliary Building and Reactor Building are protected from external missiles.

Cabling for the primary and backup channel instruments will be routed in raceways separately and seismically mounted. Cables from the sensors in the SFP area will be in dedicated rigid steel conduits, routed in covered recess in the floor to avoid interference with fuel handling activities.

### **RAI-2**

Please provide a clearly labeled sketch or marked-up plant drawing of the plan view of the SPF area, depicting the SPF inside dimensions, the planned locations/ placement of the primary and back-up SPF level sensors, and the proposed routing of the cables that will extend from the sensors toward the location of the local electronics cabinets and read-out/display devices in the main control room or alternate accessible location.

### **3.3 Mounting**

The OIP states, in part, that

Mounting of the primary and backup channel instruments will be seismic class I. Installed equipment will be seismically qualified to withstand the maximum seismic ground motion considered in the design of the plant area in which it is installed.

### **RAI-3**

Please provide the following:

- a) The design criteria that will be used to estimate the total loading on the mounting device(s), including static weight loads and dynamic loads. Describe the methodology that will be used to estimate the total loading, inclusive of design basis maximum seismic loads and the hydrodynamic loads that could result from pool sloshing or other effects that could accompany such seismic forces.
- b) A description of the manner in which the level sensor (and stilling well, if appropriate) will be attached to the refueling floor and/or other support structures for each planned point of attachment of the probe assembly. Indicate in a schematic the portions of the level sensor that will serve as points of attachment for mechanical/mounting or electrical connections.
- c) A description of the manner by which the mechanical connections will attach the level instrument to permanent spent fuel pool structures so as to support the level sensor assembly.

- d) A description of how other material stored in the SFP will not create adverse interaction with the fixed instrument location(s).

### **3.4 Qualification**

The OIP states, in part, that

The primary and backup instrument channels will be reliable at temperature, humidity and radiation levels consistent with the SFP water at saturation conditions for an extended period.

Instrument channel reliability will be demonstrated via an appropriate combination of design, analyses, operating experience, and/or testing of channel components for the following sets of parameters:

- Conditions in the area of instrument channel component use for all instrument components,
- Effects of shock and vibration on instrument channel components used during and following any applicable event for only installed components, and
- Seismic effects on instrument channel components used during and following a potential seismic event for only installed components.
- Augmented quality components, similar to those applied to fire protection, will be used for this project....

Applicable components of the instrument channels are rated by the manufacturer (or otherwise tested) for seismic effects at levels commensurate with those of postulated design basis event conditions in the areas of component usage (with the exception of battery chargers and replaceable batteries)...

### **RAI-4**

Please provide the following:

- a) A description of the specific method or combination of methods you intend to apply to demonstrate the reliability of the permanently installed equipment under beyond-design-basis ambient temperature, humidity, shock, vibration, and radiation conditions.
- b) A description of the testing and/or analyses that will be conducted to provide assurance that the equipment will perform reliably under the worst-case credible design basis loading at the location where the equipment will be mounted. Include a discussion of this seismic reliability demonstration as it applies to a) the level sensor mounted in the spent fuel pool area, and b) any control boxes, electronics, or read-out and re-transmitting devices that will be employed to convey the level information from the level sensor to the plant operators or emergency responders.

- c) A description of the specific method or combination of methods that will be used to confirm the reliability of the permanently installed equipment such that following a seismic event the instrument will maintain its required accuracy.

### **3.5 Independence**

The OIP states, in part, that

The primary instrument channel will be independent of the backup instrument channel. The primary instrument channel sensor will be located in the north east corner of the SFP, and the associated signal processor and remote display units will be located in the Auxiliary Building. The backup instrument channel sensor will be located in the north west corner of the SFP, and the associated signal processor and remote display units will be located in the Reactor Building. Cabling for the primary channel will be routed separately from cabling for the backup channel. The power sources for the primary channel and the backup channel will be from a different local 120V AC power source.

### **RAI-5**

Please provide the following:

- a) A description of how the two channels of the proposed level measurement system in each pool meet this requirement so that the potential for a common cause event to adversely affect both channels is minimized to the extent practicable.
- b) Further information describing the design and installation of each level measurement system, consisting of level sensor electronics, cabling, and readout devices. Please address how independence of these components of the primary and back-up channels is achieved through the application of independent power sources, physical and spatial separation, independence of signals sent to the location(s) of the readout devices, and the independence of the displays.

### **3.6 Power Supplies**

The OIP states, in part, that

Fermi 2 instrumentation channels will each be powered by a separate Fermi 2 local 120V AC power source. Each channel will be provided with external backup power using replaceable batteries with a minimum duration/capacity of 72 hours. Each channel will automatically switch over to backup power on loss of normal power. For extended battery operation, each channel will have an "On Demand" operation feature. Backup power will be provided by Phase 2 and/or Phase 3 generators within 72 hours. FLEX power will have sufficient capacity to sustain the level indication function indefinitely consistent with FLEX implementation guide NEI 12-06 (Reference 9.5).

In addition, a manual transfer switch and an auxiliary power disconnect switch will also be installed for each instrument channel so that a portable FLEX generator can be connected, providing robustness within 72 hours on loss of normal channel power.

#### **RAI-6**

Please provide the following:

- a) A description of the electrical AC power sources and capacities for the primary and backup channels.
- b) If the level measurement channels are to be powered through a battery system (either directly or through an Uninterruptible Power Supply (UPS)), please provide the design criteria that will be applied to size the battery in a manner that ensures, with margin, that the channel will be available to run reliably and continuously following the onset of the BDB event for the minimum duration needed, consistent with the plant mitigation strategies for BDB external events (Order EA-12-049).

#### **3.7 Accuracy**

The OIP states, in part, that

The primary and backup instrument channels will be designed to maintain their design accuracy following a power interruption or change in power source without recalibration. The accuracy of the instrument channels, including display accuracy, will be consistent with the guidelines of NRC JLD-ISG-2012-03 & NEI 12-02 (References 9.3 and 9.4) and determined during design phase.

#### **RAI-7**

Please provide the following:

- a) An estimate of the expected instrument channel accuracy performance (e.g., in % of span) under both a) normal SFP conditions (approximately Level 1 or higher) and b) at the beyond-design-basis conditions (i.e., radiation, temperature, humidity, post-seismic and post-shock conditions) that would be present if the SFP level were at the Level 2 and Level 3 datum points.
- b) A description of the methodology that will be used for determining the maximum allowed deviation from the instrument channel design accuracy that will be employed under normal operating conditions as an acceptance criterion for a calibration procedure to flag to operators and to technicians that the channel requires adjustment to within the normal condition design accuracy.

### **3.8 Testing**

The OIP states, in part, that

The primary and backup instrument channels design will provide for routine testing and calibration consistent with the guidelines of NRC JLD-ISG-2012-03 & NEI 12-02 (References 9.3 and 9.4) and permit in-situ testing. Details will be determined during the engineering and design phase

#### **RAI- 8**

Please provide the following:

- a) A description of the capability and provisions the proposed level sensing equipment will have to enable periodic testing and calibration, including how this capability enables the equipment to be tested in-situ.
- b) A description of how such testing and calibration will enable the conduct of regular channel checks of each independent channel against the other, and against any other permanently-installed SFP level instrumentation.
- c) A description of how calibration tests and functional checks will be performed and the frequency at which they will be conducted. Discuss how these surveillances will be incorporated into the plant surveillance program.
- d) A description of what preventative maintenance tasks are required to be performed during normal operation, and the planned maximum surveillance interval that is necessary to ensure that the channels are fully conditioned to accurately and reliably perform their functions when needed.

### **3.9 Display**

The OIP states, in part, that

The primary instrument channel remote display will be located in the control room. The backup instrument channel remote display will be located on the Reactor Building 2nd floor near the FLEX SFP refill station. The displays will provide continuous indication of SFP water level. In addition, the SFPI signal processors located in the Auxiliary Building and the Reactor Building will have display screens showing SFP level numerical read out with continuous indication. Trained personnel will be able to promptly monitor the SFP water level during various drain-down scenarios.

## **RAI-9**

Please provide the following:

- a) Since the backup display location is not in the main control room, please provide a description of the specific location for the backup display, including justification for prompt accessibility to displays including primary and alternate route evaluation, habitability at display location(s), continual resource availability for personnel responsible to promptly read displays, and provisions for communications with decision makers for the various SFP drain down scenarios and external events.
- b) The reasons justifying why the location selected will enable the information from these instruments to be considered "promptly accessible". Include consideration of various drain-down scenarios.

## **4.0 PROGRAM FEATURES**

### **4.2 Procedures**

The OIP states, in part, that

Procedures will be developed using guidelines and vendor instructions to address the maintenance, operation and abnormal response issues associated with the new SFPLI.

Procedures will also address the following situations consistent with the applicable NEI 12- 02 guidelines (Reference 9.4):

- If, at the time of an event or thereafter until the unit is returned to normal service, an instrument channel ceases to function, its function will be recovered within a period of time consistent with the emergency conditions that may apply at the time.
- If, at the time of an event or thereafter until the unit is returned to normal service, an instrument channel component needs to be replaced, a commercially available component may be used even if it does not meet all of the qualifications (section 6.3 above) in order to maintain the instrument channel functionality.
- Fermi 2 will have a strategy to ensure SFP water level addition is initiated at an appropriate time consistent with the implementation of NEI 12-06 (Reference 9.5).

## **RAI-10**

Please provide the following:

- a) A list of the operating (both normal and abnormal response) procedures, calibration/test procedures, maintenance procedures, and inspection procedures that will be developed for use of the SFP instrumentation in a manner that addresses the order requirements.
- b) A brief description of the specific technical objectives to be achieved within each procedure. If your plan incorporates the use of portable spent fuel level monitoring components, please include a description of the objectives to be achieved with regard to the storage location and provisions for installation of the portable components when needed.

### **4.3 Testing and Calibration**

The OIP states, in part, that

Processes will be established and maintained consistent with the applicable NEI 12-02 guidelines (Reference 9.4) for scheduling and implementing necessary testing and calibration of the primary and backup SFP level instrument channels to maintain the instrument channels at the design accuracy. The testing and calibration of the instrumentation will be consistent with vendor recommendations or other documented bases. Calibration will be specific to the mounted instrument and the monitor.

## **RAI-11**

Please provide the following:

- a) Further information describing the maintenance and testing program the licensee will establish and implement to ensure that regular testing and calibration is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. Include a description of your plans for ensuring that necessary channel checks, functional tests, periodic calibration, and maintenance will be conducted for the level measurement system and its supporting equipment.
- b) A description of how the guidance in NEI 12-02 Section 4.3 regarding compensatory actions for one or both non-functioning channels will be addressed.
- c) A description of the compensatory actions to be taken in the event that one of the instrument channels cannot be restored to functional status within 90 days.