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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM RELIEF REQUESTS

ILLINOIS POWER COMPANY, ET AL.

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a(g), requires that inservice testing (IST) of certain 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 and applicable addenda, except where specific written relief has been requested by the licensee and granted by the Commission pursuant to Subsections (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In 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 with certain requirements of the applicable Code edition and addenda is impractical for its facility. Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to Code requirements which have been determined by the staff to be acceptable, provided the alternatives are implemented in accordance with the guidance delineated in the applicable positions.

These regulations authorize the Commission to grant relief from ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested as part of the licensee's IST Program are contained in this Safety Evaluation (SE).

In Illinois Power Company's June 25, 1992, submittal, Revision 11 of the Clinton Power Station (CPS) IST Program was provided. Revision 11 addressed eighteen anomalies identified in NRC's September 30, 1991, SE. Table 1 describes each anomaly and indicates the action taken by Illinois Power Company to address the concerns. Any additional action is also described in Table 1. Evaluations of the new and revised relief requests are provided below.

2.0 RELIEF REQUEST 3006

Relief from the requirements of ASME Section XI, Subsection IWP-3210 and Table IWP-3100-2, for acceptance criteria of measured values for pump testing is requested. IWP-3120 tabulates the allowable and alert ranges of inservice test quantities (differential pressure (DP)) in relation to the reference, or baseline, values. Table IWP-3100-2 requires an acceptable DP range of 0.93 x baseline DP to 1.02 x baseline DP and an alert range of 0.9 x baseline DP to 1.03 x baseline DP.

The relief request pertains to the four water-leg pumps (1E12-C003, 1E21-C002, 1E22-C003, and 1E51-C003). These pumps are required to maintain the water level in the associated emergency core cooling systems (ECCS) to ensure the prevention of a water-hammer transient in the event of an ECCS initiation. In addition, these pumps have similar characteristics. All four are Gould model 3196 ST, with the primary difference being impeller diameter. They are tested at flows ranging from 50 to 64.5 gpm with baseline DP ranging from 44.4 to 48.3 psid for the 1E12-C003, 1E21-C002, and 1E22-C003 pumps and 29.4 psid for 1E51-C003. All pumps are ASME Code Class 2.

2.1 Licensee's Basis for Relief The licensee states:

> Because the water-leg pumps operate at a low DP and the Code-specified acceptable ranges are based on a percentage of the baseline, a small increase in DP can result in the pump reaching the alert or action range when the pump is operating within design parameters.
>
> Using data for the HPCS [high pressure core spray] water-leg pump (1E22-C003) as a representative example, which has a baseline DP of 48.5 psid, the Code-required acceptable range varies from 45.1 to 49.5 psid, or less than 4.4 psid. Likewise the Code-required alert range for 1E22-C003 varies from 43.7 to 50 psid, for a range of 6.3 psid.
>
> CPS [Clinton Power Station] believes the lower acceptable and alert range boundaries (0.93 and 0.9 of baseline DP) are achievable without undue hardship. However, based upon the Code required upper acceptable and alert range boundaries of 1.02 and 1.03 baseline DP, a deviation of only 1.0 psid above baseline DP is sufficient to force any of the CPS water-leg pumps onto increased frequency, and an increase greater than 1.5 psid above the baseline DP will place the pumps in the action range.

2.2 Alternative Testing The licensee proposes:

> Illinois Power will utilize the following allowable, alert, and action ranges for water-leg pump differential pressure.

Acceptable Range	(0.93 to 1.05) x (Baseline DP Value)
Alert Range	(0.90 to 1.10) x (Baseline DP Value)
Action Range	< (0.90) x (Baseline DP Value) > (1.10) x (Baseline DP Value)

> Based upon CPS's operating experience, CPS feels that the revised upper ranges will provide good indications of pump degradation

without the unnecessary burden of requiring the pumps to be tested on increased frequency or declaring them inoperable for minor (1 to 2 psid) variations in DP. CPS has evaluated minor fluctuations of this type and has determined that this performance is not an indication of pump degradation, and the pumps are operating within design allowable limits.

In addition, as these pumps are normally running, line pressure is continually monitored via pressure transmitters by the Main Control Room and any failure will be immediately observed by Control Room personnel.

2.3 Evaluation The Code requirements for establishing alert and required action ranges are to ensure that increased testing is imposed or required corrective actions are taken when pump test results indicate degrading performance. Generally, a pump will not indicate improved performance (increased differential pressure results); therefore, the upper limits are established to indicate that a problem in the test method or test instrumentation exists, rather than a degrading condition in the pump itself. For pumps which have such a narrow margin of acceptable values, such as the subject water-leg pumps, an increase of 1 to 2 psid may not be indicative of an actual problem. A 10% increase on the order of 4 to 6 psid would be a reasonable margin for the upper limit requiring corrective action to assess what condition, such as instrument fluctuations, has caused the increase. This is supported by later editions of the Code which have been approved by NRC.

The requirements of Table IWP-3100-2 were changed in Operations and Maintenance (O&M) Standard Part 6, *Inservice Testing of Pumps in Light-Water Reactor Power Plants*, based on the general consensus that test failures that resulted from "higher than reference value" hydraulic measurements were caused by instrument fluctuations. The "high" alert values for hydraulic parameters were deleted. The "high" required action values were increased from 1.03 to 1.10 times reference value. The "high" required action values were maintained to assure test repeatability, thereby maintaining the quality of the vibration testing of the pumps. The NRC approved the use of OM-6 as alternative rules for pump testing in Revision 8 (November 1990) of Regulatory Guide (RG) 1.147, *Inservice Inspection Code Case Acceptability ASME Section XI Division 1*, Code Case N-465. However, in order to implement OM-6 per RG 1.147, the testing must comply with all of the requirements, or relief is required.

CPS does not comply with all of the requirements of OM-6, particularly in the vibration measurements of velocity (inches per second) rather than displacement (amplitude). Therefore, while the increased limits of OM-6 for differential pressure cannot be implemented for all pumps at CPS, relief is appropriate for the subject water-leg pumps to avoid declaring the pumps inoperable when no actual pump problem exists within the narrow margin of acceptable test values. The proposed alternative testing provides an acceptable level of quality and safety for assessing the operational readiness

and monitoring for degradation of these pumps, while maintaining an upper limit will ensure that problems with the testing method or test instrumentation will continue to be identified.

2.4 Conclusion The staff concludes that relief should be granted pursuant to 10 CFR 50.55a(a)(3)(i) for the four water-leg pumps to increase the upper alert and required action limits based on the proposed alternative testing providing an acceptable level of quality and safety.

3.0 RELIEF REQUEST 3002

Relief from the requirements of IWP-3210 and Table IWP-3100-1 for flow rate acceptance criteria has been requested for the three diesel fuel oil (DO) transfer pumps 1DO01PA/PB/PC. These pumps are used to transfer diesel fuel from the diesel storage tanks to the diesel fuel day tanks. The pumps are ASME Code Class 3, Delaval IMO type N3DBS-137. CPS tests the pumps at a fixed differential pressure (DP) of 13 psid, with baseline flow rates ranging from 16.424 to 18.13 gpm.

ASME Section XI, Subsection IWP-3210 tabulates the allowable ranges of inservice test quantities (flow rate) in relation to the reference or baseline values. Table IWP-3100-2 requires an acceptable flow rate range of 0.94 to 1.02 of baseline flow rate, and an alert range of 0.9 to 1.04 of baseline flow rate.

3.1 Licensee's Basis for Relief The licensee states:

> Because the DO pumps operate at a low flow and the Code specified acceptable ranges are based upon a percentage of the baseline, an increase in flow of less that 0.5 gpm (1.02 x baseline flow rate) is sufficient to force any of the pumps into the required action range.
>
> The design required fuel delivery rates for each of the diesel generators (supplied by the day tanks which the DO pumps maintain) is considerably less than the rated fuel delivery of any of the three DO pumps. The diesel engines are equipped with skid mounted pumps which supply fuel oil at a rate of 4 gpm per engine. The engines consume less than 3 gpm per engine with the excess routed back to the day tank. Pumps 1DO01PA and 1DP01PB supply 2 engines each and therefore 8 gpm has been determined to be the limiting flow rate required for these pumps to ensure adequate fuel delivery. Pump 1DO01PC supplies only 1 engine and therefore has a limiting flow rate of 4 gpm.
>
> CPS believes that due to the low flow characteristics of the DO pumps and the significant margin of safety between the flow

requirements of the diesel generator and the baseline flowrate provided by the DO pumps, compliance with the Code requirements constitute a hardship with no appreciable gain in safety.

3.2 Alternative Testing The licensee proposes:

Illinois Power will utilize the following Allowable, Alert, and Action ranges for Diesel Oil pump flowrates.

Acceptable Range	$\geq$ 14 gpm and $\leq$ 19 gpm
Alert Range	$\geq$ 13 and < 14 gpm or $\geq$ 19 and < 20 gpm
Action Range	< 13 gpm > 20 gpm

Based upon CPS's operating experience, CPS feels that the revised upper ranges will provide good indications of pump degradation without the unnecessary burden of requiring the pumps to be tested on an increased frequency or declared inoperable for minor (< 0.5 gpm) variations in flow rates.

3.3 Evaluation The Code requirements for establishing alert and required action ranges are to ensure that increased testing or required corrective actions are taken when pump test results indicate degrading performance. Generally, a pump will not indicate improved performance (increased flow rate results); therefore, the upper limits are established to indicate that a problem in the test method or test instrumentation exists, rather than a degrading condition in the pump itself. For pumps which have such a narrow margin of acceptable values, such as the subject DO pumps, an increase of 0.5 gpm may not be indicative of an actual problem. A 10% increase on the order of 1.5 to 2 gpm would be a reasonable margin for the upper limit requiring corrective action to assess what condition, such as instrument fluctuations, has caused the increase. This is supported in later editions of the Code which have been approved by NRC.

The requirements of Table IWP-3100-2 were changed in Operations and Maintenance (O&M) Standard Part 6, *Inservice Testing of Pumps in Light-Water Reactor Power Plants*, based on the general consensus that test failures that resulted from "higher than reference value" hydraulic measurements were caused by instrument fluctuations. The "high" alert values for hydraulic parameters were deleted. The "high" required action values were increased from 1.03 to 1.10 times reference value. The "high" required action values were maintained to assure test repeatability, thereby maintaining the quality of the vibration testing of the pumps. The lower limits for flow rate were increased for positive displacement pumps, and for centrifugal pumps, the alert limit was eliminated, with a required action limit of 0.90, based on the main emphasis of OM-6 pump operability being on vibration.

The NRC approved the use of OM-6 as alternative rules for pump testing in Revision 8 (November 1990) of Regulatory Guide (RG) 1.147, *Inservice Inspection Code Case Acceptability ASME Section XI Division 1*, Code Case N-465. However, in order to implement OM-6 per RG 1.147, the testing must comply with all of the requirements, or relief is required.

CPS does not comply with all of the requirements of OM-6, particularly in the vibration measurements of velocity rather than displacement. Therefore, while the increased limits of OM-6 for flow rate cannot be implemented for all pumps at CPS, relief is appropriate for the upper limits of the subject DO pumps to avoid declaring the pumps inoperable when no actual pump problem exists within the narrow margin of acceptable test values. The proposed alternative testing provides an acceptable level of quality and safety for the upper limits of flow rate for assessing the operational readiness and monitoring for degradation of these pumps, while maintaining an upper limit will ensure that problems with the testing method or test instrumentation will continue to be identified; however, the upper limits must be set in accordance with OM-10 for each specific pump rather than a single set of criteria for all three pumps (1.10 times the reference value). The values may be rounded up to the nearest whole number.

However, the lower limits should continue to be based on the Code-required multiples of 0.9 and 0.94 times the reference values for each specific DO pump. The licensee has provided no basis for the acceptability of utilizing limits lower than the Code-required values. In the graph provided as supporting information to the relief request, none of the values fell into the lower alert or required action ranges. Therefore, there is no basis that the imposition of the lower limits required by Code present a hardship without a compensating increase in the level of quality and safety.

3.4 Conclusion The staff concludes that relief should be granted pursuant to 10 CFR 50.55a(a)(3)(i) for the three diesel fuel oil transfer pumps to increase the upper alert and required action limits based on the proposed alternative testing providing an acceptable level of quality and safety, provided the upper limits are established in accordance with OM-10 for each pump. However, the proposed lower limits are not acceptable. The lower limits for alert and required action are to be established in accordance with the Code.

4.0 RELIEF REQUEST 2034

Relief from the requirements of ASME Section XI, Subsection IWV-3420, *Valve Leak Rate Testing*, for all containment isolation valves has been requested. IWV-3420 requires leak rate testing for valves where leakage is limited to a specific amount in fulfillment of their safety function. Subsection IWV-3423 further stipulates that this leak rate testing be performed with the system pressure differential in the same direction as when the valve is performing its function.

4.1 Licensee's Basis for Relief The licensee states:

> The Nuclear Regulatory Commission has concluded that the applicable leak rate test procedures and requirements for containment isolation valves are determined by 10CFR50, Appendix J. The ASME Code requires individual valve leak rate tests, while 10CFR50, Appendix J, allows testing of valves in groups. By establishing conservative acceptance criteria for a valve group (containment penetration) such that none of the valves can be significantly degraded, considerable savings in personnel radiation exposure and scheduling flexibility can be achieved. This approach is of benefit to Illinois Power and provides equivalent levels of quality and safety to those achieved through individual testing. As the purpose of these valves is to isolate the containment, testing in groups, i.e., by containment penetration, would verify the integrity of the containment boundary. By establishing conservative acceptance criteria, the condition of the valves within reasonable limits can also be established by this method.

4.2 Alternative Testing The licensee proposes:

> The maximum permissible leakage rate for a specific containment penetration (inboard and outboard isolation valves combined) will be specified utilizing conservative acceptance criteria which allows for detection of valve degradation within reasonable limits instead of a leakage rate for individual valves as required by IWV-3426, *Analysis of Leakage Rates*. Attachment 1 to this relief request [not restated in this SE] provides a technical basis for the acceptance criteria. The evaluation of test results will be based on the penetration leakage rate (inboard and outboard isolation valves combined) instead of on the individual valve leakage rate as required by IWV-3427, *Corrective Action*.

4.3 Evaluation Anomaly 4 of the previous SE indicated that leak rate testing of valve groups is acceptable when it is impractical to test individually provided the limits for leakage are established such that leakage through any individual valve in the group can be detected and the appropriate corrective action taken. The licensee has indicated that a leakage limit will be established for a group of valves based on the leakage which identifies valve degradation. The licensee's attachment to the relief request describes the method for establishing how the leakage limit will be established to ensure conservative acceptance criteria. The method is based on representative sizes of valve wear (degradation) which would result in excessive leakage and were verified during refueling outage RF-3 by experimentation using a local leak rate testing machine and precisely machined orifices of various sizes. Thus, the licensee has addressed the concern of Anomaly 4 regarding conservative acceptance criteria.

Relief Request 2034 expands the applicability of the previous requested relief to all containment isolation valves such that testing in groups is an acceptable alternative even when leak testing of an individual valve is practical, and to test in the reverse direction as allowed by Appendix J. Generic Letter 89-04, *Guidance on Developing Acceptable Inservice Testing Programs*, Attachment 1, Position 10, states that "the staff has determined that the leak test procedures and requirements for containment isolation valves specified in 10 CFR Part 50, Appendix J are equivalent to the requirements of IWV-3421 through 3425," but that "the licensee must comply with the analysis of leakage rates and corrective action requirements of Paragraphs IWV-3426 and 3427(a)."

Compliance with IWV-3426 and IWV-3427(a) can only be achieved by testing individual valves. However, the rulemaking which approved the 1989 Edition of Section XI, and by reference OM-10, *Inservice Testing of Valves in Light-Water Reactor Power Plants*, discusses leakage testing of containment isolation valves. The rulemaking takes exception to OM-10, Paragraph 4.2.2.2, for leak testing containment isolation valves in accordance with Appendix J, and imposes the additional requirements of Paragraph 4.2.2.3 to containment isolation valves, as well as other Category A valves. However, Paragraph 4.2.2.3 addresses the conditions which allow for exception to testing in the same direction as when the valve is performing its function, and addresses and allows testing valves in groups (valve combinations). Additionally, the owner is to specify the permissible leakage for a specific valve or valve combination. Corrective action is also addressed for valves or valve combinations.

Establishing acceptance criteria which provides limits for a group of valves, based on identification of increases in leakage indicative of degrading conditions in one valve, can provide a comparable level of assurance to testing of individual valves through the corrective actions taken. Once a leakage increase exceeds the acceptance criteria, the leakage pathway must be identified by methods structured for individual valves, repairs made when the leakage pathway is determined, and retesting performed to ensure all potential pathways were repaired such that leakage is within acceptable limits following maintenance. This procedure eliminates unnecessary individual valve leakage testing solely to meet two different regulatory requirements. Essentially, no additional information would be gained by performing individual valve leakage testing when the initial testing of a valve group indicates minimal or no leakage. When the group leakage does indicate increased leakage, an assessment to determine the leakage pathway would address individual valves. However, this procedure must comply with the requirements of Appendix J and OM-10 related to the direction of the test pressure against the seat of the valve.

The proposed alternative testing appears to be consistent with the requirements of OM-10 with the exception taken in the rulemaking. Therefore, the alternative testing can provide an acceptable level of quality and safety within the requirements approved by NRC for later editions of the Code (with

the stated exception), if the licensee's testing complies with the requirements of OM-10, Paragraph 4.2.2.3. with acceptable leakage limits based on the proposed method in Attachment 1 of Relief Request 2034.

4.4 Conclusion The staff concludes that relief should be granted pursuant to 10 CFR 50.55a(a)(3)(i) for testing containment isolation valves as allowed by Appendix J in groups provided the testing complies with the requirements of OM-10, Paragraph 4.2.2.3, for leakage testing in the reverse direction, leakage limits, and corrective action for the valve group. The granting of relief is to be based on the alternative testing providing an acceptable level of quality and safety as evidenced by NRC approval of OM-10.

5.0 RELIEF REQUEST 2008

Relief from the requirements of IWV-3520 to full-stroke exercise valves individually every 3 months is requested for five valves. Valve 1E22-F006 is located between high pressure core spray (HP) water-leg pump and the main HP injection line. It is a 2-inch stop-check valve, ASME Class 2, Category C valve. Valves 1E12-F085A/B/C and 1E21-F034 are located between the water-leg pumps and their respective injection lines, residual heat removal (RHR) and low pressure core spray (LP). They are ASME Class 2, Category C, 2-inch stop-check valves of identical design.

5.1 Licensee's Basis for Relief The licensee states:

> The above groups of valves, although located in separate systems, have similar configurations; they are check valves located in series with other check valves and no test connections provided between them to permit individual valve testing.
>
> Each of these valves has a separate check valve in series. The two check valves in series, although not required by design or safety analysis, provide an added assurance that the high pressure Emergency Core Cooling System (ECCS) line will not damage the lower pressure water-leg piping. Illinois Power Company considers these two check valves in series as a single entity and will test them as such.

5.2 Alternative Testing The licensee proposes:

> Illinois Power Company considers these two check valves in series a single entity and will perform the closure test every three (3) months as a single unit. Acceptance criteria will be established and in the event of not meeting this criteria, appropriate action will be initiated for the entity and the deficiency will be corrected. The open exercise of these valves will also be performed every three (3) months.

5.3 Evaluation The previous NRC SE granted interim relief for the licensee to use a disassembly and inspection process for verifying the closure capability of the in-series check valves, such that during the interim an alternative testing method could be developed to verify closure by some other means. Disassembly and inspection of check valves is not equivalent to a test. Performance of a test that verifies the two in-series check valves quarterly, with appropriate acceptance criteria and corrective action for the pair of valves, is considered a better alternative than disassembly and inspection of the individual valves. There are a number of risks associated with disassembly and inspection, and it is not considered an acceptable alternative for closure verification when other means are practical.

The licensee's proposed alternative addresses the concern identified in the previous safety evaluation, and it will verify closure by a means other than disassembly and inspection. Due to the design of the system, verification of the closure of individual valves is impractical. There are no test connections provided between the valves to permit individual valve testing and it would be a burden to require the licensee to install these test connections if individual testing requirements were imposed. The testing of the valves in pairs, with acceptance criteria established for the pair of valves such that corrective action will be initiated for both valves, provides adequate assurance of the operational readiness of the valve pairs at the Code required frequency. As stated in the relief request, the safety analysis for CPS credits only a single unit, and is not based on assuming dual valves. The licensee should apply the same level of quality assurance to both in-series valves in order to treat them as a single unit (i.e., both valves should be considered safety related for testing purposes) and include both valves in the IST program as a single unit.

5.4 Conclusion The staff concludes that relief should be granted to verify closure of the five pairs of check valves as a unit rather than by individual valve testing pursuant to 10 CFR 50.55a (f)(6)(i) based on (1) the impracticality of performing the testing in accordance with Code requirements for individual valves, (2) the burden upon the licensee if the requirements were imposed, and (3) the proposed alternative testing providing adequate assurance of the operational readiness of the valve pairs.

6.0 RELIEF REQUEST 2033

Relief is requested for valves 1G33-F051 and 1G33-F052A/B, injection check valves which complete the flow path between the reactor water cleanup (RT) system and the reactor pressure vessel. These valves are ASME Class 2, Category C [relief request states Category B which is incorrect for check valves], 4-inch valves of identical design. Section XI, IWV-3520, requires these valves be full-stroke exercised individually every 3 months.

6.1 Licensee's Basis for Relief The licensee states:

> 1G33-F052A/B are parallel valves in the piping system and both of these valves are in series with 1G33-F051. These valves are located in series with no test connections provided between them to permit individual valve testing. Illinois Power Company considers valves 1G33-F052A and 1G33-F051 (both are in series) as a single entity and will test the valves as such. Valves 1G33-F052B and 1G33-F051 (both are in series) are also considered as a single entity for testing purposes and will be tested as such.
>
> These units (valves) cannot be tested every three (3) months since they are located in the Steam Tunnel and physical access is restricted during normal plant operation due to the high radiation field in this area. Testing these valves during cold shutdown will either require the Reactor Water Cleanup (RT) System to be out of service or will require flow to be bypassed to the condenser. Testing these valves with RT system flow bypassed to the condenser may create spurious differential flow signals and may cause containment isolation valves in this system to isolate and subsequently trip the RT pumps, which will likely require filing a Licensee Event Report (LER). Either method will cause the RT system to be out of service and create potential delay for plant startup. This will cause unnecessary hardship for Illinois Power Company without any significant gain in safety.

6.2 Alternative Testing The licensee proposes:

> Illinois Power Company considers these check valves in series as a single entity and will perform the closure test every refueling outage on a single unit. Acceptance criteria will be established and in the event of not meeting this criteria, appropriate action will be initiated for the entity and the deficiency will be corrected.

6.3 Evaluation The previous NRC SE, Paragraph 3.10.2 of the TER, discussed the application of a sample disassembly and inspection program for verifying the closure capability of these valves due to the impracticality of individual valve leak testing to verify closure. It was recommended that the licensee investigate nonintrusive methods as alternatives to disassembly and inspection.

The proposed alternative discussed in this new relief request would verify closure by a leak test of two of the three valves at a time. Each of the parallel valves would be tested in series with 1G33-F051. The licensee's basis for relief indicates that they will treat the two groups as two single entities, but they do not state that the safety analysis assumptions treat the design as crediting only a single valve. In effect, testing of the three valves could pass if only a single valve is capable of closure (1G33-F051).

Relief as requested is not justified. The licensee should reinstate the relief as approved in the previous SE to employ a disassembly and inspection program, investigate and implement nonintrusive methods, or include test connections which would allow individual valve testing. If additional information exists which justifies that a single valve (1G33-F051) meets all design and safety assumptions, considering single failure criteria, etc., a revised relief request may be submitted. The proposed alternative testing is otherwise unacceptable.

6.4 Conclusion The staff concludes that relief as requested should be denied. The previous SE granted relief to employ a disassembly and inspection program to these valves. The relief request should be revised to reinstate the disassembly and inspection program, or to provide additional justification for the proposed alternative. The revised relief request should be submitted within 90 days of the date of this SE.

7.0 RELIEF REQUEST 2014

The licensee has requested relief for extension of the test interval for testable check valves 1E12-F041A/B/C, 1E21-F006 and 1E22-F005 which provide isolation from the reactor coolant system and the emergency core cooling system (residual heat removal, low pressure core spray, high pressure core spray). These valves are ASME Class 1, Category A/C valves. Valves 1E12-F041A/B/C are 12-inch diameter and valves 1E21-F006 and 1E22-F005 are 10-inch diameter. All of these valves are non-slam check valves.

7.1 Licensee's Basis for Relief The licensee states:

> Exercising these valves on a three month frequency using the emergency core cooling system pumps to inject water into the reactor is not in the interest of plant safety, because this cooler water would create an undesirable power transient. In addition, neither the Low Pressure Core Spray nor Residual Heat Removal pumps are capable of opening their injection valves against full reactor pressure. Mechanically exercising these valves during reactor operation is not practical because they are located inside the drywell and access is restricted due to radiation conditions.
>
> Mechanically exercising these valves on a cold shutdown frequency as allowed by the ASME Code is not practical because the air operator is not designed to perform a full-stroke test. Although the air operator can be removed to perform the full-stroke test, this is a significant maintenance activity and could interfere with work which is necessary to restore the plant to service. This would create an unreasonable hardship for Illinois Power Company which is not consistent with the guidelines for cold shutdown testing which were provided in Generic Letter 89-04.

Using pump pressure to exercise these valves during cold shutdown is also not in the interest of plant safety. Although temperature could be matched fairly closely between the injection source (emergency core cooling systems) and the reactor, a minor thermal mismatch between these temperatures creates an undesirable effect on the fatigue life of the reactor nozzles.

In addition, the injection lines associated with the residual heat removal system nozzles are not equipped with internal sparges. General Electric Service Information Letter 401 identifies problems in injecting water through this flow path and the potential damage to nuclear instrumentation or fuel assemblies which could occur if this flow path were used for other than emergency conditions.

7.2 Alternative Testing The licensee proposes:

Illinois Power Company will partial-stroke exercise these valves using the air operators during cold shutdown and full-stroke exercise the valves by removing the air actuator during refueling outages and measuring the torque required to lift the disc and then move the disc through a full-stroke.

7.3 Evaluation Section XI requires full-stroke exercising of check valves quarterly, or during cold shutdown, to verify that the disc opens adequately to allow design basis flow, and to verify that on cessation of flow, the disc reseats and no obstruction is preventing closure. Mechanical opening force and the associated requirements to verify opening using a mechanical exerciser are discussed in IWV-3522(b). The force or torque delivered to the disc by the exerciser must be limited to less than 10% of the equivalent force or torque represented by the minimum emergency condition pressure differential acting on the disc, or to 200% of the actual observed force or torque required to perform the exercise on the valve when the valve is new and in good operating condition, whichever is less.

For testing during power operations, the injection of water cooler than primary water would cause power transients. No other flowpath is available for testing the subject valves. Therefore, it is impractical to perform testing quarterly. Imposition of the quarterly testing would be a burden in that an alternative flowpath which would not inject water into the reactor vessel would have to be installed in the ECCS systems.

Full-stroke testing the valves during cold shutdown conditions could delay startup due to the time involved in removing the air operator and performing the testing. (NOTE: The licensee refers to guidelines for cold shutdown testing provided in GL 89-04. In fact, GL 89-04 did not provide guidelines for cold shutdown testing.) A second important issue related to the impracticality of performing testing during cold shutdown is the effect of flow impingement on the reactor internals when injecting through the low

pressure injection nozzles. The referenced General Electric Service Information Letter, SIL-401, concludes that the flow should not be injected in non-emergency conditions due to thermal fatigue (power operating conditions) and the possible damage caused during non-power operating conditions. E.en with flow deflectors, flow could cause channel wear or burnishing of the fuel channels. Imposition of the Code requirements would be a burden on the licensee in that damage to fuel channel or other reactor internals would immediately, or over a period of time, result.

The 1989 Edition of ASME Section XI has been incorporated by rulemaking to 10 CFR 50.55a. IWV specifies that, for inservice testing of valves, OM-10 provides the requirements. OM-10, Paragraph 4.3.2.2(e) specifies that if exercising is not practicable during plant operation or cold shutdowns, it may be limited to full-stroke during refueling outages. Therefore, the deferral of the testing of the subject check valves to refueling outages provides adequate assurance of the operational readiness of the valves. The Code requirements for the use of the mechanical exerciser must be met.

7.4 Conclusion The staff concludes that relief should be granted for deferral of testing to refueling outages for the subject injection check valves pursuant to 10 CFR 50.55a(f)(6)(i) based on (1) the impracticality of performing the testing quarterly or during cold shutdown conditions, (2) the burden on the licensee if the requirements were imposed, and (3) the alternative testing providing adequate assurance of the operational readiness of the valves, provided the Code requirements for the use of mechanical exercisers are met.

Attachment: Table 1

Principal Contributor: P. L. Campbell

Date: September 25, 1992

Table 1
Safety Evaluation for Clinton Power Station
Response to NRC September 30, 1991, Safety Evaluation Anomalies
Illinois Power Response Dated June 25, 1992

Anomaly Number	Description of Anomaly in NRC SE Dated September 30, 1991	Illinois Power Response to Anomaly	Remaining Action
Anomaly 1 Relief Request 3006	The licensee requested general relief from the Code specified allowable ranges for pump flow rate and differential pressure. General relief was not granted. The licensee was to request relief on a pump specific basis.	RR 3006 was revised to address only the four water-leg pumps 1E12-C003, 1E21-C002, 1E22-C003, and 1E51-C003. The revised relief request provided additional justification for alternative acceptance criteria for these four pumps based on historical pump performance.	Revised RR 3006 is evaluated in the current SE, Section 2.0. Relief is granted per 10 CFR 50.55a (a)(3)(i).
Anomaly 2 Relief Request 3002	The licensee proposed to calculate the flow rate for the diesel generator fuel oil transfer pumps and requested relief from the Code specified allowable ranges for pump flow rate. The proposed allowable ranges were not acceptable because they could allow substantial pump degradation without corrective action required. Relief was denied. If the calculated methods could be as accurate as the Code, relief may be acceptable; otherwise, the licensee should consider installation of flow instrumentation.	The pump flow rate can be calculated with sufficient accuracy and repeatability to meet the Code requirements. RR 3002 was revised to provide additional justification for the allowable pump flow rate ranges proposed for these pumps based on historical performance.	Revised RR 3002 is evaluated in the current SE, Section 3.0. Relief is granted for the proposed upper limits, per 10 CFR 50.55a (a)(3)(i), but not for the proposed lower limits. The revised relief request no longer addresses the calculation of flow which was previously approved. This should be reinstated to the relief request unless the licensee no longer intends to calculate flow.

Anomaly Number	Description of Anomaly in NRC SE Dated September 30, 1991	Illinois Power Response to Anomaly	Remaining Action
Anomaly 3 Relief Request 1002	The licensee requested relief from testing safety-related pumps or valves when the redundant subsystem is out of service for maintenance or repairs, and perform the required testing within 7 days after the subsystem is restored. Relief was not granted on a general basis. The licensee was to submit specific relief requests for components where a Technical Specification Action Statement could be exceeded.	RR 1002 has been withdrawn. The testing will be performed in accordance with the Code requirements.	No further action is required.
Anomaly 4 Relief Request 2011	Relief was requested from the Code requirement to individually leak rate test certain containment isolation valves in pairs. Testing in groups was accepted for relief provided group leakage limits are conservatively set such that excessive leakage through any individual valve in the group can be detected and the appropriate corrective action taken.	During the RF-3 refueling outage (1992), the licensee performed a series of tests to determine if seat leakage was related to the size of a valve, or was more closely related to the size of a postulated score on the seating surface. Based on these tests, additional justification for the proposed acceptance criteria of the valves groups has been included in a new relief request, RR 2034.	RR 2011, as revised, documents that the guidance in GL 89-04, Position 10, for not applying IWV-3427(b) to containment isolation valves, is approved per GL 89-04. Implementation is subject to NRC inspection. New RR 2034 is evaluated in the current SE, Section 4.0. Relief is granted per 10 CFR 50.55a(a)(3)(i).
Anomaly 5 Relief Request 2021	Relief was requested from the Code requirement to perform post-maintenance testing for valves that undergo maintenance which could affect valve performance (packing adjustment). Relief was granted with guidance to be applied when the post-maintenance testing was to be deferred.	RR 2021 was withdrawn. Post-maintenance testing will be performed in accordance with the Code following valve stem packing adjustments.	No further action is required.
Anomaly 6 Relief Request 2027	Relief from the Code requirement to perform Section XI leak rate tests on the drywell isolation valves was requested. Interim relief to perform a drywell bypass leakage test as an alternative was granted.	The drywell isolation valves have been reevaluated and are now categorized as Category B or C valves. Therefore, individual valve leak rate testing is not required. RR 2027 has been withdrawn.	No further action is required.

Anomaly Number	Description of Anomaly in NRC SE Dated September 30, 1991	Illinois Power Response to Anomaly	Remaining Action
Anomaly 7 Relief Request 2011	The licensee requested relief from the leak rate testing requirements for the excess flow check valves and proposed to verify leakage is not excessive during the containment integrated leak rate test every 40 months. Relief was granted provided the licensee also demonstrates that each excess flow check actuates to restrict flow when subjected to the set differential pressure.	The IST program and implementing procedures currently verify that each excess flow check valve actuates to restrict flow when subjected to the set differential pressure.	No further action is required.
Anomaly 8 Relief Request 2008	The licensee requested relief from the exercising frequency requirements of the Code for the water-leg keep-fill check valves and proposed to verify valve closure by sample disassembly and inspection during refueling outages. Interim relief was granted to allow the licensee a period of time to develop other testing methods.	RR 2008 has been revised to propose testing the in-series check valves as a single unit on a quarterly basis. Reactor water cleanup check valves have been removed from RR 2008 and a new relief request (RR 2033) has been submitted to address these valves.	Revised RR 2008 is evaluated in the current SE, Section 5.0. Relief is granted per 10 CFR 50.55a(f)(6)(i). RR 2033 is evaluated in the current SE, Section 6.0. Relief is denied.
Anomaly 9 Relief Request 2012	The licensee requested relief from the exercising frequency and stroke time measurement requirements of the Code for the main steam automatic depressurization system valves and proposed to exercise these valves during refueling outages but not measure stroke time. Relief was granted provided the licensee develop a method to monitor for degrading conditions.	RR 2012 has been revised to reflect that the stroke time testing of these rapid-acting valves will be consistent with GL 89-04, Position 6. The implementation will be initiated in the next scheduled performance of these tests during the fourth refueling outage scheduled to begin in October 1993.	The application of the alternative testing of GL 89-04, Position 6, is approved by GL 89-04, provided the guidance delineated in the position is followed. Relief for extension of the test frequency was approved in the previous SE. Implementation is subject to NRC inspection.
Anomaly 10 Relief Request 2031	The licensee requested relief from the safety relief valve test method requirements of the Code for the main steam safety relief valves and proposed to replace 8 of the 16 valves each refueling outage with valves that have been refurbished, with not testing of additional valves based on failures. Relief was denied.	RR 2031 has been withdrawn. Testing of the main steam safety relief valves will be in accordance with the Code requirements.	No further action is required.

Anomaly Number	Description of Anomaly in NRC SE Dated September 30, 1991	Illinois Power Response to Anomaly	Remaining Action
Anomaly 11 Relief Request 2014	The licensee had requested relief for five valves which should be full-stroke exercised during cold shutdowns. Relief was not granted for these five valves.	RR 2014 has been revised to provide more technical justification for not performing a full-stroke exercise during cold shutdown conditions.	Revised RR 2014 is evaluated in the current SE, Section 7.0. Relief is granted per 10 CFR 50.55a(f)(6)(i), provided the Code requirements for the use of mechanical exercisers are met.
Anomaly 12 Relief Request 2029	The licensee proposed to verify closure of the check valves in the air lines to valves operator accumulators by performing a pressure drop test of each accumulator. Relief was granted provided the licensee specifically identifies acceptance criteria for these pressure drop tests in the IST program and test procedures.	The IST program and implementing procedures currently provide acceptance criteria for these pressure drop tests.	No further action is required.
Anomaly 13 Relief Request 2030	The licensee requested relief form the exercising frequency requirements of the Code for closure of valves 1E12-F050A/B and proposed to exercise these valves closed once every two years in conjunction with the Code required leak test. Relief was denied based on inadequate justification.	RR 2030 has been withdrawn. Testing will be performed in accordance with Code requirements.	No further action is required.
Anomaly 14 Relief Request 2007	Relief from the stroke time measurement requirements for 1E12-F095 was requested. Interim relief was granted to allow the licensee a period of time to develop a method to monitor the valve for degradation.	The IST program has been revised to reflect that valve 1E12-F095 does not have an active safety function, and, therefore, stroke time measurement is not required. RR 2007 has been withdrawn.	No further action is required.
Anomaly 15 Relief Request 2020	The licensee requested relief from full-stroke exercising testable check 1E51-F066, proposing to partial-stroke exercise the valve during cold shutdowns. Interim relief was granted to allow the licensee a period of time to develop a method to full-stroke this valve during cold shutdown.	RR 2020 has been withdrawn. Testing will be performed in accordance with the Code.	No further action is required.

Anomaly Number	Description of Anomaly in NRC SE Dated September 30, 1991	Illinois Power Response to Anomaly	Remaining Action
Anomaly 16 Relief Request 2030	Relief from the Code exercising frequency requirements for closure of valve 1E51-F040 was requested, with a proposal to exercise this valve closed once every two years in conjunction with the Code required leak test. Relief was denied.	RR 2030 has been withdrawn. Testing will be performed in accordance with the Code.	No further action is required.
Anomaly 17 Relief Request 2030	Relief from the Code exercising frequency requirements for closure of valve 1C41-F006 was requested, with a proposal to exercise this valve closed once every two years in conjunction with the Code required leak test. However, the IST program indicates that this valve is full-stroke exercised during cold shutdowns and there is no apparent reason that it cannot be verified closed at the frequency. Interim relief was granted to allow the licensee to develop test procedures to verify closure during cold shutdowns.	RR 2030 has been withdrawn. Testing will be performed in accordance with the Code.	No further action is required.
Anomaly 18 Relief Request 2017	Relief for not exercising the reactor water cleanup system isolation valves quarterly or during cold shutdown was requested. Relief was denied based on inadequate justification.	RR 2017 has been withdrawn. Testing will be performed in accordance with the Code.	No further action is required.
Anomaly 19 Relief Request 2026	Interim relief was granted for testing of the diesel generator air start valves by observing a decrease in air receiver pressure. The licensee was to develop a means to monitor the valves for degradation.	These valves are not ASME Code Class 1, 2, or 3 valves; therefore, the relief request has been revised to state that the testing is "augmented" and does not require NRC approval.	No further action is required.
Anomaly 20 Relief Request 2024	The justification provided does not specifically apply to the HCU-114 valves since they are Category C check valves which do not require stroke time measurement. A more specific technical justification should be provided for these valves.	These valves are not ASME Code Class 1, 2, or 3 valves; therefore, the relief request has been revised to state that the testing is "augmented" and does not require NRC approval.	No further action is required.

Anomaly Number	Description of Anomaly in NRC SE Dated September 30, 1991	Illinois Power Response to Anomaly	Remaining Action
Anomaly 21 Relief Request 1001	The test frequency interval extensions requested in RR 1001 should not apply to safety and relief valves which are tested once every five years in accordance with the schedule established by Table IWV-3510-1. This test schedule covers a long time period and already has one built-in scheduling flexibility. The proposed extension should not be necessary.	RR 1001 has been revised to apply only to those tests which are required on a quarterly or shorter testing frequency. The scope of the revised relief request is bounded by the approval in the previous SE.	No further action is required.