

Joseph H. Plona
Site Vice President

6400 N. Dixie Highway, Newport, MI 48166
Tel: 734.586.5910 Fax: 734.586.4172

DTE Energy



10 CFR 50.55a

March 22, 2010
NRC-10-0023

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D C 20555-0001

- References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43
- 2) Detroit Edison's Letter to NRC, "Submittal of the Inservice Testing Program Relief Requests for Pumps and Valves – Third Ten-year Interval," NRC-09-0064, dated November 3, 2009

Subject: Response to Request for Additional Information Regarding Relief Requests PRR-004, PRR-005, PRR-007 and PRR-010 for the Inservice Testing Program Third Ten-Year Interval

In Reference 2, Detroit Edison submitted proposed Relief Requests for the third ten-year interval of the Inservice Testing (IST) Program for Pumps and Valves. In an e-mail from Mr. Mahesh Chawla to Mr. Alan Hassoun dated February 5, 2010, the NRC requested additional information for Relief Requests PRR-004, Residual Heat Removal Pumps Vibration Alert Limits; PRR-005, Smooth Running Pump Vibration Acceptance Criteria; PRR-007, Relief from Comprehensive Pump Testing for Centrifugal Pumps; and PRR-010, Relief from Comprehensive Pump Testing for Standby Liquid Control and Diesel Generator Fuel Oil Transfer Pumps. This was discussed in a subsequent telephone conversation between NRC staff and Detroit Edison personnel on February 23, 2010. The additional information requested by NRC staff is enclosed.

There are no new commitments included in this document.

Should you have any questions or require additional information, please contact Mr. Rodney W. Johnson of my staff at (734) 586-5076.

Sincerely,

A handwritten signature in cursive script that reads "Joseph H. Plona".

USNRC
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Enclosure

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 4, Region III
Regional Administrator, Region III
Supervisor, Electric Operators,
Michigan Public Service Commission

**Enclosure
To NRC-10-0023**

**Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43**

**Response to Request for Additional Information Regarding
Relief Requests PRR-004, PRR-005, PRR-007 and PRR-010
for the Inservice Testing Program Third Ten-Year Interval**

The following is Detroit Edison's response to each NRC request for additional information (RAI):

RAI-PRR-004-01

Relief Request PRR-004 provides vibration data (Figures 1 thru 6) on pages 27 thru 32 of 79. ISTB-3540 provides the physical location on a pump for vibration measurements. Relief Request Figure 17 shows the vibration monitoring points on the RHR motor/pump assembly, but these points do not show their physical location clearly. Please describe the physical location of points, EA1, EA2, EA3, EC1, and EC2 as required by ISTB-3540 for vibration measurements.

RESPONSE:

The physical location of the vibration measurement points requested are:

- EA1 - Radial 0 deg measurement on top portion of motor in line with upper bearing housing
- EA2 - Radial 90 deg measurement on top portion of motor in line with upper bearing housing
- EA3 - Axial at 0 deg measurement on top of motor upper end bell
- EC1 - Radial 0 deg measurement on top portion of pump casing
- EC2 - Radial 90 deg measurement on top portion of pump casing

RAI-PRR-004-02

Please confirm that vibration data shown on Figures 1 thru 6 are measured as peak and inch/second.

RESPONSE:

All vibration data shown on Figures 1 thru 6 in PRR-004 are the measurements of Peak Total Amplitude and all are in the units of inches per second. These measurements are in accordance with the requirements of ISTB-5123(d).

RAI-PRR-004-03

During the Fermi 2 Second 10-year IST interval, the licensee requested and NRC staff authorized relief to change the "Alert" range from 0.325 in/sec thru 0.7 in/sec to 0.4 in/sec thru 0.7 in/sec for EA1, EA2 and EA3 points. Whereas for the Fermi 2 third 10-year IST interval, the licensee is requesting relief to change the "Alert" range from 0.325 in/sec thru 0.7 in/sec to 0.415 in/sec thru 0.7 in/sec for all five points (EA1, EA2, EA3, EC1, and EC2). Please explain and justify that (1) the new increased vibration level (Alert Range from 0.4 in/sec to 0.415 in/sec) is not a sign of degradation of RHR pumps; and (2) the new Alert

Range requested for all the EA1, EA2, EA3, EC1, and EC2 points instead of EA1, EA2, and EA3 points is not a sign of degradation of the RHR pumps.

RESPONSE:

Relief Request PRR-004 provides RHR pump differential pressure trend graphs since 1990 (Figures 7 through 10 provided with the Relief Request). The figures indicate no evidence of pump degradation. These pumps do exhibit a very slight upward trend in Peak Total Amplitude vibration data; however, this upward trend is directly attributable to long term motor bearing degradation. The degradation rate is low and well within the existing timeframe for scheduled motor PMs. The slowly increasing nominal vibration readings combined with the flow-noise induced fluctuation problem described in the Relief Request increases the likelihood of exceeding the current Alert criteria. Detroit Edison is confident that we can accurately track the motor condition and that any change in the degradation rate will be evident. Increasing the Alert criteria to 0.415 provides the necessary margin to the true vibration levels such that flow-noise induced fluctuations will not unnecessarily trigger Alert criteria.

All of the vibration monitoring locations are subject to some degree of flow-noise induced fluctuation; however, it is highest at the EA1, EA2 and EA3 points. Including the EC1 and EC2 points in the Relief Request considers the slow increase in nominal values over the next ten years and provides for consistency in the procedural guidance.

RAI-PRR-004-04

During the Fermi 2 Second 10-year IST interval, the relief was only authorized for RHR pumps B and C. For the Fermi third 10-year IST interval, the relief is being requested for all the RHR pumps A, B, C, and D. Please justify that the increased vibration measurement requested for all RHR pumps A, B, C, and D instead of only B and C is a not a sign of pump degradation.

RESPONSE:

Vibration from flow-noise fluctuations and the 0.325 Alert level has resulted in early, costly and unnecessary RHR pump motor testing and replacement. For example, the testing frequency for RHR pump A motor was doubled in 2005 resulting in a replacement in 2007 as a corrective action for the several instances of flow-noise induced fluctuations above the 0.325 Alert level. However, pre and post motor replacement data indicates that minimal vibration improvement was achieved. RHR pump D has also resulted in many instances of triggering Alert level over the last several years. Relief Request PRR-004 seeks to provide reasonable criteria for all four pumps to avoid unnecessary testing and costly rework, while still assuring the ability to detect and monitor for degrading trends. Pump degradation is addressed in the response to RAI-PRR-004-03 above.

RAI-PRR-005-01

In Pump Relief Request PRR-005, the licensee is requesting relief for various pumps at Fermi 2. The ASME OM Code acceptance criteria of vibration for various pumps are different for various types of pumps, as specified in various Tables ISTB-5121-1, ISTB-5221-1, ISTB-5321-1, and ISTB-5321-2. The various pumps are (1) centrifugal pumps (except vertical line shaft centrifugal pumps); (2) vertical line shaft centrifugal pumps; (3) positive displacement pumps (except reciprocating); and (4) reciprocating positive displacement pumps. Therefore, please provide the following information related to each pump listed in PRR-005.

- (1) Type of pump;
- (2) Description of pump;
- (3) Pump Categories: Group A or B based on its function as defined in ISTB; and
- (4) Pump operating speed (rpm), because pump operating speed is a critical component in the vibration acceptance criteria.

RESPONSE:

The response to RAI-PRR-005-01 is combined with that for RAI-PRR-005-02 below.

RAI-PRR-005-02

Relief Request PRR-005 lists all the applicable pumps on page 47 thru 48 and provides measured reference vibration values at points EA1, EA2, EA3, EC1, and EC2. (1) Please describe the physical location of these points, and (2) Please confirm that pumps' vibration values provided are based on historical data.

RESPONSE:

The Table below provides responses to both RAI-PRR-005-01 and RAI-PRR-005-02:

| PIS No. | Pump Name | ISTB Category | Pump Type ⁽¹⁾ | Operating Speed | Vibration Points ⁽²⁾ |
|------------|--------------------------|---------------|--------------------------|-----------------|---------------------------------|
| E1151C001A | RHR Service Water Pump A | A | VLSC | 1800 | Fig. 1 |
| E1151C001B | RHR Service Water Pump B | A | VLSC | 1800 | Fig. 1 |
| E1151C001C | RHR Service Water Pump C | A | VLSC | 1800 | Fig. 1 |

| PIS No. | Pump Name | ISTB Category | Pump Type ⁽¹⁾ | Operating Speed | Vibration Points ⁽²⁾ |
|----------------|--|----------------------|---------------------------------|------------------------|--|
| E1151C001D | RHR Service Water Pump D | A | VLSC | 1800 | Fig. 1 |
| P4400C001A | Emergency Equip Cooling Water Div 1 Pump | B | CENT | 1800 | Fig. 2 |
| P4400C001B | Emergency Equip Cooling Water Div 2 Pump | B | CENT | 1800 | Fig. 2 |
| P4400C002A | EECW Makeup Div 1 Pump | B | CENT | 1800 | Fig. 2 |
| P4400C002B | EECW Makeup Div 2 Pump | B | CENT | 1800 | Fig. 2 |
| P4500C002A | Emergency Equip Service Water South Pump | B | VLSC | 1800 | Fig. 1 |
| P4500C002B | Emergency Equip Service Water North Pump | B | VLSC | 1800 | Fig. 1 |
| R3000C001 | EDG 11 Diesel Fuel Oil Xfer Pump A | B | PD | 1200 | Fig. 2 |
| R3000C002 | EDG 12 Diesel Fuel Oil Xfer Pump A | B | PD | 1200 | Fig. 2 |
| R3000C003 | EDG 11 Diesel Fuel Oil Xfer Pump B | B | PD | 1200 | Fig. 2 |
| R3000C004 | EDG 12 Diesel Fuel Oil Xfer Pump B | B | PD | 1200 | Fig. 2 |
| R3000C009 | EDG 13 Diesel Fuel Oil Xfer Pump A | B | PD | 1200 | Fig. 2 |
| R3000C010 | EDG 14 Diesel Fuel Oil Xfer Pump A | B | PD | 1200 | Fig. 2 |
| R3000C011 | EDG 13 Diesel Fuel Oil Xfer Pump B | B | PD | 1200 | Fig. 2 |
| R3000C012 | EDG 14 Diesel Fuel Oil Xfer Pump B | B | PD | 1200 | Fig. 2 |
| R3001C005 | EDG 11 DG Service Water Pump | B | VLSC | 1800 | Fig. 1 |

| PIS No. | Pump Name | ISTB Category | Pump Type ⁽¹⁾ | Operating Speed | Vibration Points ⁽²⁾ |
|-----------|------------------------------|---------------|--------------------------|-----------------|---------------------------------|
| R3001C006 | EDG 12 DG Service Water Pump | B | VLSC | 1800 | Fig. 1 |
| R3001C007 | EDG 13 DG Service Water Pump | B | VLSC | 1800 | Fig. 1 |
| R3001C008 | EDG 14 DG Service Water Pump | B | VLSC | 1800 | Fig. 1 |

Pump type codes:

- (1) (CENT) Centrifugal pump (except vertical line shaft centrifugal pump)
- (VLSC) Vertical line shaft centrifugal pump
- (PD) Positive displacement pump (except reciprocating)

- (2) Vibration monitoring point locations are shown on Figures 1 and 2 below.

Figure 1 - VLSC

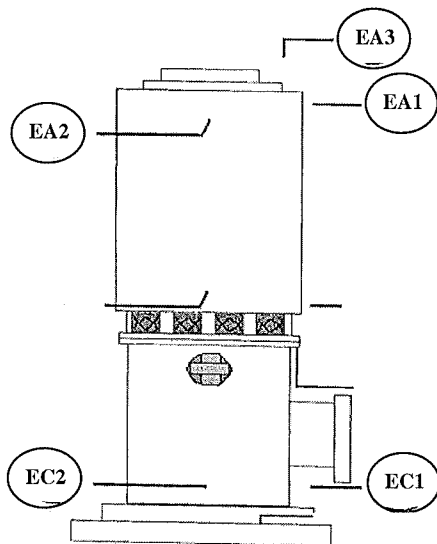
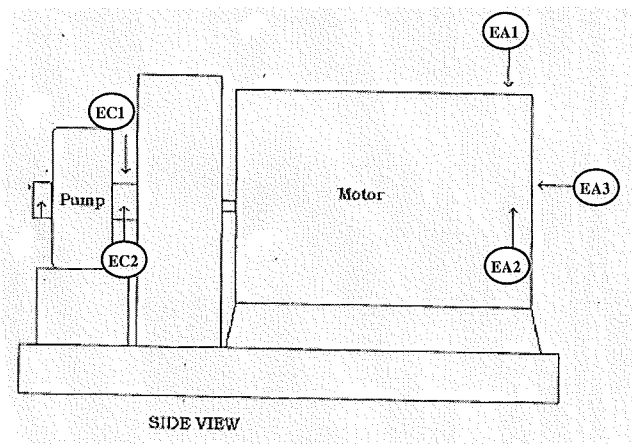


Figure 2 - Centrifugal horizontal



The measured reference vibration values provided in the Relief Request are the IST reference values for the particular monitoring point. These reference values were established during baseline testing at reference flow when the pump was known to be operating acceptably.

RAI-PRR-005-03

Relief Request PRR-005 establishes a vibration reference value (Vr) of 0.04 in/sec (Fermi selected value) for smooth running pumps. The relief request lists all of the pumps with Vr above and below values of 0.04 in/sec. For a smooth-running pump, the measured vibration values at all points (EA1, EA2, EA3, EC1, and EC2) must be less or equal to established reference value Vr. Therefore, please explain how all of the pumps included in PRR-05 are defined as smooth-running pumps since many have vibration values greater than 0.04 in/sec.

RESPONSE:

There is no definition of smooth-running pump provided in ASME OM 2004, NUREG-1482 Rev. 1 or Generic Letter 89-04. Relief Request PRR-005 defines smooth-running pumps as those having one or more vibration reference values at or below 0.04 in/sec, which is slightly more conservative than the three approved relief requests cited in the Precedents section of the Relief Request. The Relief Request proposes the use of a minimum reference value of 0.04 only for those points and pumps identified in PRR-005 which are below 0.04.

RAI-PRR-005-04

Please confirm that the Preventive and Predictive Maintenance Program for the specified pumps at Fermi 2 includes such items as bearing temperature trending, oil sampling and analysis, and thermographic analysis including with enhanced vibration monitoring.

RESPONSE:

Preventive and Predictive Maintenance Program elements for the specified pumps are shown in the following table:

| PIS No. | Pump Name | Pump Refurb/Repl PM Event | Enhanced Vibration Monitoring | Bearing Re-lubrication | Thermographic Analysis | Oil Sampling & Analysis |
|------------|--------------------------|---------------------------|-------------------------------|------------------------|------------------------|-------------------------|
| E1151C001A | RHR Service Water Pump A | X | X | X | | X |
| E1151C001B | RHR Service Water Pump B | X | X | X | | X |
| E1151C001C | RHR Service Water Pump C | X | X | X | | X |
| E1151C001D | RHR Service Water Pump D | X | X | X | | X |

| PIS No. | Pump Name | Pump Refurb/Repl PM Event | Enhanced Vibration Monitoring | Bearing Re-lubrication | Thermographic Analysis | Oil Sampling & Analysis |
|------------|--|---------------------------|-------------------------------|------------------------|------------------------|-------------------------|
| P4400C001A | Emergency Equip Cooling Water Div 1 Pump | | X | X | | |
| P4400C001B | Emergency Equip Cooling Water Div 2 Pump | | X | X | | |
| P4400C002A | EECW Makeup Div 1 Pump | | X | X | | |
| P4400C002B | EECW Makeup Div 2 Pump | | X | X | | |
| P4500C002A | Emergency Equip Service Water South Pump | X | X | X | | X |
| P4500C002B | Emergency Equip Service Water North Pump | X | X | X | | X |
| R3000C001 | EDG 11 Diesel Fuel Oil Xfer Pump A | | X | X | | |
| R3000C002 | EDG 12 Diesel Fuel Oil Xfer Pump A | | X | X | | |
| R3000C003 | EDG 11 Diesel Fuel Oil Xfer Pump B | | X | X | | |
| R3000C004 | EDG 12 Diesel Fuel Oil Xfer Pump B | | X | X | | |
| R3000C009 | EDG 13 Diesel Fuel Oil Xfer Pump A | | X | X | | |
| R3000C010 | EDG 14 Diesel Fuel Oil Xfer Pump A | | X | X | | |
| R3000C011 | EDG 13 Diesel Fuel Oil Xfer Pump B | | X | X | | |
| R3000C012 | EDG 14 Diesel Fuel Oil Xfer Pump B | | X | X | | |
| R3001C005 | EDG 11 DG Service Water Pump | X | X | X | X | |
| R3001C006 | EDG 12 DG Service Water Pump | X | X | X | X | |
| R3001C007 | EDG 13 DG Service Water Pump | X | X | X | X | |
| R3001C008 | EDG 14 DG Service Water Pump | X | X | X | X | |

RAI-PRR-007-01

Please provide the current classification (Group A or Group B) for each of the pumps associated with this relief request.

RESPONSE:

The table below indicates the current pump classifications in accordance with ISTB-2000.

| Pump No. | Description | ISTB-2000 classification |
|-----------------|--|---------------------------------|
| E1102C002A | RHR Pump A | A* |
| E1102C002B | RHR Pump B | A* |
| E1102C002C | RHR Pump C | A* |
| E1102C002D | RHR Pump D | A* |
| E1151C001A | RHR Service Water Pump A | A* |
| E1151C001B | RHR Service Water Pump B | A* |
| E1151C001C | RHR Service Water Pump C | A* |
| E1151C001D | RHR Service Water Pump D | A* |
| E4101C001 | High Pressure Injection Pump | B |
| P4400C001A | Emergency Equip Cooling Water Div 1 Pump | B |
| P4400C001B | Emergency Equip Cooling Water Div 2 Pump | B |
| P4500C002A | Emergency Equip Service Water South Pump | B |
| P4500C002B | Emergency Equip Service Water North Pump | B |
| R3001C005 | EDG 11 DG Service Water Pump | B |
| R3001C006 | EDG 12 DG Service Water Pump | B |
| R3001C007 | EDG 13 DG Service Water Pump | B |
| R3001C008 | EDG 14 DG Service Water Pump | B |
| T4100C040 | South CCHVAC Chilled Water Pump | A |
| T4100C041 | North CCHVAC Chilled Water Pump | A |

A* - These pumps could be classified as Group B based on very low run-hours per month, however since they are run periodically for various non-test system operations they were conservatively classified as Group A.

RAI-PRR-007-02

In order to use the modified Group A test for pumps currently classified as Group B, the Group B pumps must be re-classified as Group A pumps. If any of the pumps associated with this relief request are currently classified as Group B, please confirm that you reclassifying them as Group A pumps.

RESPONSE:

Detroit Edison has re-classified all of the pumps associated with Relief Request PRR-007 that are currently classified Group B pumps as Group A pumps.

RAI-PRR-007-03

It is not clear what flow rate is being used for the design flow rate stated in ISTB-3300(e)(1) for the pumps. If the design accident flow rate is being used, then some of the pump quarterly test flow rates are outside of the +/- 20% band allowed in ISTB-3300-(e)(1). Please provide the design flow rates for each pump.

RESPONSE:

Column 3 in the table provided in Relief Request PRR-007 lists the design accident flow rate which is synonymous with design flow rate. Column 4 in the table lists Best Efficiency Point (BEP) values from the pump curve for each pump. The reference flow rates shown as quarterly test flow rates in column 2 in the table are at or above 80% of design flow and are as close to the BEP points as possible to ensure data may be trended.

RAI-PRR-007-04

The table in Section 8 of the relief request has indications for footnotes 1, 2, and 4. These footnotes do not appear in the relief request package. Please provide these footnotes.

RESPONSE:

The information was provided on page 56 of 79 of Reference 2. The footnotes are as follows:

- 1 - Curve shows linear Q-P relationship from 4500 gpm - 8000 gpm (reference VMR4-3.2)
- 2 - Curve shows linear Q-P relationship from 1200 gpm - 2600 gpm (references C1-6858 and C1-6859)
- 3 - Curve shows linear Q-P relationship from 200 gpm - 420 gpm (reference VMB9-19)
- 4 - Notes for each system substantiating Design Accident Flow Rates as follows:

RAI-PRR-007-05

Please verify that vibration monitoring will be performed as part of the quarterly testing.

RESPONSE:

All quarterly testing at Fermi 2 includes vibration monitoring. As stated in Relief Request PRR-007, Detroit Edison will continue to perform vibration monitoring as part of normal quarterly testing.

RAI-PRR-010-01

Please confirm that the pumps will be re-classified as Group A pumps.

RESPONSE:

Detroit Edison has re-classified all of the pumps associated with Relief Request PRR-010 that are currently classified Group B pumps as Group A pumps.

RAI-PRR-010-02

Please provide the equipment number for each SLC pump and each Fuel Oil Transfer pump.

RESPONSE:

The requested information is provided below:

C4103C001A - Standby Liquid Control pump A
C4103C001B - Standby Liquid Control pump B

R3000C001 - EDG 11 Diesel Fuel Oil Transfer Pump A
R3000C002 - EDG 12 Diesel Fuel Oil Transfer Pump A
R3000C003 - EDG 11 Diesel Fuel Oil Transfer Pump B
R3000C004 - EDG 12 Diesel Fuel Oil Transfer Pump B
R3000C009 - EDG 13 Diesel Fuel Oil Transfer Pump A
R3000C010 - EDG 14 Diesel Fuel Oil Transfer Pump A
R3000C011 - EDG 13 Diesel Fuel Oil Transfer Pump B
R3000C012 - EDG 14 Diesel Fuel Oil Transfer Pump B