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SUBJECT: Provides reply to NRC 931022 info request for BFN Units 1,2 & 3 pumps & valves testing program described in util 920831 ltr. Revised relief requests PV-25, PV-2 & PV-33 encl. Relief requests PV-4 & PV-5 withdrawn.

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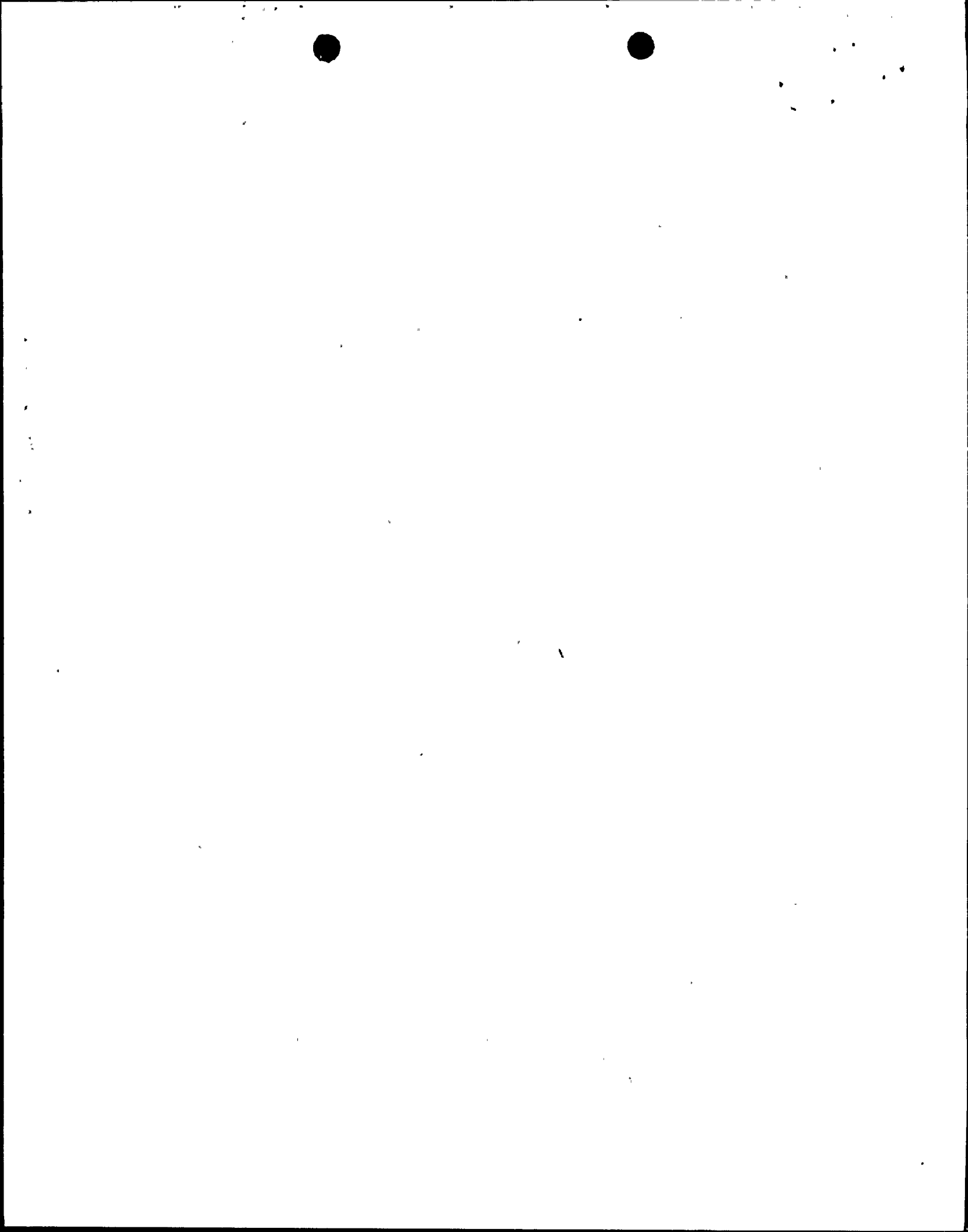
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Gentlemen:

In the Matter Of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

**BROWNS FERRY NUCLEAR PLANT (BFN) - TVA'S AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI PUMPS AND VALVES TESTING (P&VT) PROGRAM CLARIFICATIONS AND CHANGES FOR BFN UNITS 1, 2, AND 3**

- References:
1. Letter from NRC to TVA, dated October 22, 1993, "Safety Evaluation and Request for Program Revision Regarding the Inservice Testing Program for Pumps and Valves at the Browns Ferry Nuclear Plant, Units 1, 2, and 3 (TAC NOS. M84494, M84495, and M84496)"
  2. Letter from TVA to NRC, dated August 31, 1992, "BFN Units 1, 2, and 3 American Society of Mechanical Engineers (ASME) Section XI Inservice Testing Pumps and Valves Program for the Second Ten-Year Interval"

The purpose of this letter is to provide TVA's reply to NRC's information request (Reference 1) for BFN's Units 1, 2, and 3 P&VT program. Additionally, TVA provides clarifications to the P&VT program described in the Reference 2 letter. The clarifications include TVA's testing of ASME Section XI valves in systems addressed by BFN's Technical Specifications (TS), testing of non-code class diesel fuel transfer pumps, and testing of Standby Liquid Control (SLC) pumps. In addition, TVA includes the reply to NRC's January 13, 1994, telephone call information request.

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U.S. Nuclear Regulatory Commission

Page 2

MAY 02 1994

In the Reference 1 letter, NRC requested that TVA document BFN's methodology for testing or not testing the Residual Heat Removal and Core Spray testable check valves open with flow. Also in the Reference 1 letter, NRC denied TVA's relief request addressing valves in plant systems required by TS. As a result, TVA is withdrawing this relief request. TVA's testing of valves in plant systems required by TS will be in accordance with the ASME Section XI requirements.

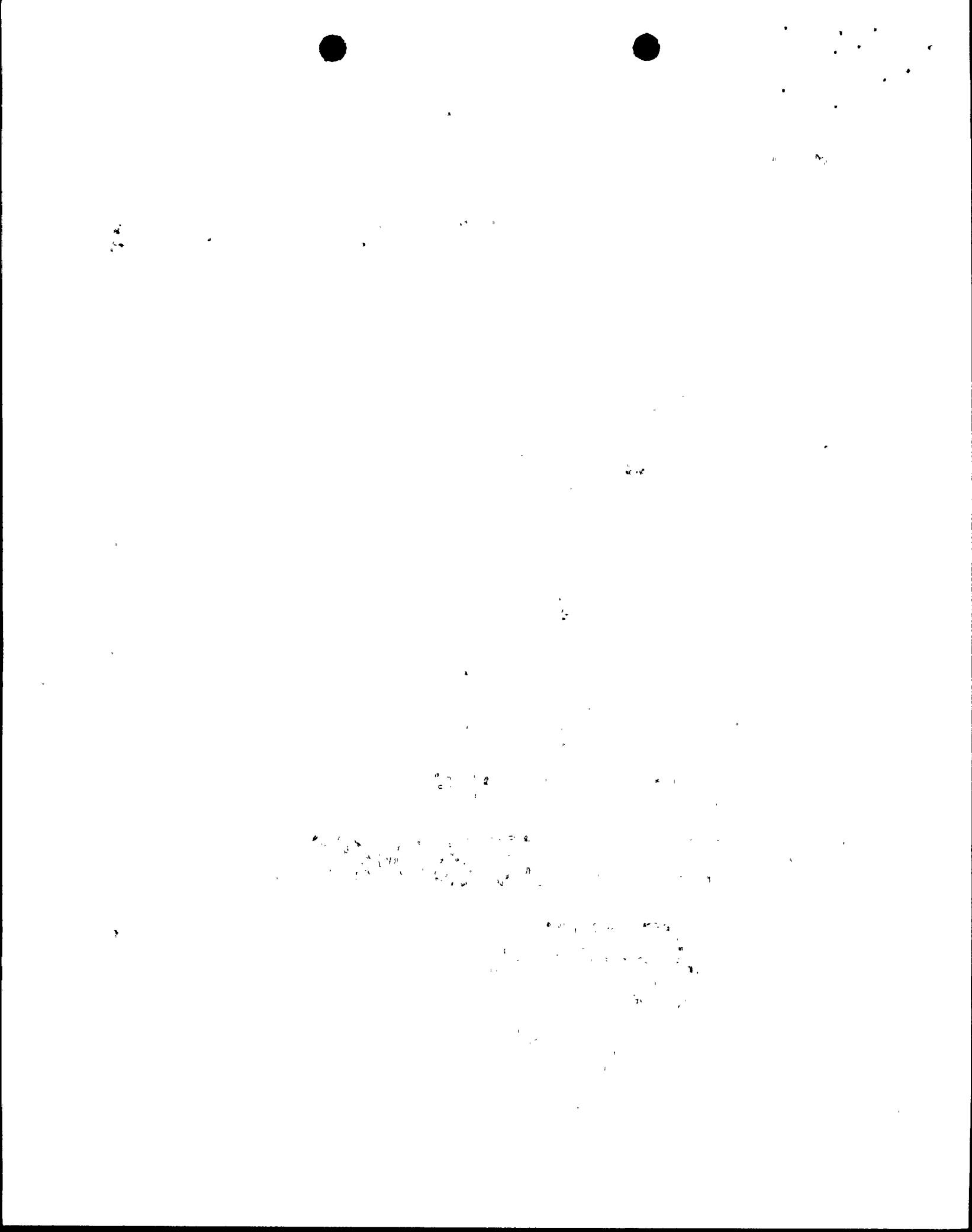
During TVA's review of the Reference 1 letter, TVA identified a concern with the requirements stated in NRC's evaluation response for relief request PV-33. Therefore, on January 13, 1994, TVA held a telephone conference call with NRC to discuss NRC's evaluation response for relief request PV-33. During this telephone conference, NRC requested additional information regarding the requirements stated in NRC's evaluation response for other relief requests.

Enclosure 1 provides revised relief request PV-25. This revised relief request documents BFN's methodology for testing the Residual Heat Removal and Core Spray testable check valves. This revised relief request is for information only; therefore, NRC approval is not required.

Enclosure 2 contains TVA's relief request withdrawal for testing valves addressed by BFN's TS. Also included are program clarifications for TVA's testing of the non-code class diesel fuel transfer pumps and the SLC pumps. NRC approval is not required.

Enclosure 3 contains TVA's revised relief request that combines all the relief requests for the SLC pumps into one relief request. This revised relief request also addresses the frequency range for the SLC pumps' vibration measuring instruments. TVA requests NRC approval of this relief request and a safety evaluation report.

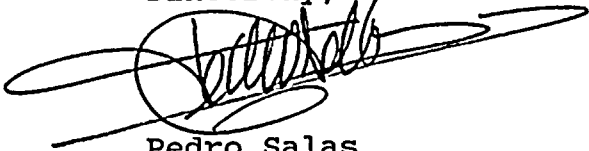
Enclosure 4 provides revised relief request PV-33. This enclosure also contains TVA's reply to NRC's January 13, 1994, telephone call information request. TVA requests NRC to revise the Reference 1 safety evaluation report for relief request PV-33.



U.S. Nuclear Regulatory Commission  
Page 3  
MAY 02 1994

There are no commitments contained in this letter. If you have any questions please telephone me at (205) 729-2636.

Sincerely,



Pedro Salas  
Manager of Site Licensing

Enclosure

cc (Enclosure):

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNITS 1, 2, AND 3

METHODOLOGY FOR TESTING THE RESIDUAL HEAT REMOVAL AND CORE SPRAY  
TESTABLE CHECK VALVES

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SUMMARY DESCRIPTION

PV-25

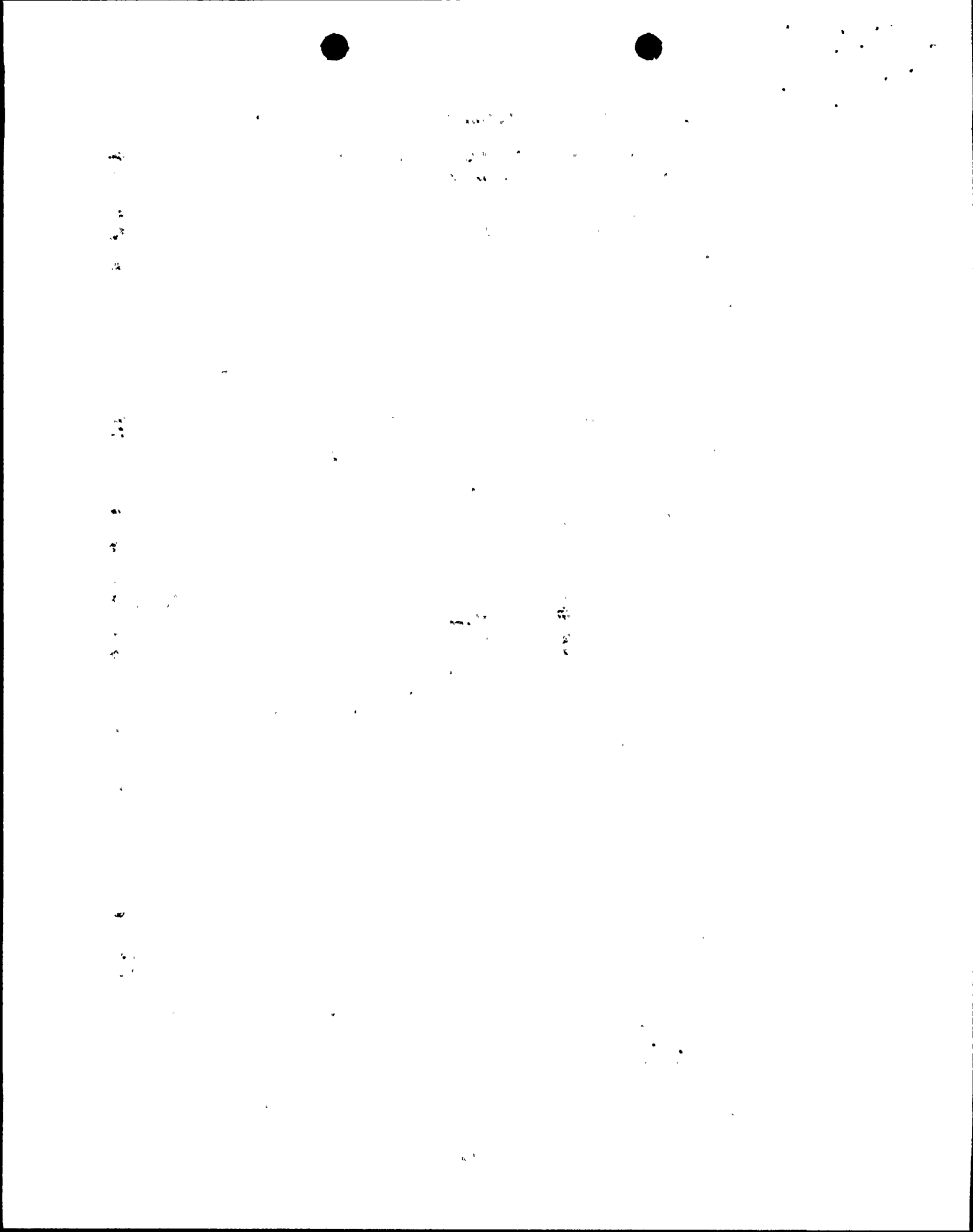
Unitized drawing list.

Added valve category.

Clarified basis for relief section.

Documented testing methodology for the Residual Heat  
Removal and Core Spray valves.





RELIEF REQUEST PV-25

System: Residual Heat Removal (RHR) (74)  
Core Spray (CS) (75)

Drawing: 1, 2, 3-47E811-1 (RHR)  
1, 2, 3-47E814-1 (CS)

Components: Testable check valves 74-54, 74-68  
Testable check valves 75-26, 75-54

Category: AC

Class: 1

Function: Valves open to allow emergency/shutdown cooling water supply to the reactor. Valves close to maintain primary containment isolation and prevent loss of reactor coolant.

Impractical Requirement: IWV-3521 - Cycle valves quarterly. IWV-3522 - Cycle valves during cold shutdown (CSD) if impractical to cycle quarterly.

Basis for Relief: These four valves are located inside the drywell (primary containment) where the atmosphere is inerted during operation as required by Technical Specification 3.7.A.5.a. (and may remain inerted during CSD depending on the reason for going to CSD). Due to potentially inadvertent valve operation caused by non-class 1E circuitry to the valve operator, the air supply to each valve operator is normally disconnected and the valves cannot be cycled quarterly (self-actuation is unaffected). Entry to the drywell to reconnect the air supply to test these valves would be hazardous to personnel unless the unit is in CSD with the drywell atmosphere de-inerted.

Cycling the RHR testable check valves with flow is possible during CSD using the shutdown cooling mode of RHR. However, it may not be possible to cycle both valves during the same shutdown. Technical Specifications 3.5.B.2 and 3.5.B.9 require at least one RHR loop be maintained operable for containment cooling. This permits flushing the other loop in preparation for being placed in SDC, but prevents both loops from being flushed at the same time. Flushing can take 2-4 hours. Following completion of flushing, the valve in that loop can be tested, then the loop realigned for standby readiness.

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However, during the time that the first loop is being returned to standby readiness and the second loop is being flushed, no shutdown cooling is in service. If decay heat is still significant, heating of the moderator could occur such that containment integrity would have to be maintained. This could also cause RHR SDC to be automatically isolated on high reactor pressure (greater than or equal to 105 psig).

Cycling of CS valves with flow is possible during CSD but not practical. The design flow rate of the CS system is 6250 gpm. The addition of this amount of water to the reactor vessel would challenge maintaining reactor water level during CSD and could potentially lead to flooding the main steam lines. Flooding the main steam lines could delay returning the unit to service until the lines were drained and dried.

Reactor water chemistry could be adversely affected due to the lower quality pressure suppression chamber water that would be injected into the reactor vessel to open the testable check valves.

Alternate testing:

RHR - A minimum of one of the testable check valves will be cycled during each CSD (provided three months has passed since the previous CSD). This will be done by verifying the valve opens using normal shutdown cooling flow (7000 GPM minimum) and closes on cessation of shutdown cooling flow. If Technical Specifications and plant conditions allow, the opposite testable check valve will be cycled using shutdown cooling flow during the same CSD. If both valves cannot be cycled during the same CSD, then the uncycled valve will be cycled first during the next CSD (provided Technical Specifications and plant conditions allow). If entry to the drywell is possible, the valves may be cycled by connecting temporary air to the valve operators instead of by passing flow through the shutdown cooling flow path. In this case, the valves would then be stroked full open and full closed using the control room handswitch.

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CS - The testable check valves will be cycled during each CSD that the drywell atmosphere is de-inerted (provided three months has passed since the previous CSD and plant conditions allow). This will be done by temporarily connecting an air supply to the valve operator. The valves will then be stroked full open and full closed using the control room handswitch.



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ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNITS 1, 2, AND 3

PUMPS AND VALVES TEST PROGRAM  
RELIEF REQUEST CLARIFICATIONS

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SUMMARY DESCRIPTION

- PV-1           Removed Diesel Fuel Transfer (DFT) pumps from this relief request. DFT pumps are addressed in PV-3.
- Removed Standby Liquid Control (SLC) pumps from this relief request. SLC pumps are addressed in PV-2.
- Added system number to system names.
- Unitized drawing list.
- Clarified applicability (all three units) to component description.
- Reformatted class descriptions.
- PV-3           Combined DFT pump-related information from relief requests PV-1, PV-2, and PV-5 into this relief request.
- Unitized drawing.
- Specified method for monitoring DFT pumps.
- PV-4           Request withdrawn.
- PV-5           Withdrawn (combined with PV-3).





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RELIEF REQUEST NUMBER PV-1

System: Residual Heat Removal (RHR) (74)  
High Pressure Coolant Injection (HPCI) (73)  
Reactor Core Isolation Cooling (RCIC) (71)  
Core Spray (CS) (75)  
RHR Service Water (RHRSW) (23)

Drawing: (RHR) 1, 2, 3-47E811-1  
(HPCI) 1, 2, 3-47E812-1  
(RCIC) 1, 2, 3-47E813-1  
(CS) 1, 2, 3-47E814-1  
(RHRSW) 1-47E858-1

Components: RHR Pumps A, B, C, D (All 3 units)  
HPCI Pumps (All 3 units)  
RCIC Pumps (All 3 units)  
CS Pumps A, B, C, D (All 3 units)  
RHRSW Pumps A1, A2, A3, B1, B2, B3, C1, C2, C3,  
D1, D2, D3

Class: RHR, HPCI, RCIC, CS - Class 2  
RHRSW - Class 3

Function: RHR - Reactor core residual heat removal,  
emergency core cooling and containment cooling  
HPCI - Emergency core cooling  
RCIC - Emergency core cooling  
CS - Emergency core cooling  
RHRSW - Emergency equipment cooling, and  
residual heat removal

Impractical Test Requirement: IWP-3100 - Monitor pump bearing temperatures and observe lube oil level/pressure during inservice testing.

Basis for Relief: The bearings for the RHR, CS, and RHRSW pumps are lubricated by the pumped fluid. These pumps and the RCIC pump are not equipped with temperature indicators. The RCIC and HPCI pumps have oil cooled bearings. However, these pumps cannot be operated long enough for the bearing oil to reach stable temperatures without overheating the torus and causing unit shutdown.

Alternative Testing: Vibration measurements are taken on all the pumps in the ASME Section XI program during testing to detect changes in the bearing performance. Temperature and lubricant level/pressure are monitored on pumps which are equipped with instrumentation.



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RELIEF REQUEST NUMBER PV-3

System: Diesel Fuel Transfer (DFT) (18)  
Drawing: 0-47E840-3  
Components: DFT Pumps 1A1, 1A2, 1B1, 1B2, 1C1, 1C2, 1D1, 1D2, 3A1, 3A2, 3B1, 3B2, 3C1, 3C2, 3D1, 3D2  
Class: Non-ASME Code Class  
Function: Pump diesel fuel from the seven-day tank to the diesel engine day tank

Impractical Test Requirement:

IWP-3100 - Monitor pump bearing temperature and observe lube oil level and pressure during inservice tests.  
IWP-3100 - Measure inlet and differential pressure prior to and during pump tests.  
IWP-3500(a) - Five minute minimum run time.  
IWP-3210 - Allowable ranges of inservice test quantities.  
IWP-4110 - Instrument accuracy shall be within the limits of Table IWP-4110-1.

Basis for Relief:

The DFT pumps are positive displacement (PD) pumps. According to Draft NUREG-1482 paragraph 5.1.2, since discharge pressure is independent of inlet pressure for PD pumps, the requirement has been changed to require discharge pressure as the sole indicator of pump degradation.

The pumps are not instrumented to measure bearing temperature, inlet pressure, discharge pressure, or flow rate. The pump bearings are cooled and lubricated by the process fluid (diesel fuel oil). Measurement of bearing temperature is now recognized to be an inadequate second choice for monitoring bearing condition compared to vibration monitoring. American Society of Mechanical Engineers /American National Standards Institute ASME/ANSI Standard OM-6 reflects this in that it does not require monitoring of bearing temperatures (relying on vibration monitoring instead).

The only means of determining flow rate is by use of a stopwatch and the day tank level gauge. The level gauge is located under diesel engine appurtenances which makes it difficult for plant operators to properly read the gauge (must read it from an angle). The gauge itself

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has a range of 0-500 gallons in 20 gallon increments. Considering the gauge increments and obstructions, the accuracy of the flow measurements exceeds the ASME Code-required plus or minus two percent accuracy.

Accumulation of pump performance data is difficult for two reasons. First, depending on the level of the day tank when the surveillance procedure is performed, the high level switch could stop the pump before sufficient data is accumulated. Second, the pumps are mounted on the diesel engine skid and cannot be run independently of the diesel engines. As a result, the vibration measurements of the DFT pumps will include the vibrations of the diesel engine skid.

Alternative  
Testing:

Per Draft NUREG-1482, relief requests for Non-ASME Code Class components included in Inservice Test (IST) programs may be implemented without NRC evaluation and approval. This relief request documents the manner in which BFN will test the DFT pumps.

These pumps will be tested quarterly during the diesel engine operability surveillance tests. The pump vibration will be measured twice during each test while the diesel engine is running: (1) once while the DFT pumps are running, and (2) once while the DFT pumps are not running. Vibration will be measured in velocity units (inches per second) using reference values established when the pumps are determined to be operating acceptably. The acceptable, alert and required action ranges specified by ASME/ANSI Standard OM-6, Table 3, for reciprocating pumps will be used as guidelines only. Pump flow rate will be measured using the tank level gauges to verify that the pump flow rate exceeds the diesel engine consumption rate of 5 GPM. From this data, an engineering evaluation will determine what, if any, corrective action or preventive maintenance is required. Increased frequency testing will not be implemented unless specified by the system engineer. These actions will be recorded in the plant record of tests.



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RELIEF REQUEST NUMBER PV-4

This relief request is withdrawn.



RELIEF REQUEST NUMBER PV-5

This relief request is withdrawn. Information previously contained in this request has been combined with relief request PV-3.

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ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNITS 1, 2, AND 3

REVISED RELIEF REQUEST  
FREQUENCY RANGE FOR THE STANDBY LIQUID CONTROL PUMPS

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SUMMARY DESCRIPTION

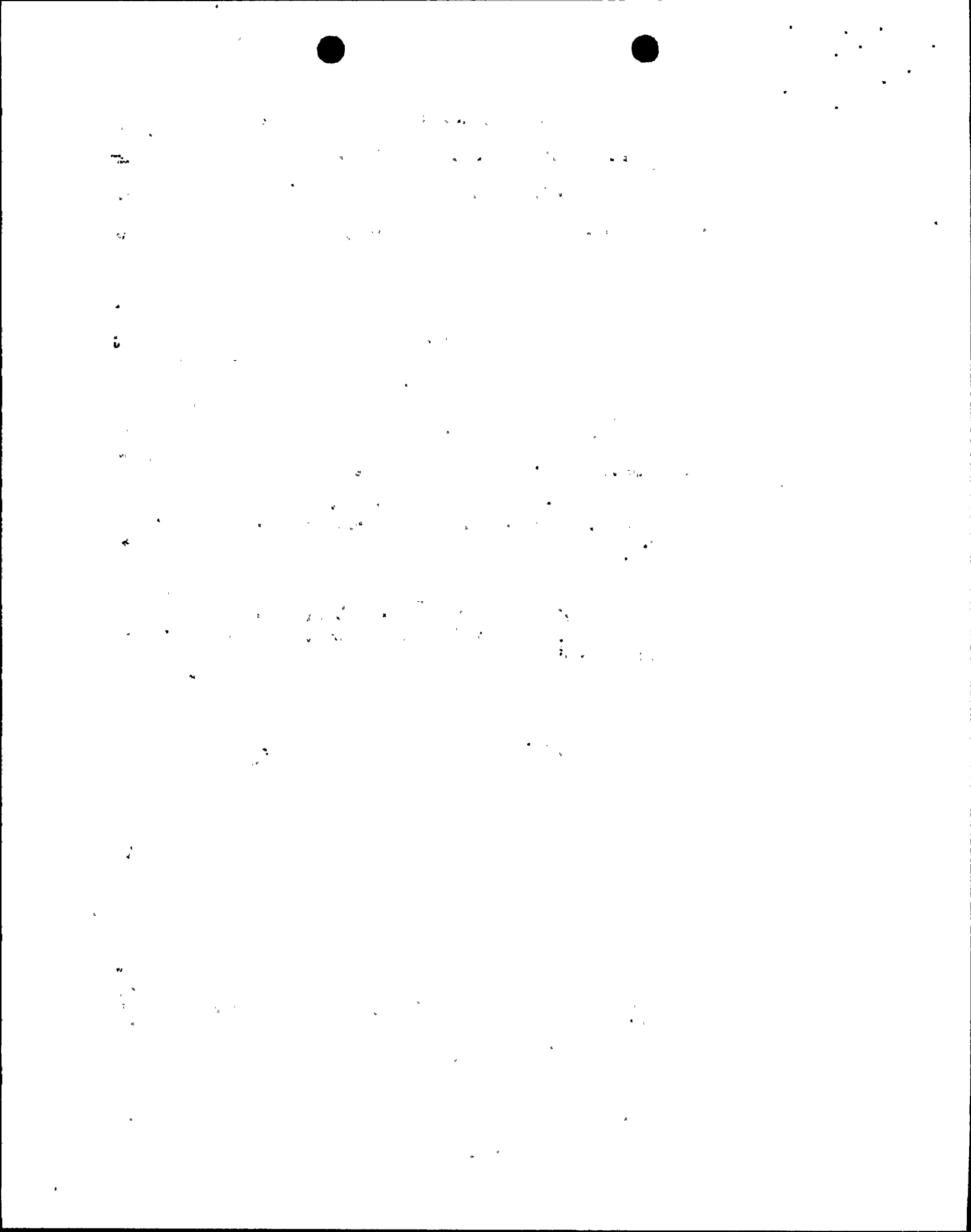
PV-2 Removed DFT pumps from this relief request. Measurement of DFT pump pressure is addressed in PV-3.

Unitized drawing list.

Revised the impractical test requirement section to add information previously included in relief request PV-1 and address vibration measurement.

Revised basis for relief section.

Revised alternative testing section to provide more details and address vibration frequency response range for SLC pumps.



RELIEF REQUEST NUMBER PV-2

System: Standby Liquid Control (SLC) (63)  
Drawing: 1, 2, 3-47E854-1  
Components: SLC Pumps A and B (all three units)  
Class: 2  
Function: Emergency injection of sodium pentaborate into the reactor vessel to bring the reactor from full power to shutdown condition.

Impractical Test Requirement:

IWP-3100 - Measure inlet pressure prior to and during pump tests and measure pump differential pressure during pump tests. Monitor pump bearing temperatures and observe lube oil level/pressure during inservice testing.

IWP-4520(b) - Frequency response range of the read out system shall be from one-half minimum speed to at least maximum pump shaft rotational speed.

Basis for Relief:

Monitoring inlet (and differential) pressure is not meaningful for these pumps because they are positive displacement (PD) pumps. According to Draft NUREG-1482, paragraph 5.1.2 since discharge pressure is independent of inlet pressure for PD pumps, the requirement has been changed to require discharge pressure as the sole indicator of pump degradation. American Society of Mechanical Engineers/American National Standards Institute (ASME/ANSI) Standard OM-6 recognizes this fact and does not require measurement of inlet or differential pressure.

The SLC pumps are not equipped with temperature indicators. ASME/ANSI Standard OM-6 does not require monitoring of bearing temperatures or observation of lube oil level/pressure during inservice tests.

ASME/ANSI Standard OM-6 requires a frequency response range of from one-third minimum pump shaft rotational speed to at least 1000 Hertz (Hz) for vibration measuring instruments. The SLC pumps are not variable speed pumps. The SLC pump shaft rotational speed is 520 RPM, which translates to a frequency response of 8.67 Hz. To comply with Standard OM-6, TVA would be required to monitor a frequency range

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of 2.89 Hz (one-third of 8.67 Hz) to 1000 Hz; however, TVA intends to monitor from 6 Hz to at least 1000 Hz.

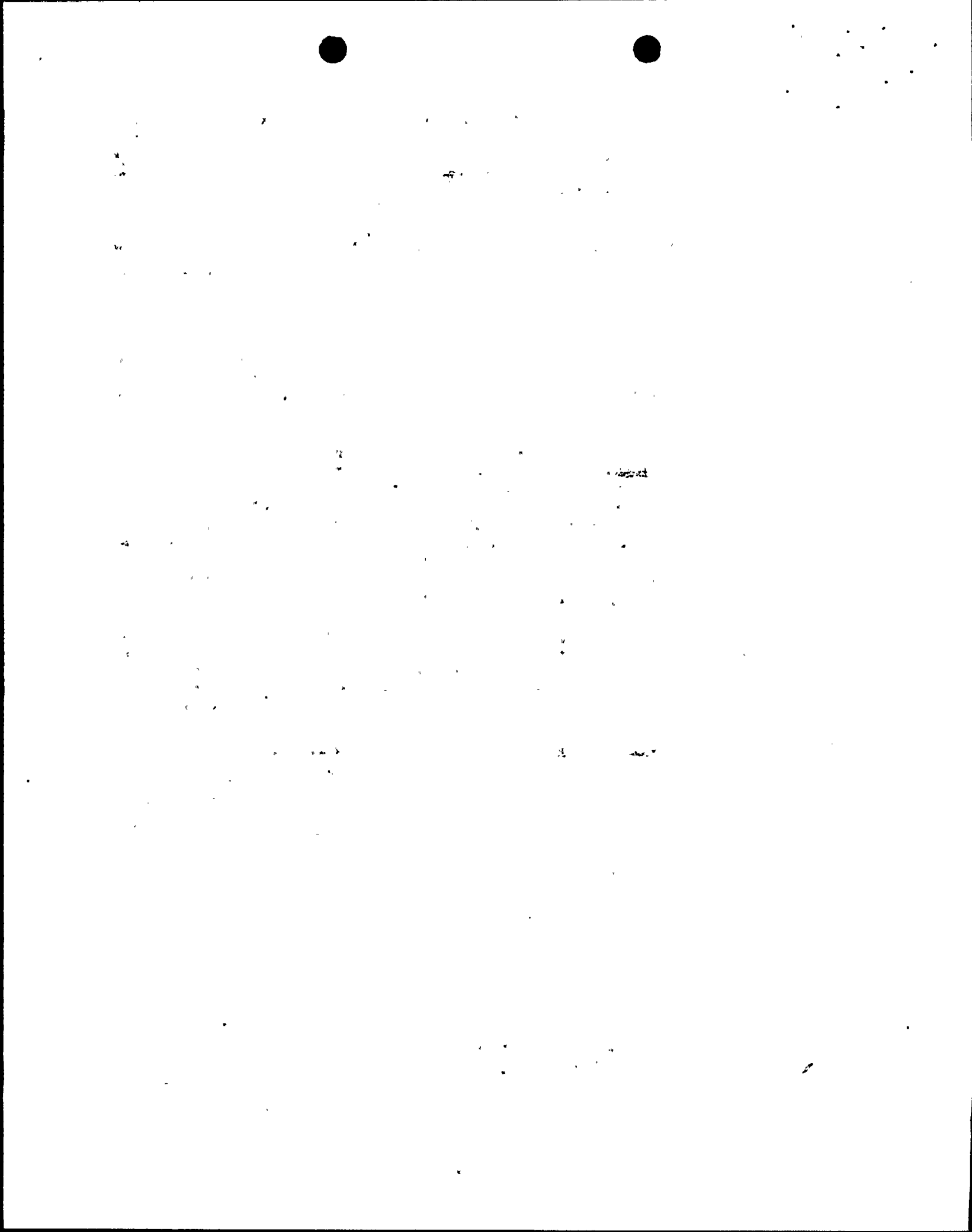
Draft NUREG-1482 states that the frequency response range of vibration monitoring instrumentation must meet the requirements of ASME/ANSI Standard OM-6 unless the information gained at the low frequency does not apply for the bearing design of the pump in question.

The information gained at a frequency lower than shaft rotational speed is used to detect oil swirl in sleeve type bearings. The bearings on the SLC pumps are roller type. Accordingly, there is no information gathered at a frequency lower than shaft rotational speed that would be applicable.

Alternative  
Testing:

Pump discharge pressure, flow rate, and vibration will be measured during quarterly surveillance testing. Data will be trended using all related requirements of ASME/ANSI Standard OM-6, except for the frequency response range of the vibration measuring instruments.

TVA will monitor the SLC pump vibration using a frequency response range of 6 Hz to at least 1000 Hz. This will encompass all frequencies from just below shaft rotational speed to the 1000 Hz minimum required by ASME/ANSI Standard OM-6.





ENCLOSURE 4

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT (BFN)  
UNITS 1, 2, AND 3

REPLY TO NRC TELEPHONE CALL INFORMATION REQUEST  
AND REVISED RELIEF REQUEST PV-33

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I. PURPOSE

The purpose of this enclosure is to clarify relief request PV-33. In addition, TVA provides the response to NRC's January 13, 1994, telephone request.

II. BACKGROUND

By the Reference 1 letter, TVA submitted BFN's Pump and Valve Testing program for NRC's review. This letter included relief request PV-33. Relief request PV-33 requested to compare the as-tested valve stroke time to a reference stroke time, rather than comparing with the previously tested stroke time.<sup>1</sup> Relief request PV-33 was identical to relief request PV-36 submitted in Reference 2 and approved by NRC in Reference 3.

NRC's Reference 4 letter approved relief request PV-33 provided all applicable and related requirements of ASME/ANSI Standard OM-10 are used. TVA is concerned with the above provision to use all applicable and related requirements of ASME/ANSI Standard OM-10. Consequently, on January 13, 1994, TVA held a telephone conference call with NRC to discuss this provision.

During the conference call, TVA clarified relief request PV-33. Specifically, TVA stated that relief request PV-33 only requested to permit comparing the as-tested valve stroke time to a reference valve stroke time. TVA also stated that relief request PV-33 did not request NRC approval to use ASME/ANSI Standard OM-10.

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<sup>1</sup>Comparing the as-tested stroke time to a reference stroke time is the testing method specified in American Society of Mechanical Engineers (ASME)/American National Standards Institution (ANSI) Operation and Maintenance Standard OM-10.



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At the conclusion of the conference call, NRC requested additional information concerning ASME/ANSI Standard OM-10. Specifically, NRC requested that TVA provide a list of other NRC relief request evaluations that imposed only some of the applicable portions of ASME/ANSI Standard OM-10.

### III. DISCUSSION OF REVISED RELIEF REQUEST

TVA has revised relief request PV-33 to clarify the testing methodology actually in use at BFN. This testing methodology uses the reference values specified in ASME/ANSI Standard OM-10, Paragraph 3.3, but does not use the remainder of ASME/ANSI Standard OM-10 requirements. This testing methodology is used instead of the method required by the 1986 Edition of ASME Section XI<sup>2</sup>. All other applicable aspects of the 1986 Edition of ASME Section XI (corrective actions, ranges, etc.) are used.

TVA is only requesting relief from the requirement to perform a comparison of the latest stroke time to the previous stroke time. TVA does not want to convert completely to ASME/ANSI Standard OM-10 for testing these valves. BFN's program would require significant procedure revisions to implement all related and applicable requirements of ASME/ANSI Standard OM-10.

### IV. TVA'S RESPONSE TO NRC'S REQUEST

TVA has reviewed NRC safety evaluations of BFN relief requests. Based upon this review, TVA has determined that NRC's evaluation of relief request PV-33 is the only NRC evaluation that specifies a portion of ASME/ANSI Standard OM-10 requirements when other portions of ASME/ANSI Standard OM-10 are also applicable.

### V. CONCLUSION

TVA is submitting revised relief request PV-33. TVA requests NRC to reconsider and approve relief request PV-33 without imposing all applicable ASME/ANSI Standard OM-10 requirements.

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<sup>2</sup>ASME Section XI (1986 Edition) requires that the latest valve stroke time be compared to the previous stroke time.



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VI. REVISED RELIEF REQUEST NUMBER PV-33

System: Various

Drawing: Various

Components: All safety-related valves which are stroke time tested

Class: 1, 2, 3, and Non-American Society of Mechanical Engineers (ASME) code class

Function: Various

Impractical Test Requirement: IWV-3417 (a) - Compare latest test stroke time with the previous test stroke time to determine valve testing frequency and need for corrective action

Basis for Relief: In Generic Letter (GL) 89-04, NRC approved use of reference stroke time as a preferred means of comparing valve stroke times to determine: (1) testing frequency, and (2) the need for corrective action for valves that stroke in 10 seconds or less. Specifically, in Appendix A, Staff Position 6, Question Group 40 response, NRC stated that comparing routine test stroke times to reference stroke times is a better method for evaluating changes in valve performance than the method required by ASME IWV-3400. NRC stated that this method is better for all valves, not just valves that stroke in 10 seconds or less.

Alternative Testing: Reference stroke times will be established for each valve that is required to be stroke time tested (with the exception of rapid acting valves that stroke in 2 seconds or less). The reference stroke times will be an actual stroke time obtained when the valve is known to be operating acceptably. The acceptable and alert ranges will be established using the IWV-3417(a) multipliers. Corrective actions will



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be in accordance GL 89-04 positions 5 and 6, and IWV-3417(a) (1986 Edition), with the exception of comparing the latest valve stroke time to the previous stroke time.

VII. REFERENCES

1. Letter from TVA to NRC, dated August 31, 1992, "BFN Units 1, 2, and 3 American Society of Mechanical Engineers (ASME) Section XI Inservice Testing Pumps and Valves Program for the Second Ten-Year Interval"
2. Letter from TVA to NRC dated November 5, 1991, "BFN American Society of Mechanical Engineers (ASME) Section XI - Pump and Valve Testing (P&VT) Program, Request For Relief"
3. Letter from NRC to TVA dated January 3, 1992, "Inservice Testing Program Relief for the Browns Ferry Nuclear Plant (TAC NOS. M82118, M82119, and M82120)"
4. Letter from NRC to TVA, dated October 22, 1993, "Safety Evaluation and Request for Program Revision Regarding the Inservice Testing Program for Pumps and Valves at the Browns Ferry Nuclear Plant, Units 1, 2, and 3 (TAC NOS. M84494, M84495, And M84496)"

