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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE INSERVICE TESTING PROGRAM
NEBRASKA PUBLIC POWER DISTRICT
COOPER NUCLEAR STATION
DOCKET NUMBER 50-298

1.0 INTRODUCTION

The *Code of Federal Regulations*, 10 CFR 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to Sections (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. Guidance related to the development and implementation of inservice testing (IST) programs is given in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," issued April 3, 1989, and its Supplement 1 issued April 4, 1995. Additional guidance can be found in NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," NUREG/CR-6396, "Examples, Clarifications, and Guidance on Preparing Requests for Relief from Pump and Valve Inservice Testing Requirements," and "Summary of Public Workshops Held in NRC Regions on Inspection Procedure 73756, 'Inservice Testing of Pumps and Valves,' and Answers to Panel Questions on Inservice Testing Issues."

The 1989 Edition of the ASME Code is the latest edition incorporated by reference in Paragraph (b) of Section 50.55a. Subsection IWP of the 1989 Edition, which gives the requirements for IST of pumps, references Part 6 of the American National Standards Institute/ASME *Operations and Maintenance Standards* (OM-6) as the rules for IST of pumps. OM-6 replaces specific requirements in previous editions of Section XI, Subsection IWP of the ASME Code. Subsection IWV of the 1989 Edition, which gives the requirements for IST of valves, references Part 10 of the American National Standards Institute/ASME *Operations and Maintenance Standards* (OM-10) as the rules for IST of valves. OM-10 replaces specific requirements in previous editions of Section XI, Subsection IWV, of the ASME Code.

By letter dated November 21, 1995, Nebraska Public Power District (NPPD), the licensee, submitted the Cooper Nuclear Station (CNS), third ten-year interval program for inservice testing of pumps and valves. The staff evaluated the relief requests contained in the licensee's

ENCLOSURE

revised IST Program and issued a safety evaluation (SE) on February 19, 1997. The SE approved ten relief requests, authorized 1-year interim relief for three relief requests (RV-08, RV-09, and RV-13), and denied five relief requests (RV-06, RV-07, RV-11, RV-12, and RV-14). The licensee addressed the five denied relief requests in Revision 1.2 of the Cooper IST Program dated April 29, 1997. The licensee addressed the three interim relief requests in Revision 2 of the Cooper IST Program dated August 7, 1997. Following the licensee's April 29, 1997, submittal, the Nuclear Regulatory Commission (NRC) issued a request for additional information on July 30, 1997, related to RV-14. On September 5, 1997, the licensee responded to this request for additional information by withdrawing RV-14 and converting it into a refueling outage justification (Revision 2.1 of the IST Program). The licensee submitted one additional (new) relief request, RV-15, by letter dated May 4, 1998.

This SE concerns revised relief request's (RV-06, RV-07, RV-08, RV-09, RV-11, RV-12, and RV-13) and the one new relief request (RV-15).

2.0 BACKGROUND

The CNS IST Program for the third ten-year interval began on March 1, 1996. The CNS IST Program was developed to the 1989 Edition of ASME Section XI of the ASME Boiler and Pressure Vessel Code. The 1989 edition of the Code specifies that the rules for the inservice testing of pumps and valves are stated in the ASME/ANSI Operations and Maintenance (OM) Standards, Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants." References in the CNS IST Program to OM-1, OM-6, and OM-10 correspond to the 1987 Edition of the ASME/ANSI OM Standard Parts 1, 6, and 10, respectively. For OM-6 and OM-10, the applicable edition includes the 1988 OMa addenda.

The scope of the CNS IST Program includes ASME Code Class 1, 2, or 3 pumps that are provided with an emergency power source and perform a specific function in shutting down the reactor to the safe shutdown condition, maintaining the safe shutdown condition, or necessary to mitigate the consequences of an accident. ASME Code Class 1, 2, or 3 valves that perform these functions and safety or relief valves which provide overpressure protection for systems or portions of systems which are required to perform these functions, are also included. The safe shutdown condition at CNS is the hot shutdown mode as defined in the CNS technical specifications (TSs).

Non-Code Class components whose functions are essential to the safety or reliability of the plant are also included in the CNS IST Program as augmented components. These augmented components are tested to the same acceptance standards as Code Class components to the extent practicable. Since, non-Code components are outside the scope of 10 CFR 50.55a, requests for relief are not required if the OM Standards cannot be met. Nevertheless, deviations from the OM Standards are documented and justified in the licensee's IST Program.

3.0 VALVE TESTING PROGRAM

3.1 Core Spray (CS) System

3.1.1 Revised Relief Request RV-06

RV-06 pertains to core spray system check valves CS-CV-12CV, CS-CV-13CV, CS-CV-14CV, and CS-CV-15CV. These pressure maintenance check valves open to maintain the core spray system solid and close to prevent diversion of core spray flow. There are two sets of two check valves in-series, one in-series set to core spray loop A and the other in-series set to core spray loop B. RV-06 requests relief from OM-10, paragraph 4.3.2.1, which requires check valves to be individually exercised nominally every 3 months, except as provided by paragraphs 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

This revised relief request was submitted by the licensee in response to an SE dated February 19, 1997, which denied the request and stated that the licensee must take actions within 120 days to comply with the Code requirements or to seek review and approval of revised relief requests.

3.1.1.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

> These valves are normally closed check valves (with two in series). The inboard valve is essential (safety related). The redundant outboard valve is nonessential. The valves are the same make and model number and met the same quality assurance requirements at the time they were installed. They open as necessary to keep the CS system in a solid standby condition, which is not a safety function. When the CS pumps start, these valves close to ensure maximum flow to the reactor. These valves do not perform a function which requires leakage to be limited to a specified amount.
>
> Only one valve is required to close to prevent the diversion of flow as determined and documented in accordance with CNS safety classification requirements. However, the current system design does not allow independent testing to ensure both valves have closed. Thus, both valves will be tested together. When a CS Pump is started, should both valves fail to close, a relief valve would lift or a pressure sensor would alarm on the condensate supply side of the valves.

3.1.1.2 Proposed Alternate Testing

The licensee proposed the following:

> The check valve in each loop will be tested closed simultaneously to assess the operational readiness of each pair of valves. Should the acceptance criteria be exceeded, both valves will be declared inoperable until they are repaired or replaced as necessary.

3.1.1.3 Evaluation

Pressure maintenance check valves CS-CV-12CV, CS-CV-13CV, CS-CV-14CV, and CS-CV-15CV (two pairs of valves configured in series) are normally closed valves that have a safety function to close to prevent the diversion of core spray flow. The open function is not safety related. These valves do not perform a function which requires leakage to be limited to a specified amount. The Code requires valves performing safety functions to be stroked to the position(s) required for the valves to perform those functions; however, the licensee states that the current system design does not allow testing to ensure both valves will close.

Section 4.1.1 of NUREG-1482 addresses closure verification for check valves installed in series without intermediate test connections. The licensee's proposed alternative is consistent with the guidance provided in this section of NUREG-1482. As indicated by the licensee, only one of each of these redundant in-series check valves is credited in the licensee's safety analysis. Therefore, verification that each pair of valves is capable of performing the required (closed) safety function should be acceptable for inservice testing. Both check valves in each paired group are included in the licensee's IST Program and were subject to equivalent quality assurance criteria at the time they were installed. Each in-series pair will be full-stroke exercised to the closed position quarterly as required by the Code (see Section V of the licensee's IST Program). If the licensee finds indication that the closure capability of either pair of valves is questionable, both of the valves in that pair will be declared inoperable and corrective actions taken, as necessary, before returning the pair to service. Thus, the licensee's proposed alternative will provide reasonable assurance of the operational readiness of each valve pair.

There are no position indicators on these valves or other means for verifying valve closure. Current system design does not allow independent testing of each valve to ensure that each has closed. Therefore, the only practical means of verifying closure is to perform a back-leakage test of each in-series pair of valves. It would impose an undue hardship on the licensee to require that the system be modified to facilitate individual valve testing.

3.1.1.4 Conclusion

The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements results in a hardship without a compensating increase in the level of quality and safety.

3.2 High Pressure Coolant Injection (HPCI) System

3.2.1 Revised Relief Request RV-07

RV-07 pertains to high pressure coolant injection system check valves HPCI-CV-18CV and HPCI-CV-19CV. These two in-series pressure maintenance check valves open to maintain the HPCI system solid and close to prevent the diversion of HPCI flow. RV-07 requests relief from OM-10, paragraph 4.3.2.1, which requires check valves to be individually exercised nominally every 3 months, except as provided by paragraphs 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

This revised relief request was submitted by the licensee in response to an SE dated February 19, 1997, which denied the request and stated that the licensee must take actions within 120 days to comply with the Code requirements or to seek review and approval of revised relief requests.

3.2.1.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

> These valves are normally closed check valves (with two in series). The inboard valve is essential (safety related). The redundant outboard valve is nonessential. The valves are the same make and model number and met the same quality assurance requirements at the time they were installed. They open as necessary to keep the HPCI system in a solid standby condition, which is not a safety function. When the HPCI starts, these valves close to ensure maximum flow to the reactor. These valves do not perform a function which requires leakage to be limited to a specified amount.
>
> Only one valve is required to close to prevent the diversion of flow as determined and documented in accordance with CNS safety classification requirements. However, the current system design does not allow independent testing to ensure both valves have closed. Thus, both valves will be tested together. When HPCI is started, should both valves fail to close, a relief valve would lift or a pressure sensor would alarm on the condensate supply side of the valves.

3.2.1.2 Proposed Alternate Testing

The licensee proposed the following:

> The check valves will be tested closed simultaneously to assess the operational readiness of the pair of valves. Should the acceptance criteria be exceeded, both valves will be declared inoperable until they are repaired or replaced as necessary.

3.2.1.3 Evaluation

Pressure maintenance check valves HPCI-CV-18CV and HPCI-CV-19CV (in series) are normally closed valves that have a safety function to close to prevent the diversion of high pressure coolant injection flow. The open function is not safety related. These valves do not perform a function which requires leakage to be limited to a specified amount. The Code requires valves performing safety functions to be stroked to the position(s) required for the valves to perform those functions; however, the licensee states that the current system design does not allow testing to ensure both valves will close.

Section 4.1.1 of NUREG-1482 addresses closure verification for check valves installed in series without intermediate test connections. The licensee's proposed alternative is consistent with the guidance provided in this section of NUREG-1482. As indicated by the licensee, only one

of these redundant in-series check valves is credited in the licensee's safety analysis. Therefore, verification that the pair of valves is capable of performing the required (closed) safety function should be acceptable for inservice testing. Both check valves are included in the licensee's IST Program and were subject to equivalent quality assurance criteria at the time they were installed. The in-series pair will be full-stroke exercised to the closed position quarterly as required by the Code (see Section V of the licensee's IST Program). If the licensee finds indication that the closure capability of the pair of valves is questionable, both of the valves in the pair will be declared inoperable and corrective actions taken, as necessary, before returning the pair to service. Thus, the licensee's proposed alternative will provide reasonable assurance of the operational readiness of the valve pair.

There are no position indicators on these valves or other means for verifying valve closure. Current system design does not allow independent testing of each valve to ensure that each has closed. Therefore, the only practical means of verifying closure is to perform a back-leakage test of the in-series pair of valves. It would impose an undue hardship on the licensee to require that the system be modified to facilitate individual valve testing.

3.2.1.4 Conclusion

The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements results in a hardship without a compensating increase in the level of quality and safety.

3.2.2 Revised Relief Request RV-08

RV-08 pertains to high pressure coolant injection system valves HPCI-SOV-SSV64 and HPCI-SOV-SSV87. The HPCI turbine and exhaust steam drip leg drain to gland condenser (HPCI-SOV-SSV64) and HPCI turbine and exhaust steam drip leg drain to equipment drain isolation valve (HPCI-SOV-SSV87) have an active safety function in the closed position to maintain pressure boundary integrity of the HPCI turbine exhaust line. These valves also serve as a Class 2 to Non-Code boundary barrier. RV-08 requests relief from OM-10, paragraphs 4.2.1 and 4.2.1.6. OM-10, paragraph 4.2.1, requires Category A and B power-operated valves to be individually full-stroke exercised and stroke-timed nominally every 3 months, except as provided by paragraphs 4.2.1.2, 4.2.1.5, and 4.2.1.7. OM-10, paragraph 4.2.1.6, requires valves with fail-safe actuators to be tested by observing the operation of the actuator upon loss of valve actuating power in accordance with the exercising frequency of paragraph 4.2.1.1.

This revised relief request was submitted by the licensee in response to an SE dated February 19, 1997, which authorized interim relief pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), for one year (until February 19, 1998) to allow the licensee time to develop a method to adequately monitor for valve degradation.

3.2.2.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

These valves are rapid acting, encapsulated, solenoid operated valves. Their control circuitry is provided with a remote manual switch for valve actuation to the Open position and an Auto function which allows the valves to actuate from signals received from the associated level switches HPCI-LS-98 and HPCI-LS-680. Both valves receive a signal to change disc position during operability testing of drain pot level switches. However, remote position indication is not provided for positive verification of disc position. Additionally, their encapsulated design prohibits the ability to visually verify the physical position of the operator, stem or internal components. Modification of the system to verify valve closure capability and stroke timing is not practicable nor cost beneficial since no commensurate increase in safety would be derived.

3.2.2.2 Proposed Alternate Testing

The licensee proposed the following:

Quarterly, each valve shall be exercised to the full closed position. Although valve stroke timing will not be performed, this test will verify that the valve moves to the safe position. Enhanced maintenance shall be performed each refueling outage by disassembling and inspecting each solenoid valve to monitor for degradation.

3.2.2.3 Evaluation

These solenoid operated valves (HPCI-SOV-SSV64 and HPCI-SOV-SSV87) are rapid acting and function in the closed position to maintain pressure boundary integrity of the HPCI turbine exhaust line. The remote position indication is not provided with positive verification of disc position. Further, their design prohibits the ability to visually verify the physical position of the operator, stem, or internal components. The licensee states that making system modification to meet the Code requirements for exercise testing, stroke-timing, and fail-safe testing is not practicable.

Stroke timing and fail-safe testing these valves is not possible using the conventional method of position indication. The licensee proposes to exercise the valves to its full closed position quarterly and to incorporate enhanced maintenance activities for the valves (i.e., disassembly and inspection every refueling outage to monitor degradation). Imposition of the Code requirements to stroke time and fail-safe test the valves as a means of monitoring valve degradation would result in a burden on the licensee in that modification to the valves, valve replacement, or the purchase of more advanced testing equipment would be necessary to comply. The licensee's proposal to exercise these valves to the closed position quarterly in combination with disassembly and inspection each refueling outage is consistent with the guidance provided in Section 2.1.3 of NUREG/CR-6396, "Examples, Clarifications, and Guidance on Preparing Requests for Relief from Pump and Valve Inservice Testing Requirements" and will provide reasonable assurance of the operational readiness of these valves.

3.2.2.4 Conclusion

Relief is granted pursuant to 10 CFR 50.55a(f)(6)(i) based on the (1) impracticality of performing testing in accordance with Code requirements (2) consideration of the burden on the licensee if the Code requirements were imposed on the facility, and (3) the proposed alternative testing providing an acceptable level of assurance of the operational readiness of the valves.

3.3 Main Steam (MS) System

3.3.1 Revised Relief Request RV-09

This relief request pertains to the main steam power-operated safety relief valves (SRVs) (i.e., MS-RV-71ARV, BRV, CRV, DRV, ERV, FRV, GRV, and HRV). The SRVs have an active safety function in the open position to prevent over pressurization of the reactor vessel. These safety relief valves have an active safety function in the closed position to maintain reactor vessel integrity. Relief is requested from OM-10, paragraph 4.2.1, which requires Category A and B power-operated valves to be individually full-stroke exercised and stroke-timed nominally every 3 months, except as provided by paragraphs 4.2.1.2, 4.2.1.5, and 4.2.1.7.

This request was submitted by the licensee in response to an SE dated February 19, 1997, which authorized interim relief pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), for one year (until February 19, 1998) to allow the licensee time to develop a method to adequately monitor for valve degradation.

3.3.1.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

> These valves are power actuated safety relief valves for the main steam lines. Each valve is exercised during startup following refueling outages. Exercising these valves during power operations can cause pressure, temperature, and reactivity transients.
>
> Exercising during cold shutdowns is impracticable since a minimum of 50 psig steam pressure is required to open the valves. The valve supplier does not recommend exercising these valves below 150 psig steam pressure because of the risk of valve seat damage and resultant leakage. CNSs required testing once each refueling cycle at a reactor pressure >100 psig, which is adequate to assess the operational readiness of these valves.
>
> Relief valves are quick acting and their stroke-times cannot be measured by conventional means. They do not have position indication in the usual sense. Pressure switches in the SRV discharge lines annunciate in the control room and indicated when the valve is open and closed. Should a relief fail to function as design, corrective action is required.

3.3.1.2 Proposed Alternate Testing

The licensee proposed the following:

> In addition to testing to the requirements of OM-1987, Part 1, paragraph 3.3.1.1, full stroke exercise tests of these valves open and closed will be performed during each refueling outage. The opening stroke time will be measured from the time the switch is actuated until a pressure switch in the discharge line annunciates. This testing method is consistent with GL 89-04, position 6.

3.3.1.3 Evaluation

Operation of these valves during power operation causes reactor pressure, temperature, and power transients that could result in a reactor trip. It would not be practical to exercise these valves quarterly during power operation as failure to close may result in a rapid depressurization and cooldown of the reactor vessel (loss-of-coolant accident) and a reactor trip. NUREG-0626 "Generic Evaluation of Feedwater Transients and Small Break Loss-of-Coolant Accidents in GE-Designed Operating Plants and Near Term Operating License Applications" recommends reduction of challenges to relief valves to lessen the risk of Small Break LOCA (see also NUREG-0737, Section II.K.3.16). Therefore, a reduced frequency of testing is appropriate.

These valves must be exercised while the reactor is at power because reactor steam warms the valve seating surfaces and aids in preventing seat damage and leakage. The valves should not be exercised when the reactor is at low temperature and pressure during cold shutdowns or refueling outages. In that condition, reactor steam is not available to warm them even though the valve operators are capable of cycling the valve without steam pressure.

These power operated safety relief valves operate rapidly and are not equipped with direct sensing position indication such as external or remote position indication based on valve obturator or actuator position. Verification of valve position changes is based on system response (i.e., thermocouple indication or acoustic monitors). This response is not accurate and lags actual valve position. Installation of instrumentation to directly indicate valve position would require system redesign and modification. This modification would be costly and burdensome to the licensee.

The licensee proposes to full stroke exercise test these valves to the open and closed positions during each refueling outage [as required by CNSs]. The NRC staff approved use of improved standard CNSs at CNS in a safety evaluation dated July 31, 1998 (Amendment 178). The licensee implemented the improved standard CNSs on August 15, 1998. As noted in the improved standard CNSs for CNS, the SRV full stroke exercise test is normally conducted during startup following refueling outages and is not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. The opening stroke time will be measured from the time the switch is actuated until a pressure switch in the discharge line annunciates. A manual actuation of each SRV (until the main turbine bypass valves have closed to compensate for SRV opening) is performed to verify that, mechanically, the valve is functioning properly and no blockage exists in the valve discharge piping. Adequate reactor steam dome pressure must be available to perform this test [not available during the refueling outage] to avoid damaging the valve. Also, adequate steam flow must be

passing through the main turbine or turbine bypass valves to continue to control reactor pressure and steam flow when the SRVs divert steam flow upon opening. Sufficient time is therefore allowed after the required pressure and flow are achieved to perform this test. Adequate pressure at which this test is to be performed is ≥500 psig, consistent with the recommendation of the valve vendor. Adequate steam flow is represented by turbine bypass valves at least 30% open, or total steam flow ≥ 10^6 lb/hr. Plant startup is allowed prior to performing this test because valve operability and the setpoints for overpressure protection are verified, per Section 3.3.3.1 of OM-1, prior to valve installation. The 12 hours allowed for manual actuation after the required pressure and steam flow are reached is sufficient to achieve stable plant conditions for testing and provides reasonable time to complete the test. This testing method will provide adequate assurance of operational readiness of these valves.

3.3.1.4 Conclusion

The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements results in a hardship without a compensating increase in the level of quality and safety.

3.3.2 Relief Request RV-15

The licensee requests relief from the requirements of OM Part 1, 3.3.1 for the main steam power-operated safety relief valves (SRVs) (i.e., MS-RV-71ARV, BRV, CRV, DRV, ERV, FRV, GRV, and HRV). OM Part 1, 3.3.1 requires that tests prior to maintenance or set pressure adjustment, or both shall be performed in the following sequence:

(a) visual examination;
(b) seat tightness determination;
(c) set pressure determination;
(d) determination of compliance with the Owner's seat tightness criteria;

MS-RV-71ARV, BRV, CRV, DRV, ERV, FRV, GRV, and HRV are ASME Code Class 1, Category B/C safety relief valves. The SRVs have an active safety function in the open position to prevent over pressurization of the reactor vessel. The SRVs also have an active safety function in the closed position to maintain reactor vessel integrity.

3.3.2.1 Licensee's Basis for Relief

The licensee provided the following basis:

> These valves are power actuated safety relief valves (SRVs) for the main steam lines. Pressure switches in the SRV discharge lines annunciate in the control room and indicate when the main valve is open. In addition, there are thermocouples on the valve discharge lines which provide leakage indication. Thus, valve seat leakage is continuously monitored. Each valve is equipped with a pilot valve assembly that controls the set pressure. The pilot valve assemblies are removed from the main body and sent off site for inspection, refurbishment, and requalification testing (set point, reseat, and pilot stage seat tightness). The

test facility has a main body slave for this purpose. During refueling outages the pilot valve assemblies are removed and previously refurbished and requalified pilot valve assemblies are installed. During startup, a full stroke exercise test of the main valve is performed (Reference: Relief Request RV-09, submitted per Letter No. NLS970138 to US Nuclear Regulatory Commission from Nebraska Public Power District dated August 7, 1997).

3.3.2.2 Proposed Alternate Testing

The licensee proposed the following:

> In lieu of the OM-1 requirements, the seat leakage tightness of the main valve disks will be demonstrated by the pressure switches and the thermocouples on the SRV discharge lines during startup after each refueling outage. Visual examination of the main valve will be performed in place without further disassembly as permitted by OM Part 1, 1.3.1.3.

3.3.2.3 Evaluation

NPPD does not test its SRVs using one complete test sequence. Rather, the licensee sends its SRV pilot assemblies to a certified valve testing facility for the performance of certain tests required by Section 3.3.1.1 of OM-1. Common industry practice is to test the Target Rock safety/relief SRV pilot assemblies as separate units. As a result, strict adherence to the sequence specified in Section 3.3.1.1 of OM-1 cannot be satisfied.

The testing sequence and practices used by NPPD must ensure that all of the tests specified in Section 3.3.1.1 of OM-1 are performed (as applicable) or relief from the specific Code test requirement must be obtained. The staff notes that valve operability is verified in accordance with CNSs 3.4.3.1. Leakage of the main stage disks is monitored continuously during normal plant operation which is acceptable.

Removal of the entire valve assembly for testing (in the sequence specified by the Code) would create hardship on the licensee by (1) extending plant outages for the removal and installation process, (2) cost increase and schedule delays for decontamination, and (3) increased shipping expenses. These hardships are not warranted since there is no compensating increase in the level of quality and safety.

3.3.2.4 Conclusion

Based on the determination that the proposal provides reasonable assurance of operational readiness and that compliance with the Code would result in hardship without a compensating increase in the level of quality and safety, the proposed alternative is authorized pursuant to §50.55a(a)(3)(ii).

3.4 Reactor Core Isolation Cooling (RCIC) System

3.4.1 Revised Relief Request RV-11

RV-11 pertains to reactor core isolation cooling system check valves RCIC-CV-18CV and RCIC-CV-19CV. These two in-series pressure maintenance check valves open to maintain the RCIC system solid and close to prevent the diversion of RCIC injection flow. RV-11 requests relief from OM-10, paragraph 4.3.2.1, which requires check valves to be individually exercised nominally every 3 months, except as provided by paragraphs 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

This revised relief request was submitted by the licensee in response to an SE dated February 19, 1997, which denied the request and stated that the licensee must take actions within 120 days to comply with the Code requirements or to seek review and approval of revised relief requests.

3.4.1.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

> These valves are normally closed check valves (with two in series). The inboard valve is essential (safety related). The redundant outboard valve is nonessential. The valves are the same make and model number and met the same quality assurance requirements at the time they were installed. They open as necessary to keep the RCIC system in a solid standby condition, which is not a safety function. When the RCIC starts, these valves close to ensure maximum flow to the reactor. These valves do not perform a function which requires leakage to be limited to a specified amount.
>
> Only one valve is required to close to prevent the diversion of flow as determined and documented in accordance with CNS safety classification requirements. However, the current system design does not allow independent testing to ensure both valves have closed. Thus, both valves will be tested together. When RCIC is started, should both valves fail to close, a relief valve would lift or a pressure sensor would alarm on the condensate supply side of the valves.

3.4.1.2 Proposed Alternate Testing

The licensee proposed the following:

> These check valves will be tested closed simultaneously to assess the operational readiness of the valves. Should the acceptance criteria be exceeded, both valves will be declared inoperable until they are repaired or replaced as necessary.

3.4.1.3 Evaluation

Pressure maintenance check valves RCIC-CV-18CV and RCIC-CV-19CV (in series) are normally closed valves that have a safety function to close to prevent the diversion of reactor

core isolation cooling system flow. The open function is not safety related. These valves do not perform a function which requires leakage to be limited to a specified amount. The Code requires valves performing safety functions to be stroked to the position(s) required for the valves to perform those functions; however, the licensee states that the current system design does not allow testing to ensure both valves will close.

Section 4.1.1 of NUREG-1482 addresses closure verification for check valves installed in series without intermediate test connections. The licensee's proposed alternative is consistent with the guidance provided in this section of NUREG-1482. As indicated by the licensee, only one of these redundant in-series check valves is credited in the licensee's safety analysis. Therefore, verification that the pair of valves is capable of performing the required (closed) safety function should be acceptable for inservice testing. Both check valves are included in the licensee's IST Program and were subject to equivalent quality assurance criteria at the time they were installed. The in-series pair will be full-stroke exercised to the closed position quarterly as required by the Code (see Section V of the licensee's IST Program). If the licensee finds indication that the closure capability of the pair of valves is questionable, both of the valves in the pair will be declared inoperable and corrective actions taken, as necessary, before returning the pair to service. Thus, the licensee's proposed alternative will provide reasonable assurance of the operational readiness of the valve pair.

There are no position indicators on these valves or other means for verifying valve closure. Current system design does not allow independent testing of each valve to ensure that each has closed. Therefore, the only practical means of verifying closure is to perform a back-leakage test of the in-series pair of valves. It would impose an undue hardship on the licensee to require that the system be modified to facilitate individual valve testing.

3.4.1.4 Conclusion

The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements results in a hardship without a compensating increase in the level of quality and safety.

3.5 Residual Heat Removal (RHR) System

3.5.1 Revised Relief Request RV-12

RV-12 pertains to residual heat removal system check valves RHR-CV-18CV, RHR-CV-19CV, RHR-CV-24CV, and RHR-CV-25CV. These pressure maintenance check valves open to maintain the RHR system solid and close to prevent the diversion of LPCI injection flow. There are two sets of two check valves in-series, one in-series set to residual heat removal loop A and the other in-series set to residual heat removal loop B. RV-12 requests relief from OM-10, paragraph 4.3.2.1, which requires check valves to be individually exercised nominally every 3 months, except as provided by paragraphs 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

This revised relief request was submitted by the licensee in response to an SE dated February 19, 1997, which denied the request and stated that the licensee must take actions within 120

days to comply with the Code requirements or to seek review and approval of revised relief requests.

3.5.1.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

> These valves are normally closed check valves (with two in series). The inboard valve is essential (safety related). The redundant outboard valve is nonessential. Each pair of valves is the same design and met the same quality assurance requirements at the time they were installed. They open as necessary to keep the RHR system in a solid standby condition, which is not a safety function. When the RHR pumps start, these valves close to ensure maximum flow to the reactor. These valves do not perform a function which requires leakage to be limited to a specified amount.
>
> Only one valve is required to close to prevent the diversion of flow as determined and documented in accordance with CNS safety classification requirements. However, the current system design does not allow independent testing to ensure both valves have closed. Thus, both valves will be tested together. When an RHR Pump is started, should both valves fail to close, a relief would lift or a pressure sensor would alarm on the condensate supply side of the valves.

3.5.1.2 Proposed Alternate Testing

The licensee proposed the following:

> These check valves in each loop will be tested closed simultaneously to assess the operational readiness of each pair of valves. Should the acceptance criteria be exceeded, both valves will be declared inoperable until they are repaired or replaced as necessary.

3.5.1.3 Evaluation

Pressure maintenance check valves RHR-CV-18CV, RHR-CV-19CV, RHR-CV-24CV, and RHR-CV-25CV (two pairs of valves configured in series) are normally closed valves that have a safety function to close to prevent the diversion of low pressure coolant injection flow. The open function is not safety related. These valves do not perform a function which requires leakage to be limited to a specified amount. The Code requires valves performing safety functions to be stroked to the position(s) required for the valves to perform those functions; however, the licensee states that the current system design does not allow testing to ensure both valves will close.

Section 4.1.1 of NUREG-1482 addresses closure verification for check valves installed in series without intermediate test connections. The licensee's proposed alternative is consistent with the guidance provided in this section of NUREG-1482. As indicated by the licensee, only one of each of these redundant in-series check valves is credited in the licensee's safety analysis.

Therefore, verification that each pair of valves is capable of performing the required (closed) safety function should be acceptable for inservice testing. Both check valves in each paired group are included in the licensee's IST Program and were subject to equivalent quality assurance criteria at the time they were installed. Each in-series pair will be full-stroke exercised to the closed position quarterly as required by the Code (see Section V of the licensee's IST Program). If the licensee finds indication that the closure capability of either pair of valves is questionable, both of the valves in that pair will be declared inoperable and corrective actions taken, as necessary, before returning the pair to service. Thus, the licensee's proposed alternative will provide reasonable assurance of the operational readiness of each valve pair.

There are no position indicators on these valves or other means for verifying valve closure. Current system design does not allow independent testing of each valve to ensure that each has closed. Therefore, the only practical means of verifying closure is to perform a back-leakage test of each in-series pair of valves. It would impose an undue hardship on the licensee to require that the system be modified to facilitate individual valve testing.

3.5.1.4 Conclusion

The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified requirements results in a hardship without a compensating increase in the level of quality and safety.

3.6 Service Water (SW) System

3.6.1 Revised Relief Request RV-13

RV-13 pertains to the loop A and loop B outlet isolation [motor operated valves] for the service water booster pump cooling water to the RHR heat exchangers (SW-MOV-MO89A and SW-MOV-MO89B). These normally closed valves have an active safety function in the throttle position to provide a flow for cooling water flow through the RHR heat exchangers during transient and accident conditions. The licensee requests relief from OM-10, paragraph 4.2.1.1, which requires these Category B power-operated valves to be individually full-stroke exercised and stroked timed nominally every 3 months, except as provided by paragraphs 4.2.1.2, 4.2.1.5, and 4.2.1.7.

This request was submitted by the licensee in response to an SE dated February 19, 1997, which authorized interim relief pursuant to 10 CFR 50.55a, paragraph (a)(3)(i), for one year (until February 19, 1998) to allow the licensee time to develop a method to adequately monitor for valve degradation.

3.6.1.1 Licensee's Basis for Request

The licensee provided the following basis for the relief request:

> These valves are exercised during quarterly Service Water Booster Pump flow testing to a throttled position required to satisfy CNS flow requirements. Valve

stroke timing to the fully opened position is impracticable. Full opening will cause RHR Service Water Booster Pump run out. These valves cannot be accurately stroke timed because they are controlled with a thumb wheel type controller. After a pump associated with either valve has started, valve movement is subject to considerable variation. This type of controller provides an output signal that is dependent upon the speed with which the controller is operated. Stroke time measurements of these valves would be very difficult to repeat due to the absence of normal valve control switches and would not contribute meaningful data to utilize in monitoring valve degradation.

3.6.1.2 Proposed Alternate Testing

The licensee proposed the following:

> These valves will be exercised to their safety-related throttled position quarterly, but stroke times will not be measured. At refueling outages, these valves will be tested under the CNS MOV Program in accordance with GL 89-10. Stroke times will be one of these parameters measured.

3.6.1.3 Evaluation

These normally closed motor-operated valves have an active safety function in the throttled position to provide a flow path for cooling water flow through the RHR heat exchangers during transient and accident conditions. The licensee states that these valves, which lack normal valve control switches, are controlled with a thumb-wheel-type controller and that stroke time measurement of these valves would be very difficult to repeat. Also, full opening could result in an RHR Service Water Booster Pump run out.

The licensee proposes to (1) exercise test the valves during quarterly Service Water Booster Pump flow testing to a throttled position required to satisfy CNS flow requirements and (2) stroke time the valves on a refueling outage frequency under the CNS MOV Program. This proposal is not a deviation from the Code requirements since OM-10, paragraph 4.2 allows exercising tests at each refueling outage if exercising is impracticable quarterly during power operation and during cold shutdowns. Therefore, this relief request is not required. The licensee's basis for impracticality of full stroke testing quarterly and during cold shutdowns is documented in the IST Program as required by OM-10, paragraph 6.2. This basis is subject to review during NRC inspections.

3.6.1.4 Conclusion

No relief request from IST requirements for the proposed exercise testing is required since OM-10, paragraph 4.2, allows exercising tests at each refueling outage if exercising is impracticable quarterly during power operation and during cold shutdowns.

4.0 PUMP TESTING PROGRAM

By letter dated October 25, 1996, NPPD requested relief from the alert range requirement (specified in Table 3b of OM-6) for differential pressure for the four service water pumps at CNS. The specific alternative proposed by the licensee is summarized in the table below.

ΔP (Vertical line shaft pumps)			
	Acceptable Range	Alert Range	Required Action Range
OM-6, Table 3b	0.95 to 1.10 ΔP_r	0.93 to <0.95 ΔP_r	<0.93 ΔP_r >1.10 ΔP_r
Proposed in RP-05 for the four Service Water Pumps	0.93 to 1.10 ΔP_r	0.90 to <0.93 ΔP_r	<0.90 ΔP_r >1.10 ΔP_r <56.2 psid at 5500 gpm

This relief request (RP-05) was denied by the staff in a safety evaluation dated August 13, 1997, based on the determination that the relief request as submitted was not in sufficient detail to justify the proposed alternative. The licensee must either comply with the Code-specified acceptable, alert, and required action ranges or obtain relief from these requirements from the NRC. The CNS IST Program should be revised to reflect the status of this relief request. Compliance with Code requirements is subject to NRC inspection.

5.0 OVERALL CONCLUSIONS

The proposed alternative in relief requests RV-06, RV-07, RV-09, RV-11, RV-12 and RV-15 are authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on determinations that the proposals provide reasonable assurance of operational readiness and that compliance with the Code would result in a hardship without a compensating increase in the level of quality and safety. Relief requests RV-08 is granted as requested pursuant to 10 CFR 50.55a(f)(6)(i) based on the determination that compliance with the Code requirements is impractical. RV-13 is considered acceptable under provisions in OM-10 and, therefore, relief is not required. The testing as described in the CNS IST Third Interval Program will provide reasonable assurance of the operational readiness of the pumps and valves to perform their safety-related functions.

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