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DTE Energy

10 CFR 50.55a

February 20, 2012
NRC-12-0015

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 [ADAMS Accession No. ML093140302]

3) NRC Letter to Detroit Edison, "Fermi 2 – Evaluation of Relief Request Nos. PRR-002, PRR-003, and PRR-006 for the Third 10-Year Interval Inservice Program (TAC Nos. ME2548, ...)" dated July 6, 2010 [ADAMS Accession No. ML101670351]

Subject: Submittal of Revised Relief Request No. PRR-002 for the Inservice Testing Program Third 10-Year Interval

The purpose of this letter is to request NRC approval of end date extension for Relief Request PRR-002 granted in Reference 3.

In Reference 2, Detroit Edison submitted Relief Requests for the third Inservice Testing (IST) Program 10-year interval at Fermi 2 for NRC review and approval. The third 10-year interval for the IST program began on February 17, 2010. Relief Request PRR-002 requested NRC approval of relief from certain requirements of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) regarding testing of the Core Spray system pumps.

Specifically, PRR-002 requested approval of performing quarterly testing of both pumps in each division simultaneously in parallel, utilizing a flow reference curve instead of a single fixed reference value for flow acceptance criterion, and delaying the performance of the first biennial Comprehensive Pump Test (CPT) for these pumps.

Reference 2 requested NRC approval of relief from individual pump testing and the delay of the performance of the first CPT until February 17, 2013. Relief from the use of a single fixed reference value was requested until February 17, 2014 in order to allow for additional time to assess system flow throttling capability under single pump testing. In Reference 3, NRC granted the requested relief for the requested time periods.

As provided in Reference 2, the relief in PRR-002 was based on a limitation in the design of the Core Spray system testing capability at Fermi 2. The current design of the test line for each division will permit full flow testing of two pumps simultaneously as required by Technical Specification Surveillance Requirement (SR) 3.5.1.8; however, it is impractical to test the pumps individually, as required by the ASME OM Code, since the test lines and test valves are sized for two pump testing. Reference 2 also indicated that Detroit Edison plans to install a modification in which several reducing orifices will be installed in each test line. Such modification would allow for individual pump testing as well as enhanced throttling capability allowing for use of single fixed reference value in the test acceptance criteria. The modification was planned to be installed during the fifteenth refueling outage (RF15) scheduled for the spring of 2012.

Although this proposed modification would enable single Core Spray pump testing in accordance with the ASME OM Code requirement, full flow testing of two pumps simultaneously as required by SR 3.5.1.8 would no longer be feasible since the reducing orifices would reduce flow limits in the test lines such that the required two-pump flow may not be achieved. Detroit Edison had planned to submit a License Amendment Request (LAR) to replace the Core Spray subsystem testing requirement in SR 3.5.1.8 with an individual pump test requirement. Subsequently, a decision was made to revise the scope of the modification. The revised modification scope precludes the need for a LAR by maintaining the current capability of performing a full flow divisional Core Spray pump testing (two pumps in parallel) while allowing the performance of individual pump tests.

The selected modification would replace the existing throttle valves in the test lines with new style "drag" operated valves that incorporate multi-stage pressure reducing elements. However, due to the lead time involved in ordering these valves and the required revision to the dynamic analysis for the suppression pool-attached piping, installation can no longer be completed by RF15; instead, the modification is now planned to be completed by the seventeenth refueling outage (RF17) scheduled for the spring of 2015.

Based on the above, Detroit Edison is requesting that the relief from individual pump testing and the delay of the performance of the first CPT be extended from February 17, 2013 until the startup from RF17 planned for the spring of 2015 (current schedule is April 15, 2015), and relief from the use of a single flow reference value be extended from February 17, 2014 until one year after startup from RF17 to allow for one additional year to assess system flow throttling capability following completion of the plant modification.

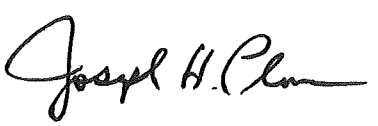
The attached revised Relief Request reflects these date extensions. The only other change from the original Relief Request is that relief is now being requested under 10CFR50.55a(f)(5)(iii) as an impractical Code requirement instead of the original request that was based on hardship and proposal of an alternative that provides acceptable level of quality and safety under 10CFR50.55a(a)(3)(i) and (ii).

Detroit Edison requests NRC approval of this revision to Relief Request PRR-002 by February 17, 2013, the end date of the currently-approved relief.

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,



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-12-0015

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

Revised IST Relief Request PRR-002
Relief to Allow Parallel Testing of Core Spray Pumps

10 CFR 50.55a Relief Request PRR-002, Revision 1

Relief to Allow Parallel Testing of Core Spray Pumps

Proposed Alternatives In Accordance with 10 CFR 50.55a(f)(5)(iii)

Inservice Testing Impracticality

1. ASME Code Component(s) Affected

Pump	Name	Code Class	ISI Drawing
E2101C001A	Core Spray Pump A	2	6M721-5814
E2101C001B	Core Spray Pump B	2	6M721-5814
E2101C001C	Core Spray Pump C	2	6M721-5814
E2101C001D	Core Spray Pump D	2	6M721-5814

2. Applicable Code Edition and Addenda

ASME OM Code 2004 Edition, No Addenda

3. Applicable Code Requirement

Section ISTB-3400 Frequency of Inservice Tests

Section ISTB-5121 Group A Test Procedure

Section ISTB-5123 Comprehensive Test Procedure

4. Impracticality of Compliance

The Core Spray (CS) System protects the reactor core in the event of a large break LOCA if the Feedwater, CRD, RCIC, HPCI, or RHR Systems are unable to maintain RPV water level. Each pump is capable of providing only 50% of the desired system flow. If one pump is determined to be inoperable, then the Division is declared inoperable. The current design of the system test line will only accommodate the full flow, two-pump testing required by Technical Specifications Surveillance Test requirements.

With the current configuration of the Core Spray system test lines, it is impractical to test the pumps of a given division individually, as required by the ASME OM Code, since the test line and test valves are sized for two-pump testing . The test line flow control valves are throttled approximately 13% open (Division 1) and 9% open (Division 2) to control two pump test flow (Pumps A and C are in Division 1, and Pumps B and D are in Division 2). The existing flow control valves are not capable of throttling low enough (less than 5% open) to accommodate single pump operation without experiencing unstable operation, cavitations, and severe vibration.

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Additionally, due to the current configuration of the test lines and valves, it is impractical to throttle to a fixed reference value during two pump testing.

5. Burden Caused by Compliance

Significant damage to the test line valves occurred during attempts to throttle for single pump operation during plant initial startup testing. Therefore, attempting to perform the Code-required single pump testing with the current plant configuration could potentially damage plant equipment.

Regarding the Code requirement to test to a single fixed reference flow value, the flow control valves are currently opened to a point in their travel in which small changes in valve position result in large changes in flow rate. Therefore, this presents an unnecessary challenge to both the equipment and the plant operators to attempt to return to a specific fixed reference value at each pump test.

6. Proposed Alternative and Basis for Change

Proposed Alternative

- Pursuant to 10 CFR 50.55a, "Codes and Standards", paragraph (a)(3)(i), relief is requested from ASME OM Code ISTB to perform quarterly testing of both Core Spray Pumps in each Division in parallel. That is, both pumps are to be run together and treated as a single component. Relief has been previously granted to perform parallel pump testing in the first two ten year intervals. This relief is for an interim period (through the end of Refueling Outage 17) until system modifications can be completed.

- Pursuant to 10 CFR 50.55a, "Codes and Standards", paragraph (a)(3)(i), relief from the requirement of ASME OM Code ISTB-5121 is requested to utilize a flow reference curve, rather than a single fixed reference value for flow. This relief is for an interim period until plant modification is completed and additional time is allowed to assess system flow throttling capability following completion of the modification.

- Pursuant to 10 CFR 50.55a, "Codes and Standards", paragraph (a)(3)(ii), one-time relief is requested from the requirement of ASME OM Code ISTB-3400 to perform a Comprehensive Pump Test (CPT) for the Core Spray Pumps biennially. Specifically, it is requested that the due date for the performance of the first CPT on these pumps be extended through the end of Fermi 2 Refueling Outage 17, which is currently scheduled in the spring of 2015.

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Testing of both Core Spray Pumps in a Division in parallel will continue to be performed quarterly until the test line modifications are completed. Both pumps are to be run together and treated as a single component. This implies that differential pressure and developed head reference values represent a combined pump flow characteristic. Since both pumps are run in parallel, acceptance criteria for differential pressure have been established which are more restrictive than the criteria given in Table ISTB-5121-1 for centrifugal pumps. The following additional limitations on the acceptance criteria are currently imposed and will be maintained for the duration of the relief request, to assure that any degradation in performance is detected and corrected in a timely manner:

1. In order to enhance the ability to detect the equivalent of one pump's degradation the following acceptance criteria will be utilized, which are more stringent than ISTB limits:
   Acceptable DP Range - 0.94 to 1.06 ($\Delta P/\Delta P_r$)
   Alert Range - 0.92 to < 0.94
   Required Action Range - Low < 0.92 and High > 1.06
   Note: This represents the least restrictive criteria which will be used.

2. If the hydraulic performance of a CS division enters the Alert Range Low for any reason other than instruments out of calibration, both pumps in that division will be individually evaluated (e.g. perform motor diagnostics, evaluate vibration data, etc.) in order to determine which pump(s) in the Division has degraded. The testing frequency will be doubled until the cause of the deviation is determined and the condition is corrected.

3. If the hydraulic performance of a CS division enters the Required Action Low ranges for any reason the CS division will be declared inoperable. Appropriate inspections, tests, and repairs will be completed prior to returning the Division to service.

4. New reference curves will be established or the current curves verified after either pump in the division has been repaired, replaced, or serviced.

5. Performance trending of the Core Spray pumps will include normalization of the DP data to a fixed reference value. This eliminates the scatter within the DP data caused by test flow values above or below a nominal fixed reference flow. Figures 1 and 2 provide examples of this normalized trending. (Note: Revision of the pump curve Tables under this provision does not require NRC review).

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Relief to Allow Parallel Testing of Core Spray Pumps

Basis for Change

The basis of this relief request is impracticality of performing ASME OM Code required testing with the current Core Spray test line configuration.

Significant system modifications are being pursued to enable testing of the Core Spray Pumps individually. These system modifications will be costly, both in terms of resources and radiation exposures during installation. It is the intent of this relief request to allow for the continued performance of parallel pump testing until such time as the system is capable of individual pump testing. The current schedule for the modifications provides for both divisions of Core Spray to be completed by the 17th refueling outage in 2015.

The quarterly testing of the Core Spray pumps is done at full flow conditions. Assuming equal performance, each pump is operating at a capacity of between 3,300 gpm and 3,600 gpm and discharge pressure greater than 270 psig during the tests. The CPT Design Accident Flowrate as described in ISTB-3300 for the Core Spray pumps is 3,175 gpm. The linear region of the pump curves is from approximately 1800 gpm to 3600 gpm, with a Best Efficiency Point (BEP) of 3100 gpm. This verifies that the historic quarterly testing has been performed at levels which would reveal any notable pump degradation.

The first Comprehensive Pump Test on each of the Core Spray pumps will be performed before the startup from the 17th refueling outage scheduled for the spring of 2015.

A reference curve will be used as a basis for variable reference points. The use of pump reference curves is necessitated by the fact that the test line and flow control valves are oversized for single pump testing. The flow control valves are opened to a point in the span of travel in which small changes in valve position result in relatively large changes in flow rate. Thus, it presents an unnecessary challenge to both the equipment and the Plant Operators to attempt to return to a fixed reference value. The combined reference pump curves were developed using four to seven data points over a 600 gpm range of flows (approximately 4% of the operating range). The data was then fit to a differential pressure - flow curve using linear regression, which is an appropriate method considering that the pump curve is essentially linear over this very small range.

A review of pre-service test data and inservice test results obtained prior to establishing the reference curves confirmed that the pumps were in good operating condition when the curves were developed. A review of the test results obtained using the reference curves shows that the data is consistent and trendable. Additionally, the individual pump vibration data is extremely stable and indicates no signs of

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degradation on any of the Core Spray Pumps. If invalid data were used to generate the pump reference curves, or if the curve fit was poor, the test results would be erratic, and such is not the case in over 20 years of testing experience with these pumps, thus validating data credibility.

A review of the historic test results shows that the data is consistent and trendable. The Core Spray pumps are standby system pumps and accumulate very few hours of run time per year. The individual pump vibration data indicates no signs of degradation on any of the Core Spray Pumps. Degradation is unlikely for such pumps constructed to high quality standards, with periodic maintenance / lubrication activities and very low lifetime run hours. Charts showing historic performance trends for each division pair of pumps are attached to this relief request. Those charts represent historic DP values normalized to a flow rate of 6600 gpm.

The use of a reference curve for Core Spray pump testing will continue until the planned modifications to the test line are completed. These modifications will provide enhanced throttling capability and allow for standard pump testing with a fixed reference value. Relief to use pump reference curves is requested for the first 4 years of the Third Ten Year Interval, which is one year beyond the anticipated date of completion of the modifications. The flow throttling ability will be assessed and determination made regarding the continued need for reference curves within the year following the modifications. If necessary, a revised relief request will be submitted at that time to allow for continued use of reference curves.

The following information will address elements of NUREG-1482 Revision 1, section 5.2, and justify the use of pump reference curves:

1. The Core Spray pumps were known to be operating acceptably when the curve basis test data was recorded. The Division 1 pump(s), A and C, reference curve was revised based on data taken in November, 1993. The Division 2 pump(s), B and D, reference curve was developed based on pre-service data taken in December, 1984 and has not been changed.

2. Flow and discharge pressure gauges meet the range and accuracy requirements of the Code.

3. The Division 1 curve is constructed with 7 points and the Division 2 curve with 4 points. The application of the curve, however, is limited to a 600 gpm range. This range is well within the accuracy limits of the respective linear equations as demonstrated by r values of > 0.99 in both cases.

4. The combined pump curve for each division is beyond the flat portion of that curve for all data.

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5. The acceptance criteria is above the Technical Specifications minimum flow requirements and minimum discharge pressure required for each Core Spray division based on both pumps running.

6. Vibration levels for the four Core Spray Pumps have remained constant over many years of testing within the applicable flow ranges.

7. There have been no major repairs or replacements completed on the Core Spray pumps since pre-service testing in 1984.

7. Additional Information:

- Group A type testing will be performed at nominally full flow conditions of greater than or equal to 6,600 gallons per minute (gpm) per division.

- The monitoring, analysis, and evaluation requirements of ISTB-6000 will apply using the modified hydraulic acceptance criteria above (Performance trending of the core spray pumps will include normalization of the ΔP data to a fixed reference value to eliminate scatter within the ΔP data caused by test flow values above or below a nominal fixed reference flow to provide the ability to detect degradation).

- When a reference curve may have been affected by repair, replacement, or routine servicing of a pump, a new reference curve will be determined, or an existing reference curve will be reconfirmed.

- The vibration acceptance criteria of Table ISTB-5121-1 are applicable and will be applied to each pump individually. A single Alert criterion and a single Required Action criterion will be used over the range of the pump curve. Individual vibration reference values for all four pumps were taken during baseline testing in 1984. These reference values range from a low of 0.131 inch per second to a high of 0.315 inch per second and were relatively consistent over the test flow range. As a result, the Code maximum limits of 0.325 inch per second. Alert and 0.700 inch per second Required Action will be used for all monitoring points on all four pumps.

- The second CPT will be performed 2 years following the first CPT in accordance with ISTB-3400-1 test frequency requirements.

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8. Duration of Proposed Alternative

This proposed alternative will be utilized until startup from the 17th refueling outage scheduled for the spring in 2015. For the specific relief to use pump reference curves, the proposed alternative will be utilized for one year after startup from the 17th refueling outage to allow additional time to assess system flow throttling capability following completion of the plant modification.

9. Precedents

- Wolf Creek obtained relief (Request 3PR-04) to extend the interval of Comprehensive Pump Testing to allow for planned system modifications. Reference Accession No. ML061930407 ; SER dated 8/4/2006

- Fermi 2 previously obtained relief (Request PRR-02) for parallel pump testing and use of pump reference curves. Reference Accession No. ML003684536 ; SER dated 2/17/2000

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Relief to Allow Parallel Testing of Core Spray Pumps

DIVISION 1 CORE SPRAY PUMPS PERFORMANCE CURVE AND ACCEPTANCE CRITERIA TABLE FOR PROCEDURE 24.203.02

$$\Delta P_r = 456.8592530 - 0.027306 Q_r$$

where: ΔP_r = Reference Differential Pressure, psi

Q_r = Reference Flow, gpm

Acceptable Range: $0.94\Delta P_r \leq \Delta P \leq 1.06\Delta P_r$

Alert Range Low: $0.92\Delta P_r \leq \Delta P < 0.94\Delta P_r$

Required Action Range: Low $\Delta P < 0.92\Delta P_r$
High $\Delta P > 1.06\Delta P_r$

Table 1 Core Spray Loop A E2101C001A&C

Flow gpm	Required Action Range Low psi	Alert Range Low psi	Acceptable Range ΔP psi	Required Action Range High psi
6600	<254.6	254.6 to <260.1	**260.1 to 290.4**	>290.4
6650	<253.3	253.3 to <258.8	**258.8 to 289.0**	>289.0
6700	<252.0	252.0 to <257.5	**257.5 to 287.6**	>287.6
6750	<250.8	250.8 to <256.2	**256.2 to 286.1**	>286.1
6800	<249.5	249.5 to <255.0	**255.0 to 284.7**	>284.7
6850	<248.3	248.3 to <253.7	**253.7 to 283.3**	>283.3
6900	<247.0	247.0 to <252.4	**252.4 to 281.8**	>281.8
6950	<245.8	245.8 to <251.1	**251.1 to 280.4**	>280.4
7000	<244.5	244.5 to <249.8	**249.8 to 279.0**	>279.0
7050	<243.3	243.3 to <248.5	**248.5 to 277.5**	>277.5
7100	<242.0	242.0 to <247.3	**247.3 to 276.1**	>276.1
7150	<240.7	240.7 to <246.0	**246.0 to 274.7**	>274.7
7200	<239.5	239.5 to <244.7	**244.7 to 273.2**	>273.2

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Relief to Allow Parallel Testing of Core Spray Pumps

DIVISION 2 CORE SPRAY PUMPS PERFORMANCE CURVE AND ACCEPTANCE CRITERIA TABLE FOR PROCEDURE 24.203.03

$$\Delta P_r = 444.50000 - 0.02500 Q_r$$

where: ΔP_r = Reference Differential Pressure, psi

Q_r = Reference Flow, gpm

Acceptable Range: $0.94\Delta P_r \le \Delta P \le 1.06\Delta P_r$

Alert Range Low: $0.92\Delta P_r \le \Delta P < 0.94\Delta P_r$

Required Action Range: Low $\Delta P < 0.92\Delta P_r$
High $\Delta P > 1.06\Delta P_r$

Table 1 Core Spray Loop B E2101C001B&D

Flow gpm	Required Action Range Low psi	Alert Range Low psi	Acceptable Range ΔP psi	Required Action Range High psi
6600	<257.1	257.1 to <262.8	**262.8 to 296.1**	>296.1
6650	<256.0	256.0 to <261.6	**261.6 to 294.8**	>294.8
6700	<254.8	254.8 to <260.4	**260.4 to 293.5**	>293.5
6750	<253.7	253.7 to <259.3	**259.3 to 292.2**	>292.2
6800	<252.6	252.6 to <258.1	**258.1 to 290.9**	>290.9
6850	<251.4	251.4 to <256.9	**256.9 to 289.6**	>289.6
6900	<250.3	250.3 to <255.7	**255.7 to 288.3**	>288.3
6950	<249.1	249.1 to <254.6	**254.6 to 286.9**	>286.9
7000	<247.9	247.9 to <253.4	**253.4 to 285.5**	>285.5
7050	<246.8	246.8 to <252.2	**252.2 to 284.2**	>284.2
7100	<245.6	245.6 to <251.0	**251.0 to 282.9**	>282.9
7150	<244.5	244.5 to <249.9	**249.9 to 281.6**	>281.6
7200	<243.4	243.4 to <248.7	**248.7 to 280.3**	>280.3

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Relief to Allow Parallel Testing of Core Spray Pumps

FIGURE 1

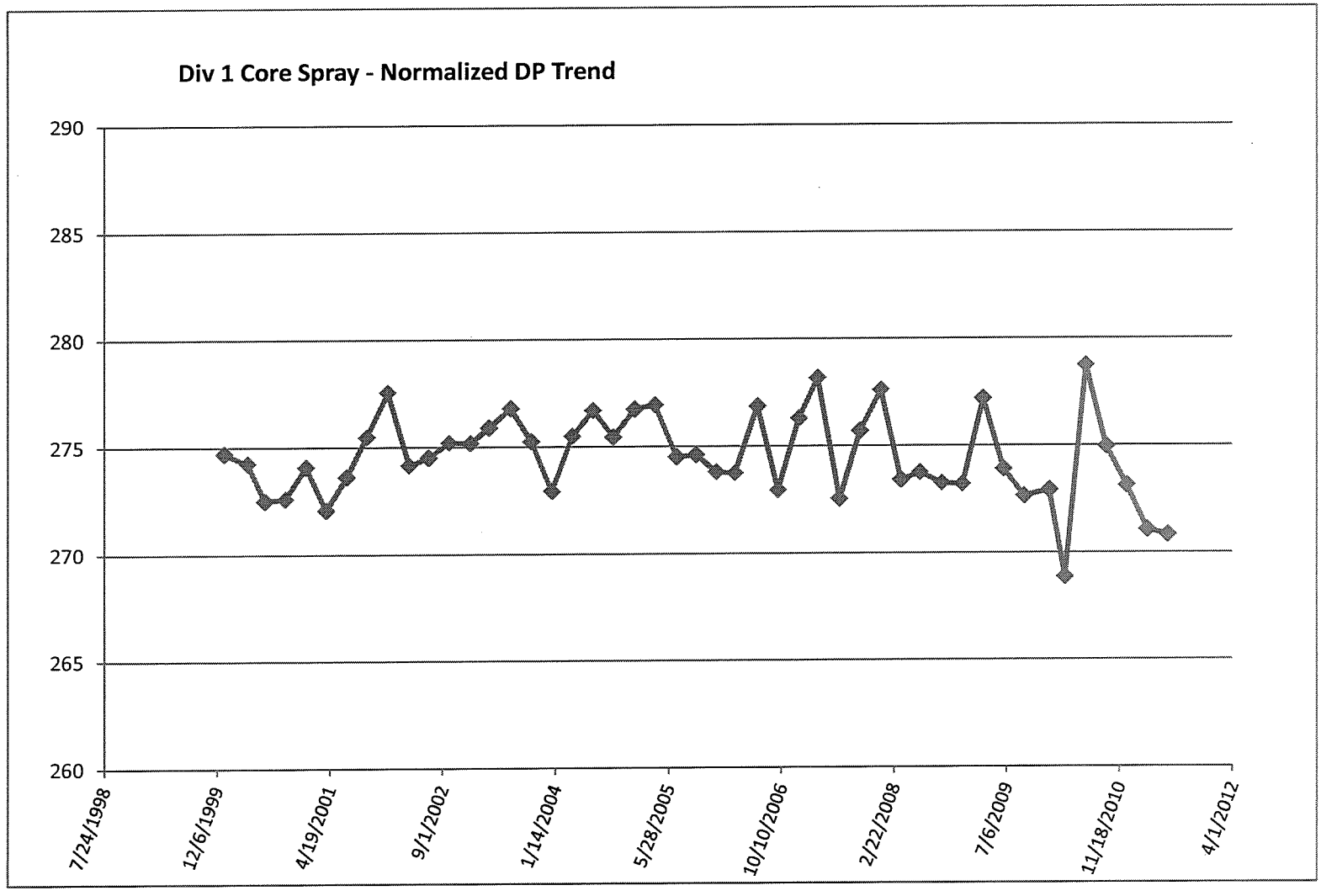

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FIGURE 2