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SAFETY EVALUATION REPORT, PUMP AND VALVE INSERVICE TESTING PROGRAM, PALISADES NUCLEAR PLANT

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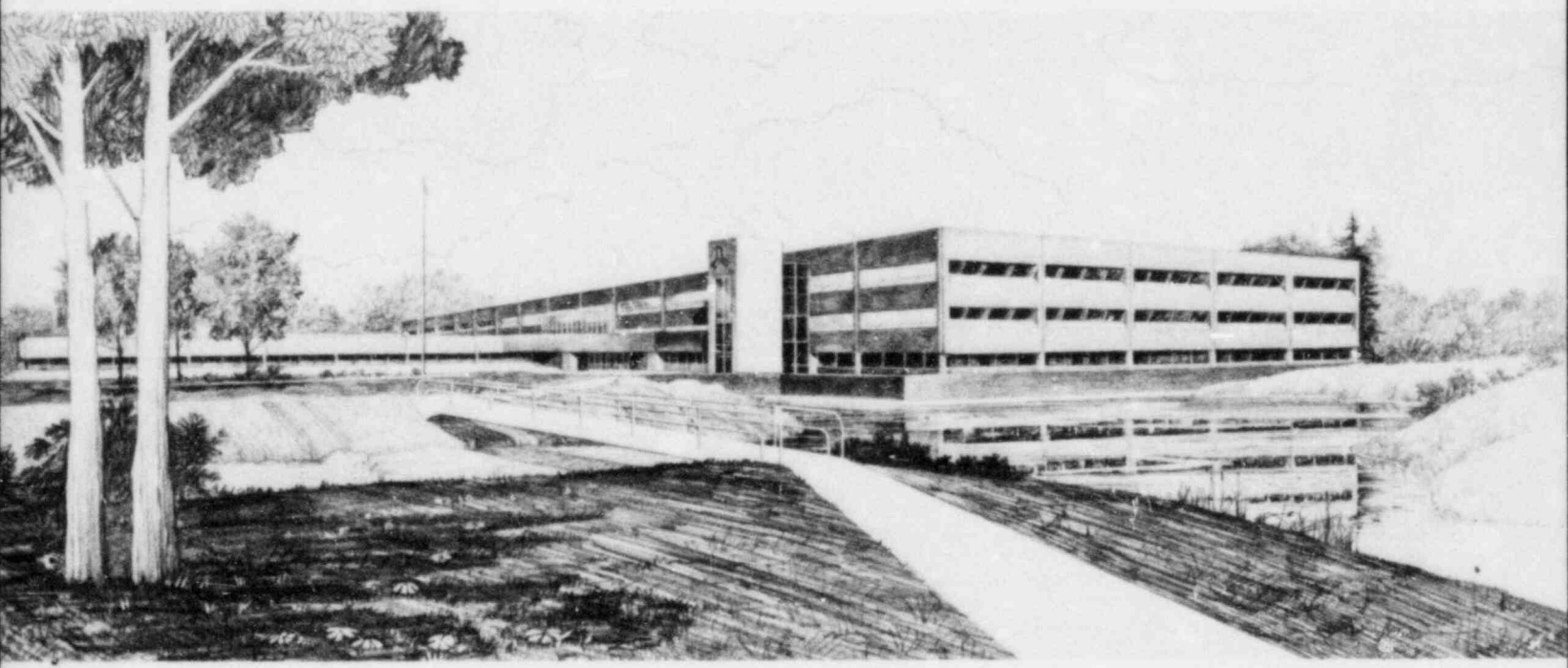
Idaho National Engineering Laboratory
Operated by the U.S. Department of Energy



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SAFETY EVALUATION REPORT
PUMP AND VALVE INSERVICE TESTING PROGRAM
PALISADES NUCLEAR PLANT

February 1983

C. B. Ransom
H. C. Rockhold

Reliability and Statistics Branch
Engineering Analysis Division
EG&G Idaho, Inc.

Docket No. 50-255

ABSTRACT

This EG&G Idaho, Inc. report presents the results of our evaluation of the Palisades Nuclear Plant Inservice Testing Program for safety-related pumps and valves.

FOREWORD

This report is supplied as part of the "Review of Pump and Valve Inservice Testing Programs for Operating Plants" Program being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Division of Engineering, by EG&G Idaho, Inc., Reliability and Statistics Branch.

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1. INTRODUCTION

Contained herein is a safety evaluation of the pump and valve inservice testing (IST) program submitted by the Consumers Power Company (CPC) for its Palisades Nuclear Plant.

EG&G Idaho, Inc., received a Palisades IST program submittal (Revision 7), dated October 28, 1981 and performed an evaluation of the program's variance with the program dated February 21, 1979 (Revision 4). The February 21, 1979 program had been reviewed by the USNRC. The changes between the programs were evaluated and those items that were not in compliance with the ASME Boiler and Pressure Vessel Code, Section XI were identified. Those items were discussed in conference calls between Consumers Power Company personnel, USNRC representatives, and EG&G Idaho reviewers on May 6 and May 21, 1982. The licensee's valve program resubmittal, dated August 6, 1982, (Revision 10) was received by EG&G Idaho, Inc., on September 7, 1982, and reviewed to verify compliance of the proposed tests of safety-related Class 1, 2, and 3 valves with requirements Section XI, 1977 Edition, through the summer of 1979 addenda. The licensee's pump resubmittal, dated May 20, 1982, was received by EG&G Idaho, Inc., on June 11, 1982, and reviewed to verify compliance of proposed tests of safety-related Class 1, 2, and 3 pumps with requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1977 Edition, through the Summer of 1979 addenda. In their resubmittal the licensee requested relief from the ASME Code testing requirements for specified pumps and valves because of practical reasons. These requests have been evaluated individually to determine whether they have significant risk implications and whether the tests, as required, are indeed impractical.

The evaluations presented in this SER of the Palisades pump and valve testing program and its associated relief requests, are the recommendations of EG&G Idaho, Inc.

A summary of pump and valve testing requirements is provided in Appendix A.

Category A, B, and C valves that meet the requirements of Section XI and are not exercised quarterly are listed in Attachment 1.

A listing of P&IDs used for this review is contained in Attachment 2.

Valves that are never full-stroke exercised or that have a testing interval greater than each refueling outage, and relief requests with insufficient technical basis where relief is not recommended are summarized in Attachment 3. This attachment also contains a list of pumps and valves that are not currently included in the IST program which we feel perform a safety-related function and should be included in the program.

A listing of minor inconsistencies in the Palisades IST Program which were noted during the course of our review is contained in Attachment 4. Resolution of these items should not affect our evaluation of the Palisades program, but it should make it more correct and complete.

2. PUMP TESTING PROGRAM

The IST program submitted by the Palisades Nuclear Plant was examined to verify that Class 1, 2, and 3 safety-related pumps were included in the program and that those pumps are subjected to the periodic tests as required by the ASME Code, Section XI. Our review found that, except for those pumps identified in Attachment 3, all Class 1, 2, and 3 safety-related pumps were included in the IST program. Our review has also found that, except for the items for which relief has been requested, the pump tests and frequency of testing comply with the Code. Each of the licensee's basis for requesting relief from the pump testing requirements and the EG&G Idaho evaluation of that request is summarized below.

2.1 Pump Suction Pressure Measurements

2.1.1 Relief Request

The licensee has requested specific relief from the test requirement of directly measuring the pump inlet pressure for all of the Class 1, 2, and 3 safety-related pumps included in the Palisades IST program. P_i cannot be directly measured on these pumps because there are no inlet pressure instruments installed in the affected systems. The pump suction pressures will be determined by measuring the height difference between the pumps and the level of the suction sources for each particular pump and then using that information to perform the appropriate calculations.

2.1.1.1 Code Requirement. Refer to IWP-3100 of the ASME B&PV Code, Section XI.

2.1.1.2 Licensee's Basis for Requesting Relief. No provisions have been made on any of the pumps included in the IST program to directly measure pump suction pressures. These will be calculated from the height difference between each pump and the level in the expansion tank on the suction side of the pump. These tank levels will be measured once with the pump running, since tank level with the particular pump turned off is immaterial.

2.1.1.3 Evaluation. We agree with the licensee's basis and, therefore, feel that relief should be granted from the inlet pressure measuring requirement of IWP-3100 of the ASME B&PV Code, Section XI, for all of the pumps in the Palisades IST program. The licensee has demonstrated that this pressure cannot be measured directly due to the lack of installed instrumentation. The pump suction pressure can be adequately calculated using the measured water height above the pump suction, therefore, the intent of IWP-3100 is satisfied.

2.1.1.4 Conclusion. We conclude that the licensee's proposal to calculate pump inlet pressure using the measurement of the fluid height above the pump suction should provide sufficient information to adequately monitor pump degradation and meet the intent of the Section XI requirements. Based on the considerations discussed above, we conclude that the alternate testing proposed will give reasonable assurance of pump operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

2.2 Pump Bearing Temperature Measurements

2.2.1 Relief Request

The licensee has requested specific relief from the test requirement of measuring the pump bearing temperature on some of the pumps included in the Palisades IST program. No measurement can be made on the pump bearing because the pump itself is inaccessible due to it's location or environment. Alternative measurements, if any, are identified in the appropriate test procedure for the affected pumps.

2.2.1.1 Code Requirements. Refer to IWP-4310 of the ASME B&PV Code, Section XI.

2.2.1.2 Licensee's Basis for Requesting Relief. An indication of bearing temperature and trends will normally be obtained using a calibrated

contact pyrometer on the outside of the bearing housing. When no measurement can be made, the specific exception to this Code requirement will be noted in each individual test procedure.

2.2.1.3 Evaluation. We agree with the licensee's basis, that some pump bearings are inaccessible and bearing temperature measurements cannot be made. However, we cannot recommend the granting of specific relief from the Code requirements since the licensee has not identified the affected pumps or provided a specific technical relief request for each group of similar pumps, explaining the impracticality of testing and providing a detailed explanation of the alternate tests to be performed. The licensee should include these relief requests in the IST pump program.

2.2.1.4 Conclusion. We conclude that relief should be granted for all of the pumps whose bearings are found to be inaccessible and whose test procedures meet the intent of the Code by providing, where practical, an alternate testing method to allow determination of any pump degradation, when this information is provided by the licensee. Based on the considerations discussed above, we conclude that the testing proposed will give reasonable assurance of pump operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

2.3 Pump Differential Pressure Measurements

2.3.1 Relief Request

The licensee has requested specific relief from the test requirement of measuring the pump differential pressure for all of the Class 1, 2, and 3 safety-related pumps included in the Palisades IST program. ΔP cannot be directly measured for these pumps because there are no ΔP instruments installed in the systems to measure the pump differential pressure. The ΔP will be determined by subtracting the calculated inlet pressure from the measured pump outlet pressure.

2.3.1.1 Code Requirement. Refer to IWP-3100 of the ASME B&PV Code, Section XI.

2.3.1.2 Licensee's Basis for Requesting Relief. Plant design will not permit direct measurement of differential pressures; they will be derived using the measured pump discharge pressure and the calculated pump suction pressure. This derived differential pressure will be used as the basis for comparing pump performance from test to test.

2.3.1.3 Evaluation. We agree with the licensee's basis and, therefore, feel that relief should be granted from the differential pressure measurement requirement of IWP-3100 of the ASME B&PV Code, Section XI, for all of the pumps in the Palisades IST program. The licensee has demonstrated that this parameter cannot be measured directly due to the lack of installed ΔP instrumentation. The ΔP can be determined by subtracting the calculated pump inlet pressure from the measured pump outlet pressure, therefore, the intent of IWP-3100 is satisfied.

2.3.1.4 Conclusion. We conclude that the licensee's proposal to derive pump ΔP using the calculated pump inlet pressure and the measured pump outlet pressure should provide sufficient information to adequately monitor pump degradation and meet the intent of the Section XI requirements. Based on the considerations discussed above, we conclude that the alternate testing proposed will give reasonable assurance of pump operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

2.4 Measurement of Both Flow and Differential Pressure

2.4.1 Relief Request

The licensee has requested specific relief from the test requirement of measurement of both pump flow and pump differential pressure for all pumps included in the Palisades IST program. Except for the service water pumps, these pumps can be tested in a fixed resistance system which would

permit the detection of pump degradation without measuring both flow and pump differential pressure. The licensee has proposed to determine the pumps ΔPs while they are operating in fixed resistance systems.

2.4.1.1 Code Requirement. Refer to IWP-3100 of the ASME B&PV Code, Section XI.

2.4.1.2 Licensee's Basis for Requesting Relief. Instrumentation is not available to measure both flow and discharge pressure for the pumps under test. It is, therefore, not possible to set a given reference flow while pressure is being measured. For all pumps except the service water pumps, however, the system test conditions are repeatable so that system resistance can be considered constant. Measuring either ΔP or flow, therefore, provides sufficient information to monitor pump hydraulic performance.

2.4.1.3 Evaluation. We agree with the licensee's basis and, therefore, feel that relief should be granted from the requirement of establishing either the reference flow-rate or differential pressure and then measuring the other parameter as stated in IWP-3100, for all pumps included in the Palisades IST program with the exception of the service water pumps. If a repeatable fixed resistance system is used when performing the pump tests, the flow rate does not have to be measured, for the ΔP measurement will provide sufficient information to detect pump degradation, which satisfies the intent of IWP-3100.

2.4.1.4 Conclusion. We conclude that the licensee's proposal to measure pump ΔP and not flow should provide sufficient information to adequately monitor pump degradation and meet the intent of the Section XI requirements. Based on the considerations discussed above, we conclude that the alternate testing proposed will give reasonable assurance of pump operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

2.4.2 Relief Request

The licensee has requested specific relief from the Section XI requirement of measurement of flow when testing service water pumps, P7A, P7B, and P7C, and proposed to utilize pump ΔP to determine the pumps performance.

2.4.2.1 Code Requirement. Refer to IWP-3100 of the ASME B&PV Code, Section XI

2.4.2.2 Licensee's Basis for Requesting Relief. For the service water system, flow resistance of the system will vary because of temperature control valves in the lines to many of the components cooled by service water. No flow indication is available, however. For these pumps, an empirical curve of discharge pressure vs lake temperature is used for the pump acceptance criteria.

2.4.2.3 Evaluation. The licensee has stated that there is no installed instrumentation to measure pump flow, therefore, flow cannot be measured as required by the Code. Since a fixed resistance system cannot be achieved for testing these pumps, we feel the licensee has not provided sufficient technical information to demonstrate that a true indication of the pumps performance can be obtained by measuring ΔP and lake temperature. We feel there are too many other variables that affect the system ΔP to allow recognition of a gradual degradation of the pump if the system flow is not also monitored.

2.4.2.4 Conclusion. We conclude that the licensee's technical justification is insufficient to provide a reasonable assurance that measuring pump outlet pressure and lake temperature will allow detection of pump degradation. Based on this consideration, we feel that the proposed testing does not meet the intent of the Section XI requirements. The licensee should investigate alternate testing methods that will provide a means of determining pump degradation and provide a reasonable assurance of the pumps capability to perform their safety-related function.

3. VALVE TESTING PROGRAM

The IST program submitted by Consumers Power Company dated August 6, 1982 was reviewed to verify that the listed Class 1, 2, and 3 valves that serve a safety-related function are subjected to the periodic tests required by the ASME B&PV Code, Section XI, and the NRC positions and guidelines. Our review found that, except as noted in Attachment 3, or where specific relief from testing has been requested, these valves are tested to the Code requirements and the NRC positions and guidelines which are summarized in Appendix A and Section 3.1 of this report. Each Consumers Power Company request for relief from the testing requirements, the Code requirement for testing, the licensee's basis for requesting relief, and the EG&G Idaho, Inc., evaluation and conclusions for that request is summarized below and grouped according to system and valve category.

3.1 General Considerations

3.1.1 Stroke Testing of Check Valves

The established NRC position is that check valves that have a safety-related function in the open position are expected to be full-stroke exercised during testing. If only limited operation is possible (and this has been demonstrated by the licensee and agreed to by the NRC), the check valve shall be partial-stroke exercised. Since disk position is not always observable, the NRC staff stated that verification of the plant's safety analysis design flow rate through the check valve would be an adequate demonstration of the full-stroke requirement. Any flow rate less than design will be considered partial-stroke exercising unless it can be shown that the check valve's disk position at the lower flow rate would permit a flow equivalent to or greater than the design flow rate through the valve.

3.1.2 Licensee Request for Relief to Exercise Valves at Cold Shutdowns

If it is impractical to exercise specific valves quarterly while the plant is operating, the Code permits the valves to be exercised during cold

shutdowns. The licensee has specifically identified the applicable valves in relief requests, and they are full-stroke exercised during cold shutdowns, thereby meeting the requirements of the ASME Code. Since the licensee is meeting the requirements of the ASME Code, it is not necessary to grant relief; however, during our review of the licensee's IST program, we have verified that we agree with the licensee's basis that it is not practical to exercise these valves during power operation. It should be noted that the NRC differentiates, for valve testing purposes, between the cold shutdown mode and the refueling mode. That is, for testing purposes, the refueling mode is not considered as a cold shutdown.

3.1.3 Valve Testing at Cold Shutdowns

Inservice valve testing at cold shutdowns is acceptable when the following conditions are met:

1. The licensee is to commence testing as soon as the cold shutdown condition is achieved but not later than 48 hours after shutdown, and continue until complete or the plant is ready to return to power.

2. Completion of all valve testing is not a prerequisite to return to power.

3. Any testing not completed at one cold shutdown should be performed during any subsequent cold shutdowns that may occur before refueling to meet the code-specified testing frequency.

For planned cold shutdowns, where ample time is available for testing all the valves identified for the cold shutdown test frequency in the IST program, exceptions to the 48 hours may be taken.

3.1.4 Category A Valve Leak Check Requirements for Containment Isolation Valves (CIVs)

All CIVs shall be classified as Category A valves. The current NRC position is that the Category A valve leak-rate test requirements of IWV-3421 through IWV-3425 have been superseded by 10CFR50, Appendix J requirements for CIVs. Relief from IWV-3421 through IWV-3425 for CIVs presents no safety problem since the intent of these sections is met by Appendix J requirements.

Based on the considerations discussed above, the NRC concludes that the alternate testing proposed will give the reasonable assurance of valve operability intended by the Code and that the relief thus granted will not endanger life or property or the common defense and security of the public.

3.1.5 Application of Appendix J Testing to the IST Program

The Appendix J review for this plant is a completely separate review from the IST program review. However, the determinations made by that review are directly applicable to the IST program. Our review has determined that the current IST program as submitted by the licensee correctly reflects the NRC's interpretation of Section XI vis-a-vis Appendix J. The licensee has agreed that, should the Appendix J program be amended, they will amend their IST program accordingly.

3.1.6 Safety-Related Valves

This review was limited to safety-related valves. Safety-related valves are defined as those valves that are needed to mitigate the consequences of an accident and/or to shut down the reactor and to maintain the reactor in a shutdown condition. Valves in this category would typically include certain ASME Code Class 1, 2, and 3 valves and could include some non-code class valves. It should be noted that the licensee may have included non-safety-related valves in their IST program as a decision on the licensee's part to expand the scope of their program.

3.2 Generic Relief Request

3.2.1 Relief Request

The licensee has requested specific relief from the exercising requirements of Section XI for the following passive containment isolation valves, and proposed that the valves be leak tested in accordance with 10CFR50, Appendix J.

3217ES	CV-1803	CV-1358
3227ES	CV-1805	1"-223 (Misc. Gas Supply, P&ID M-222)
3234ES	CV-1806	142VAS
3236ES	CV-1807	141VAS
3237ES	CV-1808	P-1 (High Pressure Air)
122CAS	CV-1813	P-2 (High Pressure Air)
2"-263 (Service Air, P&ID M-212)	CV-1814	P-3 (High Pressure Air)
CV-1501	0117SFP	601VA
CV-1502	0118SFP	603VA
CV-1503	0120SFP	604VA
4"-257 (Heating System, P&ID M-215)	0121SFP	605VA
		L-6VA

3.2.1.1 Code Requirement. Refer to Table IWV-3700-1 "Inservice Test Requirements" ASME B&PV Code, Section XI.

3.2.1.2 Licensee's Basis for Requesting Relief. These valves are normally closed passive containment isolation valves that are in their safety related position.

3.2.1.3 Evaluation. The licensee has identified these valves as passive valves that are not required to change position to perform their safety function. We have reviewed these valves and agree that they are passive valves in their safety-related position and are not required to open or close to mitigate the consequences of an accident or safely shut down the plant.

3.2.1.4 Conclusion. We conclude that the operability of these valves is inconsequential with regard to the safety function that they perform and that the Section XI quarterly stroke and stroke timing requirements are meaningless for passive valves.

3.3 Engineered Safeguards System

3.3.1 Category C Valves

3.3.1.1 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3101ES, 3116ES, 3131ES, and 3146ES, the check valves in the combined safety injection headers to the reactor coolant loops, and proposed to partial-stroke exercise the valves during hot and cold shutdowns and disassemble and stroke one valve on a ten year inservice inspection plan.

3.3.1.1.1 Code Requirement--Refer to Appendix A.

3.3.1.1.2 Licensee's Basis for Requesting Relief--The present plant configuration does not allow for flow testing these check valves to either the maximum design accident flow or the minimum flow that calculations show would fully open the valve disks. During cold shutdown the Shutdown Cooling System can achieve a maximum flow of 900 gpm through these valves. This testing cannot be performed during normal operation because the Shutdown Cooling System pressure is lower than PCS pressure. During hot shutdown a flow of approximately 40 gpm can be achieved by using the Charging System. Use of the Charging System to partial-stroke exercise

the valves is not desirable during normal plant operation because highly borated water would be injected into the PCS, which could result in a reactor trip.

3.3.1.1.3 Evaluation--We agree with the licensee's basis and, therefore, feel that temporary relief should be granted from the quarterly and cold shutdown full-stroke exercising requirements of Section XI for valves 3101ES, 3116ES, 3131ES, and 3146ES. The licensee has demonstrated that these valves cannot be full or partial-stroke exercised during power operation using the Shutdown Cooling System because the pump discharge pressure is less than the PCS pressure. They also stated that these valves cannot be partial-stroke exercised during power operation using the charging pumps because that would result in injecting highly borated water into the PCS which could cause a plant trip. We do not agree with this boric acid consideration, because the charging pump suction boric acid concentration is controlled at a proper level for the existing plant conditions. However, we do feel that using this flow path to exercise these valves during power operation could cause thermal shock to some system components which could result in their premature failure. As an alternate means of full stroke-exercising these valves, the licensee has proposed to disassemble one of the four valves to verify freedom of disk motion every ten years. If the inspection reveals any defective valve parts, the other three valves will be inspected and the inspection interval will be reduced to every refueling outage until no defective valve parts are found, at which time the inspection interval would revert to the 10 year inspection interval.

3.3.1.1.4 Conclusion--The current NRC position is that inspecting the valve internals every refueling outage is an acceptable alternate testing method. However, they have deferred their decision on the acceptability of lengthening this inspection frequency to a longer interval, especially one that might allow a valve to be installed for over 30 years without being full-stroke tested. In order to resolve this matter, the licensee should furnish to the NRC the results of the initial valve inspection so that an adequate inspection interval can be established.

3.3.1.2 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3102ES, 3117ES, 3132ES, and 3147ES, the safety injection tanks outlet check valves. This relief req est was incomplete in the program submitted to us for review; it did not contain the complete basis for relief or the alternative testing proposed by the licensee. We therefore, cannot complete the review of this relief request or make recommendations to either grant or not grant relief from the exercising requirements of Section XI.

3.3.1.3 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3216ES and 3226ES, the containment spray header check valves, and proposed to partial-stroke exercise the valves during cold shutdowns.

3.3.1.3.1 Code Requirement--Refer to Appendix A.

3.3.1.3.2 Licensee's Basis for Requesting Relief--Accident considerations require that the containment spray headers be filled to a level just below the spray rings whenever the reactor is critical. It is imprudent to test these valves during operation since Tech Specs will only allow single valve isolation of the spray headers, and single valve isolation is not adequate to assure containment spray would not result. These check valves can only be tested during cold shutdown when the spray headers can be drained. In addition, these check valves can only be full flow tested by initiating containment spray. Because of the recirculation piping configuration, a test flow of only 360 gpm can be achieved vs a minimum design spray flow of 1250 gpm. Since this flow, however, is very sensitive to check valve position, any significant change in the valves would be easily detectable.

3.3.1.3.3 Evaluation--We agree with the licensee's basis for not full-stroke exercising these valves with flow because of the equipment damage that would occur if water were sprayed into the containment. However, we feel insufficient technical justification has been provided to give reasonable assurance that these valves will pass the plant's safety

analysis design flowrate given that they are never full-stroke exercised. We feel that the licensee should further investigate alternate test methods to full-stroke exercise these valves. We temporarily agree with the licensee's basis for not partial-stroke exercising 3216ES and 3226ES quarterly, because if any leakage were to occur through the single isolation valves allowed by the Technical Specifications, it would result in water being sprayed inside containment which could cause considerable damage to plant equipment. However, we feel that chronic valve leakage is not a valid long term justification for not performing required valve testing. We feel that adequate maintenance should be performed or equipment replaced to reduce the leakage to a point where it will not preclude quarterly partial-stroke exercising of these valves.

3.3.1.3.4 Conclusion--We conclude that, with the present system design, full-stroke exercising these valves with flow is not feasible. However, we do not feel that relief should be granted that results in these valves never being full-stroke exercised. We recommend that the licensee further investigate alternate test methods, such as partial disassembly, etc., to full-stroke exercise 3216ES and 3226ES, since the proposed partial-stroke exercising does not meet the intent of the Code by providing reasonable assurance of the valves capability to pass the plant's safety analysis design flow rate.

3.3.1.4 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3104ES, 3119ES, 3134ES, and 3149ES, the high pressure injection to PCS header check valves, and proposed to partial-stroke exercise these valves during cold shutdowns and full-stroke exercise them during refueling outages.

3.3.1.4.1 Code Requirement--Refer to Appendix A.

3.3.1.4.2 Licensee's Basis for Requesting Relief--During hot plant conditions, the HPSI system design pressure is less than PCS pressure. Below a pressure of 1400 psi with the reactor vessel head installed, Technical Specifications require that the HPSI pumps be disabled

by removing their breaker control fuses to prevent possible PCS overpressurization. Partial-stroke testing is possible in cold shutdown, with the reactor vessel head installed, using the charging pumps for flow. Full stroke testing is possible during refueling outages with the reactor vessel head removed.

3.3.1.4.3 Evaluation--We agree with the licensee's basis and feel that relief should be granted from the exercising requirements of Section XI for check valves 3104ES, 3119ES, 3134ES, and 3149ES. The licensee has demonstrated that these valves cannot be full-stroke exercised with flow during power operation because the HPSI pumps do not develop sufficient head to pump into the PCS at normal operating pressures.

3.3.1.4.4 Conclusion--We conclude that partial-stroke exercising these valves during cold shutdowns, with the reactor vessel head installed, and full-stroke exercising them during refueling outages, when the reactor vessel head is removed to provide an adequate expansion volume, should provide a reasonable assurance of valve operability. On this basis we conclude that the public health and safety is not endangered by the proposed alternate testing and, therefore, we feel that relief should be granted.

3.3.1.5 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3250ES, 3251ES, 3252ES, and 3253ES, redundant high pressure injection to RCS header check valves, and proposed to partial-stroke exercise these valves during hot or cold shutdown and to full-stroke exercise them during refueling outages.

3.3.1.5.1 Code Requirement--Refer to Appendix A.

3.3.1.5.2 Licensee's Basis for Requesting Relief--Exercising these valves during normal plant operation would result in thermal shock and possibly a reactivity excursion from the injection of highly borated

water into the PCS. The resulting reactor power/PCS temperature excursion could result in a reactor trip. Partial-stroke exercising is possible during hot or cold shutdowns. Full stroke testing can only be performed during refueling outages when the reactor vessel head is removed because of pump discharge pressure limitations and technical specification limitations on operating HPSI pumps.

3.3.1.5.3 Evaluation--We agree with the licensee's basis and, therefore, feel that relief should be granted from the exercising requirements of Section XI for valves 3250ES, 3251ES, 3252ES, and 3253ES. The licensee has demonstrated that these valves cannot be full-stroke exercised during power operation because it would result in thermal shock to system components which could result in premature failure of the components or the associated welds. The HPSI pumps cannot be used to exercise these valves during power operation because they do not develop sufficient head to pump into the PCS at normal operating pressures. During cold shutdowns the HPSI pumps cannot be used to exercise the valves because the Technical Specifications require that, whenever the PCS pressure is below 1400 psi with the reactor vessel head installed, these pumps must be disabled to preclude a low-temperature overpressurization of the PCS.

3.3.1.5.4 Conclusion--We conclude that partial-stroke exercising these valves during cold shutdowns utilizing the charging pumps with the reactor vessel head installed, and full-stroke exercising them during refueling outages utilizing the HPSI pumps, with the reactor vessel head removed to provide an adequate expansion volume, should provide a reasonable assurance of valve operability. On this basis we conclude that the public health and safety is not endangered by the proposed alternate testing and, therefore, we feel that relief should be granted.

3.3.1.6 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3166ES and 3181ES, containment sump outlet check valves, and proposed to partial-stroke exercise these valves during cold shutdowns.

3.3.1.6.1 Code Requirement--Refer to Appendix A.

3.3.1.6.2 Licensee's Basis for Requesting Relief--Full-stroke exercising these valves with flow is not possible during any hot plant condition because the required pumps cannot be operated and because this testing would require the containment sump to be flooded. Full flow testing under any plant condition is undesirable because pumping the uncontrolled sump water into the PCS would result in contamination of the ESS systems and the PCS. Part-stroke testing during plant operation is not permissible because it would require disabling engineered safeguards equipment in excess of that allowed by plant Technical Specifications. Valve disassembly and manual stroking is not practical because the valves must be cut out of the piping to gain access to the discs.

3.3.1.6.3 Evaluation--We agree in part with the licensee's basis and feel that relief should be granted from exercising these valves quarterly during power operation. Exercising the valves during hot plant conditions would require violation of Technical Specifications by disabling portions of the Engineered Safeguard System. We also agree that the present plant configuration does not provide a means of full-stroke exercising these valves with flow without filling the containment sump and contaminating the PCS and ESS with low quality water. However, the licensee has not provided an alternate means of full-stroke exercising these valves nor has it provided an analysis that gives assurance that never full-stroke exercising these valves will not endanger life or property.

3.3.1.6.4 Conclusion--We conclude that, given the present plant design, partial-stroke exercising during cold shutdowns is the only practical method of testing these valves with flow. However, we recommend that relief not be granted from full-stroke exercising these valves; we feel the licensee should further investigate alternate test methods to demonstrate full-stroke operability of these valves.

3.3.1.7 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3239ES and 3240ES, the Safety Injection and Refueling Water (SIRW) tank outlet check valves, and proposed to partial-stroke exercise these valves quarterly.

3.3.1.7.1 Code Requirement--Refer to Appendix A.

3.3.1.7.2 Licensee's Basis for Requesting Relief--Full stroke exercising these valves with flow is not possible during any plant condition except a loss of coolant accident (LOCA) because it would require the use of the containment spray system along with one low pressure safety injection pump. Also valve disassembly and manual stroking is not practical because the valves cannot be isolated from the water in the SIRW tank. Part stroke testing can be performed at 950 gpm when inservice inspecting containment spray pumps.

3.3.1.7.3 Evaluation--We agree in part with the licensee's basis and feel that relief should be granted from the requirement of full-stroke exercising these valves quarterly during power operation. The licensee has demonstrated that these valves cannot be full-stroke exercised during power operation because doing so would require the initiation of the Containment Spray System which would result in damage to the piping insulation and electrical equipment inside containment. We also agree that the present plant configuration does not provide a practical means of full-stroke exercising these valves with flow during any non-accident plant condition. However, the licensee has not provided an alternate means of full-stroke exercising these valves, nor has it provided an analysis that gives assurance that never full-stroke exercising these valves will not endanger public life or property.

3.3.1.7.4 Conclusion--We conclude that given the present plant design, a partial-stroke exercise quarterly is the only practical method of testing these valves using flow. However, we recommend that relief not be

granted for never full-stroke exercising these valves; we feel the licensee should further investigate alternate testing methods to demonstrate full-stroke operability of these valves.

3.3.1.8 Relief Request. The licensee has requested specific relief from the exercising requirements of Section XI for 3186ES, 3171ES, 3177ES, the high-pressure safety injection (HPSI) pumps discharge check valves, and for 3183ES, and 3168ES, the HPSI pumps suction check valves, and proposed to full-stroke exercise all of these valves during refueling outages and to partial-stroke exercise 3168ES and 3183ES quarterly.

3.3.1.8.1 Code Requirement--Refer to Appendix A.

3.3.1.8.2 Licensee's Basis for Requesting Relief--During hot plant conditions the HPSI pumps will not develop sufficient head to overcome PCS pressure. Below 1400 psi, plant Technical Specifications require that the HPSI pumps be disabled by removing their breaker control fuses to prevent possible PCS low-temperature overpressurization. For 3186ES, 3177ES and 3171ES the only plant condition in which these valves can be exercised is during a refueling outage with the reactor vessel head removed. Valves 3168ES and 3183ES can be part-stroke tested during plant operation.

3.3.1.8.3 Evaluation--We agree with the licensee's basis and, therefore, feel that relief should be granted from the exercising requirements of Section XI for valves 3168ES, 3171ES, 3177ES, 3183ES, and 3186ES. The licensee has demonstrated that these five check valves cannot be full-stroke exercised quarterly, for to achieve the required flow-rate it would be necessary to inject water into the PCS, and the HPSI pumps cannot develop sufficient head to overcome normal operating PCS pressure. Valves 3171ES, 3177ES, and 3186ES cannot be partial-stroke exercised quarterly because there is no recirculation path that includes these valves. None of the five valves can be exercised during cold shutdown because the flow required could cause a low-temperature overpressurization of the PCS and Technical Specifications require that when the PCS pressure

is below 1400 psi and the reactor vessel head is installed that the HPSI pumps be disabled by removing their breaker control fuses. 3168ES and 3183ES cannot be full-stroke exercised during power operation because the HPSI pump mini-flow recirculation lines will not pass full system flow. These two suction check valves will be partial-stroke exercised quarterly during the HPSI pump tests.

3.3.1.8.4 Conclusion--We conclude that full-stroke exercising these valves during refueling outages, when the reactor vessel head is removed to provide an adequate expansion volume, should demonstrate proper valve operability. Based on the considerations discussed above, we conclude that partial-stroke exercising valves 3168ES and 3183ES quarterly and full-stroke exercising all of these valves during each refueling outage will give a reasonable assurance of valve operability thereby meeting the intent of the code, and that the relief thus granted will not endanger life or property or the common defense and security of the public.

APPENDIX A

1. CODE REQUIREMENT--VALVES

Subsection IWV-3411 of the 1977 Edition of the Section XI ASME Code (which discusses full-stroke and partial-stroke requirements) requires that Code Category A and B valves be exercised once every three months, with exceptions as defined in IWV-3412(a), IWV-3415, and IWV-3416. IWV-3521 (which discusses full-stroke and partial-stroke requirements) requires that Code Category C valves be exercised once every three months, with exceptions as defined in IWV-3522. In the above exceptions, the Code permits the valves to be tested at cold shutdown where:

1. It is not practical to exercise the valves to the position required to fulfill their function or to the partial position during power operation.

2. It is not practical to observe the operation of the valves (with failsafe actuators) upon loss of actuator power.

Subsection IWV-3413 requires all Category A and B power-operated valves to be stroke-time tested to the nearest second or 10% of the maximum allowable owner-specified time.

2. CODE REQUIREMENTS--PUMPS

An inservice test shall be conducted on all safety-related pumps, nominally once each month during normal plant operation. Each inservice test shall include the measurement, observation, and recording of all quantities in Table IWP-3100-1, except bearing temperature, which shall be measured during at least one inservice test each year.

ATTACHMENT 1

The following are Category A,B, and C valves that meet the exercising requirements of the ASME Code, Section XI, and are not full-stroke exercised every three months during plant operation. These valves are specifically identified by the owner and are full-stroke exercised during cold shutdowns and refueling outages. EG&G has reviewed all valves in this attachment and agrees with the licensee that testing these valves during power operation is not possible, due to the valve type and location or system design. We feel that these valves should not be exercised during power operation. These valves are listed below and grouped according to the system in which they are located.

1. PRIMARY COOLANT SYSTEM

1.1 Category B Valves

PRV-1067, 1068, 1069, 1070, 1071, and 1072, reactor vessel vent valves and Primary Coolant System high point vent valves, cannot be exercised during power operation. Exercising these valves will breach the Primary Coolant System and the Primary Coolant Pressure Boundary. During plant operation, this would result in a reduction of PCS pressure which could result in a subsequent reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

2. CHEMICAL & VOLUME CONTROL SYSTEM

2.1 Category A Valves

CV-2009, letdown line containment isolation valve, cannot be exercised during power operation. Exercising this valve would interrupt letdown flow from the Primary Coolant System and the subsequent reinitiation of flow could result in thermal shock to the regenerative heat exchanger which

could lead to premature failure of the heat exchanger. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

CV-2083, the containment isolation valve for the primary coolant pump seal controlled bleedoff line to the volume control tank, cannot be exercised during power operation. Exercising this valve will stop pump seal leakoff flow and could result in lifting of a relief valve. Exercising this valve quarterly could result in damage to the reactor coolant pumps. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

2.2 Category B Valves

MOV-2087, the volume control tank outlet isolation valve, cannot be exercised during power operation. Exercising this valve would isolate the normal charging/letdown flow path and the subsequent re-establishing of charging/letdown flow could thermal shock the regenerative heat exchanger and result in mechanical damage which could lead to premature failure of the heat exchanger. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

MO-2169 and 2170, concentrated boric acid gravity feed path isolation valves, cannot be exercised during power operation. Opening these valves during plant operation would result in a reactivity addition from injecting concentrated boric acid into the PCS. The resulting reactor power and PCS temperature excursion could cause a reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

2.3 Category C Valves

The following valves cannot be exercised during plant operation. These valves only open when there is flow of concentrated boric acid or highly borated SIRW tank water. Exercising any of these valves during plant operation would result in a reactivity excursion from injecting

concentrated boric acid into the PCS. The resulting reactor power and PCS temperature excursion could cause a reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

2138CVC - Concentrated boric acid pump discharge check valve

2139CVC - Concentrated boric acid pump discharge check valve

2141CVC - Boric acid blender bypass line check valve

2161CVC - SIRW tank to charging pump line check valve

2171CVC - Concentrated boric acid tank gravity feed line check valve

3. ENGINEERED SAFEGUARDS SYSTEM

3.1 Category B Valves

CV-3001 and 3002, the containment spray header isolation valves, cannot be exercised during plant operation. Accident considerations require that the containment spray headers be filled to a level just below the spray rings whenever the reactor is critical. The plant Technical Specifications only allow a single valve isolation of the spray headers during operation; CV-3001 and 3002 serve as this single isolation for the two spray headers. Therefore, exercising these valves quarterly could result in a Technical Specification violation by draining the containment spray headers due to leakage of the in-line check valves. CV-3001 and 3002 will be full-stroke exercised during cold shutdowns and refueling outages.

CV-3029 and 3030, the containment sump outlet isolation valves, cannot be exercised during power operations. A failure in the open position of either of these valves during testing could reduce the capability of the Engineered Safeguards System by eliminating, due to vapor binding, one or more high pressure safety injection pump, low pressure safety injection pump, and containment spray pump. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

CV-3031 and 3057, the SIRW tank outlet isolation valves, cannot be exercised during power operation since closing either of these valves would eliminate a source of water to one or more high pressure safety injection, low pressure safety injection, and containment spray pumps. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

CV-3027 and 3056, the combined safety system pumps minimum recirculation line isolation valves, cannot be exercised during power operation since the failure of either of these valves in the closed position during a test would reduce the capability of the safety injection system by eliminating the minimum flow path for the high pressure safety injection pumps, low pressure safety injection pumps, and containment spray pumps. Loss of the minimum flow path could result in damage to any of the above pumps that may be running against a shutoff head. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

3.2 Category C

3103ES, 3118ES, 3133ES, and 3148ES, the low pressure injection to the RCS header check valves, cannot be exercised during power operation since the LPSI pumps will not develop sufficient head to overcome RCS pressure during hot plant conditions. During cold plant conditions the normal shutdown cooling flow path is through these valves, therefore, these valves will be full-stroke exercised during cold shutdowns and refueling outages.

3201ES and 3192ES, the low pressure safety injection pumps discharge check valves, cannot be exercised during power operation. During hot plant conditions the LPSI pumps cannot develop sufficient head to overcome RCS pressure. Partial-stroke testing of these valves during plant operation would result in pressurizing the system up to the containment spray header isolation valves which have a history of leakage. Any leakage past the single isolation valves could result in flow into the containment spray rings with subsequent damage to equipment inside containment. Although we agree that partial-stroke exercising these valves quarterly under the conditions identified by the licensee would be undesireable, we feel that chronic

valve leakage is not a valid long term justification for not performing required valve testing. We feel that adequate maintenance should be performed or equipment replaced to reduce the leakage to a point where it will not preclude quarterly testing. Until this problem is corrected, 3201ES and 3192ES will be full-stroke exercised during cold shutdowns and refueling outages.

3208ES, 3230ES, and 3220ES, the containment spray pumps discharge check valves, cannot be exercised during power operation. Full flow testing these valves can never be performed through normal flow paths because it would result in the spraying of containment which would cause damage to motors, instrumentation, and insulation located inside containment. Alternate flow paths exist, but cannot be used during normal operation for full or part-stroke exercising because it would require pressurizing the containment spray header up to the isolation valves which have a history of leakage. Any leakage past the isolation valves could result in flow into the containment spray rings resulting in the damage described above. Although we agree that partial-stroke exercising these valves quarterly under the conditions identified by the licensee would be undesireable, we feel that chronic valve leakage is not a valid long term justification for not performing required valve testing. We feel that adequate maintenance should be performed or equipment replaced to reduce the leakage to a point where it will not preclude quarterly testing. Until this problem is corrected 3208ES, 3220ES, and 3230ES will be full-stroke exercised during cold shutdowns and refueling outages.

4. MAIN STEAM SYSTEM

4.1 Category B/C Valves

CV-0501 and 0510, the main steam line isolation valves, cannot be exercised during power operation. Closing either of these valves during plant operation would result in a reactor trip. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

5. SERVICE WATER SYSTEM

5.1 Category B Valves

CV-0823 and 0826, service water outlet isolation from component cooling water heat exchangers, cannot be exercised during power operation since this could result in thermal shock to the component cooling water heat exchangers which could lead to premature failure of the heat exchangers. Isolation of one heat exchanger to permit valve exercising could lead to flow damage to the tube sheet of the heat exchanger remaining in service. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

6. COMPONENT COOLING SYSTEM

6.1 Category A Valves

CV-0910, 0911, and 0940, component cooling system containment isolation valves, cannot be exercised during power operation. These valves cannot be exercised in any hot plant mode because the resulting loss of cooling water flow to the primary coolant pumps could cause primary coolant pump seal failure with an accompanying increase in leakage of PCS coolant. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

6.2 Category B Valves

CV-0945 and 0946, component cooling water inlet isolation valves to the component cooling water heat exchangers, cannot be exercised during power operation. Exercising these valves during plant operation would result in thermal shock to the component cooling and shutdown cooling heat exchangers which could lead to premature failure. These valves will be full-stroke exercised during cold shutdowns and refueling outages.

6.3 Category A/C Valves

0910CC, component cooling water supply to containment check valve, cannot be exercised during power operation. Full-stroke exercising this valve during any hot plant mode would result in loss of cooling water flow to the primary coolant pumps which could cause a failure of the pump seal with an accompanying increase of leakage of coolant through the seal. This valve will be full-stroke exercised during cold shutdowns and refueling outages.

ATTACHMENT 2

The P&IDs listed below were used during the course of this review.

System	P&ID	Revision
Primary Coolant System	M-201	16
Chemical & Volume Control System	M-202	16
Engineered Safeguards System	M-203 & 204	15 & 16
Main Steam System	M-205	21
Feedwater & Condensate System	M-207	30
Service Water System	M-208 & 213	18 & 21
Component Cooling System	M-209	18
Radwaste-Liquid	M-210	14
Radwaste-Gaseous	M-211	24
Service & Instrument Air	M-212	9
Diesel System	M-214	14
Plant Heating System	M-215	12
Heating, Ventilation & Air Conditioning (HVAC)	M-218	18
Sample System	M-219	10
Spent Fuel Pool & Shield Cooling	M-221	9
Miscellaneous Gas Supply Systems	M-222	9
Gas Analyzing Systems	M-224	7
High Pressure Air-ILRT Penetration	M-225	8
Blowdown System	M-226	13

ATTACHMENT 3

1. We feel that the following valves perform a safety-related function and should be included in the Palisades IST Program.

	Valve Description	P&ID
a.	Two check valves in the steam lines to the Auxiliary Feedwater Pump Turbine, we believe must open to allow steam flow to the turbine.	M-205 (C8)
b.	CV-0525 steam bypass valve around Auxiliary Feedwater Pump Turbine, we feel has a safety-related function in closed position to prevent diverting steam from the turbine.	M-205 (E8)
c.	0701 & 0702 Main Feedwater line check valves we feel have a safety-related function to close to prevent auxiliary feedwater from being diverted away from the steam generators.	M-207 (D7)

2. The licensee did not include any Diesel Fuel Oil Transfer System pumps or valves in their IST program, nor did they provide us with P&IDs or information to allow us to evaluate this system. We feel that this system's pumps and valves perform safety related functions and should be included in the IST program and tested in accordance with the Code requirements.

3. We feel that the following relief requests provide insufficient technical basis, however, we recommend granting provisional relief pending a final resolution. See the individual relief request for specific information.

   a. 2.2
   b. 3.3.1.1

4. The following relief requests have insufficient technical basis, and relief is not recommended.

   a. 2.4.2
   b. 3.3.1.2
   c. 3.3.1.3
   d. 3.3.1.6
   e 3.3.1.7

5. We feel that the following items identified in Attachment I currently have suitable justification for cold shutdown exercising. However, it is our opinion that inadequate or improper maintenance and repair on valves is not a satisfactory long term justification for not exercising at the code specified frequency.

   a. 3.2 3201ES and 3192ES
   b. 3.2 3203ES, 3230ES, and 3220ES

ATTACHMENT 4

The below listed items appear to be minor inconsistencies in the Palisades Nuclear Plant IST Program. These items were noticed during the course of our review of the program submitted by Consumers Power Company. None of the items are of major significance and their resolution should not affect our evaluation of the Palisades program, however, we feel that to make the program correct and complete that these items should be corrected.

1. Table Note 1 on page 39 of the valve program is not specific enough when identifying the acceptable minimum flow for full-stroke testing check valves. We feel that the note should use the more specific terminology as indicated in section 3.1.1 of this report.

2. On page 12 of the valve program, the "QO" should be deleted in the Testing Requirements column because valves CV-0155 and V-0155B, located in the makeup line to the quench tank, are passive and are not required to be exercised by the Code.

3. On page 12 of the valve program, PORV-1043A and PORV-1042A should be indicated as Category "B" valves in the Valve Category column. Also, these valve numbers do not correspond with the valve numbers on the P&ID provided to us for our review.

4. On pages 18 and 19 of the valve program, valves 3201ES and 3192ES are indicated to receive both a partial-stroke and a full-stroke test on a cold shutdown frequency. Since these valves both can and should be full-stroke exercised during cold shutdowns, the reference to partial-stroke testing should be deleted from the program so it does not apparently offer the operator an unacceptable alternative testing procedure to be performed

instead of the acceptable full-stroke test. Reference to the partial-stroke test during cold shutdowns should also be deleted from the appropriate relief request on page 55.

5. The "Basis For Relief" on page 50 for valves 3104ES, 3119ES, 3134ES, and 3149ES, should provide a basis for not partial-stroke exercising these valves quarterly using the charging pumps.

6. The "Relief Request Basis" on page 51 for valves 3250ES, 3251ES, 3252ES, and 3253ES has an obvious omission in the second sentence of the "Alternative Testing" paragraph. Also, the "9 month period" is from the 1974 Edition of the Code, and therefore, is not correct; the correct period is "quarterly". We also feel that reference to borated water injection in the "Basis for Relief" should be deleted because the charging pump discharge water would be at the proper boric acid concentration for the existing plant conditions.

7. The "Alternative Testing" paragraph for valves 3103ES, 3118ES, 3133ES, and 3148ES on page 51 has an omission of the phrase "during cold shutdown but not" between "800 gpm" and "necessarily". Also the "9 month period" should be changed to quarterly as explained in item 6 above.

8. On page 23 of the valve program, the valve category for 0703FW, 0704FW, 0741FW, and 0743FW should be "C" instead of "B", since these are check valves.

9. The "Safety Position" for valves 0103CC, 0101CC, 0104CC, and 0102CC should be "Locked Open" since these valves are locked in a predetermined throttled position.

10. It appears to us that 122CAS and 2"-263 (M-212, B-2) on page 29 should be categorized as A-passive and A/C-passive respectively. We also feel that 2"-263 (M-212, D-3) on the same page should be categorized "C".

11. We feel that the three 16-237 (M-213, D-6 & D-7) valves on page 30 of the Palisades IST valve program should be classified as C-active valves, for they are the service water pump discharge check valves and would be open anytime the associated pump is operating and closed when the associated pump is not operating to prevent reverse flow through the idle pump.

12. Consumers Power Company has categorized several valves in the Palisades IST program as category "E" according to the guidelines of the 1974 edition of the ASME Code. The program was written to comply with the 1977 edition with Addenda through summer 1979 of the ASME Code which does not recognize category "E" valves. The use of this category does not affect our review or evaluation and we feel that the licensee may continue to use the category for their own convenience as long as it does not interfere with their compliance with the current edition of the Code.

13. The licensee has failed to address the quarterly partial-stroke exercising of check valves 3104ES, 3119ES, 3134ES, and 3149ES utilizing the charging pumps as the pressure/flow source. However, we feel utilizing this flow path could result in thermal shock and premature failure of the injection nozzles or associated components. This additional information included in the licensee's basis for requesting relief will not affect our evaluation or conclusion of this relief request.