PRIORITY 1
(ACCELERATED RIDS PROCESSING)

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9408290292 DOC.DATE: 94/08/22 NOTARIZED: NO DOCKET #
FACIL:50-389 St. Lucie Plant, Unit 2, Florida Power & Light Co. 05000389
AUTH.NAME AUTHOR AFFILIATION
SAGER,D.A. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

See Reports

SUBJECT: Frowards Rev 1 to JNS-PSL-204, "Second Ten-Yr ISI Interval IST Program for Pumps & Valves,St Lucie Nuclear Power Plant Unit 2." Response to open items noted in 930823 SE of IST program also encl.

DISTRIBUTION CODE: A047D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 20+70
TITLE: OR Submittal: Inservice/Testing/Relief from ASME Code - GL-89-04

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-2 LA	1	0	PD2-2 PD	1	1
	NORRIS,J	2	2			
INTERNAL:	ACRS	6	6	AEOD/SPD/RAB	1	1
	NRR/DE/EMCB	1	1	NRR/DE/EMEB	1	1
	NUDOCS-ABSTRACT	1	1	OC/LEDCB	1	0
	OGC/HDS3	1	0	REG FILE 01	1	1
	RES/DSIR/EIB	1	1			
EXTERNAL:	EG&G BROWN,B	1	1	EG&G RANSOME,C	1	1
	NOAC	1	1	NRC PDR	1	1

P R I O R I T Y 1 D O C U M E N T

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 504-2083) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 22 ENCL 19

FPL

P.O. Box 128, Ft. Pierce, FL 34954-0128

August 22, 1994

L-94-212
10 CFR 50.4
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

RE: St. Lucie Unit 2
Docket No. 50-389
In-Service Test Program - Revision 1
Second Ten-Year Interval
Response to Safety Evaluation Open Items

On August 23, 1993, the NRC issued a safety evaluation (SE) on the first ten-year interval in-service test (IST) program for St. Lucie Unit 2. This SE granted interim relief for certain relief requests which continued into the second interval. A response to the open items in the SE was requested by August 23, 1994. Attachment 1 is the FPL response to the open items identified in the August 23, 1993, SE.

Since the second ten-year interval began on August 8, 1993, SE open items have been incorporated in revision 1 of the IST program for the second interval. Attachment 2 is a summary of the changes incorporated into this revision. A copy of Revision 1 of the second interval IST program is enclosed.

This submittal closes the final actions on the first interval IST program. Should you have any further questions, please contact us.

Very truly yours,

D. A. Sager
Vice President
St. Lucie Plant

DAS/GRM/kw

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

DAS/PSL #1190-94

St. Lucie Unit 2
Docket No. 50-389
In-Service Test Program
Response to SE Open Items

ATTACHMENT 1

RESPONSE TO SAFETY EVALUATION OPEN ITEMS

Background

On August 23, 1993, the NRC issued the Safety Evaluation (SE) of the In-Service Testing Program for Pumps and Valves - St. Lucie Unit 2, Revision 2. Included in the SE was a list of ASME Section XI inconsistencies, omissions, and required licensee actions which were identified during the review of the St. Lucie's initial interval In-Service Testing Program, Revision 2. The NRC authorized the implementation of those relief requests, which have been approved by the SE, provided that St. Lucie resolves the items in accordance with the list of evaluations presented in Section 4.0 of the Technical Evaluation Report (TER). The SE required that St. Lucie responded before the end of the next refueling outage or one year from the date of the SE (August 23, 1994), which ever was greater.

On May 2, 1994, the NRC issued the Safety Evaluation of the In-Service Testing Program for the St. Lucie Unit 2 second ten-year interval. This SE granted, authorized, or approved the relief requests in the second ten year interval In-Service Testing Program provided the action items identified therein are addressed within one year of the date of the SE or by the end of the next refueling outage whichever is later, including the interim relief requests approved in the August 23, 1993, SE.

The NRC recommended actions from Section 4.0 of the August 23, 1993 TER have been listed below along with the St. Lucie response. Since the unresolved action items contained in the August 23, 1993, SE were also addressed in the May 2, 1994, SE, FPL requests the August 23, 1993, SE be considered closed with all future correspondence and discussion concerning these action items be directed toward the May 2, 1994, SE.

NRC Recommended Action 4.1:

The IST Program does not include a description of how the components were selected, how testing requirements were identified for each component, or the safety function of the valves. The review performed for this TER did not include verification that all pumps and valves within the scope of 10 CFR 50.55a and Section XI are contained in the IST Program, and did not ensure that all applicable testing requirements have been identified. The licensee is requested to include this information in the IST Program. The program should describe the development process, such as a listing of the documents used, the method of the basis for categorizing valves, and the method or process used for maintaining the program current with design modifications or other activities performed under 10 CFR 50.59. Additionally, for each interval, the licensee should maintain an accurate status of the relief requests including their revision and NRC approval.

St. Lucie Response 4.1:

Sections 1.0 through 4.0 of Revision 1 of the St. Lucie Unit 2 IST Program, Second Ten -Year Interval describe the processes used to develop and maintain the IST program and identify the testing requirements. An additional section has been added to each relief request which indicates the approval status of the relief request.

NRC Recommended Action 4.2:

As discussed in the TER evaluation for numerous relief requests (i.e., VR-13, VR-18, VR-19, VR-24, VR-33, VR-34), specific portions of OMa-1988, Parts 6 and 10 may be utilized without relief, provided all related requirements are implemented. Approval is recommended pursuant to 50.55a(f)(4)(iv). The use of specific portions of Part 6 or 10 and any refueling outage justifications should, however, be documented in the IST Program. Implementation of related requirements is subject to NRC inspection. (TER Sections 3.2.2, 3.3.2, 3.3.4, 3.4.1, 3.6.1, 3.7.1)

St. Lucie Response 4.2:

The specific portions of OMa-1988, Parts 6 and 10 utilized pursuant to 50.55a(f)(4)(iv) have been referenced in Section 1.0 of Revision 1 of the St. Lucie Unit 2 IST Program, Second Ten-Year Interval.

NRC Recommended Action 4.3:

Section 4.2 of the IST Program, Revision 2 states that the valve test frequency may be extended by 25%, as allowed by the Technical Specifications. The extension of test intervals should not be applied to safety and relief valves tested in accordance with the intervals defined in Section XI, because the Technical Specifications do not address these test intervals.

St. Lucie Response 4.3:

St. Lucie never has, nor does it plan to apply the 25% test frequency extension to the testing of safety and relief valves. The St. Lucie Unit 2 IST Program has been upgraded to include the requirements of OMa-1987 Part 1, as part of the St. Lucie Unit 2 Second Ten Year IST Program submittal (07/16/93). The new testing frequencies will be in compliance with the requirements set forth in OMa-1987 Part 1, for Class 1 and Class 2 & 3 safety and relief valves.

NRC Recommended Action 4.4:

In Generic Pump Relief Request PR-2, the licensee has requested relief concerning portable instruments used for temperature and speed measurement. When using temporary instruments, the licensee should ensure that the instruments are calibrated prior to use and are traceable to the in-service test records. (TER Section 2.1.2)

St. Lucie Response 4.4:

The portable instruments used in the performance of ASME Code testing of pumps are controlled by one of the Plant Measuring and Test Equipment (M&TE) procedures. These Quality Procedures assure that the test instruments are calibrated at a prescribed frequency and that each use is logged in its applicable "check-out log". In addition, the unique M&TE identification number of the portable instruments is recorded in each surveillance test procedure.

NRC Recommended Action 4.5:

In Pump Relief Request PR-7 for the Diesel Fuel Oil Transfer Pumps, the licensee is calculating pump flow rate based on measuring change in fuel oil storage tank level with respect to pump running time.

This would provide an acceptable level of quality and safety for determining pump flowrate, provided the calculation is properly proceduralized, and the accuracy is within the accuracy required by the Code using direct measurement. The licensee should evaluate the accuracy and repeatability of manually measuring tank level with a tape measure, and ensure that it is within the requirements of the Code and that the calculation is properly proceduralized.

The licensee has proposed new pump flow rate range limits in accordance with Section XI, IWP-3210. Although relief is not required, when IWP-3210 is used, the licensee must document the basis for the expanded ranges and the basis that the pump performance does not demonstrate degrading conditions. The basis for acceptable pump performance, in either case, must be related to the pump and not the system, although system requirements must be met. The licensee should include this documentation in the test records. (TER Section 2.2.1)

St. Lucie Response 4.5:

The diesel fuel oil system has been reevaluated. The diesel fuel oil system was optionally constructed to Class 3. Therefore, the system does not fall within the required scope of the IST program (IWA-1320(e)). Appropriate testing will continue, but not under the jurisdiction of the ASME IST program. This relief request has been deleted from the IST program.

NRC Recommended Action 4.6:

In Pump Relief Requests PR-8, PR-11, PR-15 and PR-16, the licensee is proposing to calculate pump suction pressure based on measuring tank or inlet structure levels. Calculation of inlet pressure based on the measured tank or inlet structure levels provides an acceptable alternative method of determining inlet pressure, provided the calculation is properly proceduralized, and the accuracy is within the accuracy required by the Code using direct measurement. This should be documented in the test records and be available for review.

In the case of the Containment Spray pumps, the licensee should evaluate the feasibility of measuring the pump inlet pressure using the pressure transmitters on pump inlet lines, and use these instruments if practical. (TER Sections 2.2.2, 2.3.1, 2.4.1, 2.5.1).

St. Lucie Response 4.6:

For most of the pumps in Unit 2, the suction and discharge pressures are obtained by reading the installed pressure gages. However, for several systems there are no installed pressure instrumentation on the pumps suction lines. The suction pressure for these pumps must be calculated by measuring the tank or intake level. The discharge pressure and the tank or intake level measurements are then inserted into an equation included in the surveillance test procedure to calculate the pump differential head. Each test surveillance that uses a tank or intake level to calculate pump suction is well within the ±2% accuracy requirements of IWP Table-4110-1, Acceptable Instrument Accuracy.

The drawings for the containment spray system (2998-G-088) show two gage locations on the suction of each of the CS pumps, PX-07-1A, 1B, 2A, and 2B. There are no permanently installed gages at these locations, "PX" denotes a location for a temporary gage connection only. The RWT level is used to calculate the CS pumps suction pressure for the quarterly Code testing.

NRC Recommended Action 4.7:

In Pump Relief Requests PR-12, PR-13, and PR-14, the licensee has requested relief from the ASME Code, Section XI, IWP-4520(b), which requires that the frequency response range of the readout system (for instruments used to measure vibration amplitude) shall be from one-half minimum speed to at least maximum pump shaft rotational speed. Specifically, in PR-12 for the Reactor Coolant Charging Pumps, the code-required frequency range is 1.75 Hz to 3.5 Hz. In PR-13 for the Intake Cooling Water Pumps, the code-required frequency range is 7.38 Hz to 14.75 Hz. In PR-14 for the Containment Spray System Hydrazine Pumps, the code-required frequency range is 0.875 Hz to 1.75 Hz.

The licensee claims that instruments satisfying these range requirements are commercially unavailable, and that the lowest available response frequency is 10 Hz. The staff has, however, identified equipment with a frequency response range less than 10 Hz. The licensee should further investigate the procurement of instruments that comply with the Code requirements. Also, the licensee has not discussed the repeatability and accuracy of the instruments to be used. The licensee should additionally evaluate each pump to determine if the pumps are susceptible to degradation mechanisms that result in increased vibration levels at frequencies lower than 10 Hz. Immediate imposition of the Code requirements is impractical due to limitations in the current instrumentation and it would be an undue burden to require the plant to declare the pumps inoperable until the evaluation of subharmonic frequencies and/or available instrumentation could be reviewed. (TER Sections 2.3.2, 2.4.2, 2.5.2). Relief is recommended for an interim period of one year or until the next refueling outage, whichever is later to perform the evaluations. The interim relief remains in effect into the next ten-year interval due to begin August 9, 1993.

St. Lucie Response 4.7:

In late 1990, St. Lucie Plant began contacting commercial vendors for the purchasing of new vibration instruments. The criteria for the instruments was that they had to be portable, easy to use, have an auto-scaling digital readout, and have a low frequency cutoff. In 1991, St. Lucie purchased the Bently Nevada model TK-81 vibration instrument with an additional set of low frequency probes (270 cpm). At that time, this instrument was evaluated as the best instrument available for all four requirements. However, even though this instrument had a low frequency response, it still was not low enough to meet the Code requirements. Therefore, relief requests PR-12, PR-13, and PR-14 were submitted.

These relief requests were based upon the frequency response listed in the sales pamphlet (10 Hz.) for the TK-81 vibration instrument. Further investigation with the manufacturer has shown the actual frequency response is much lower than originally presented. The TK-81 integrator frequency response is essentially flat down to 120 cpm (cycles per minute) where the displayed output of the instrument slightly increases to approximately +1dB at 100 cpm. The -3dB frequency response is reached at approximately 54 cpm. The velocity probes used with the TK-81 are special low frequency probes nominally rated down to 270 cpm (-3 dB).

The reactor coolant charging pumps operate at approximately 210-215 rpm which equates to a rotational frequency of 3.50 Hz. The one-half minimum speed frequency response required for the vibration instrumentation correlates to 1.75 Hz (105 cpm). The 1X (215 cpm.) vibration frequency components will be somewhat attenuated by the probes, but not cut off. Overall vibration levels would still show an increasing value if some problem developed whose characteristic frequency was 1X of the running speed.

There are virtually no mechanical degradations where only a sub-synchronous vibration component would develop on the charging pumps. For example:

a. Oil whirl (0.38X - 0.48X) is not applicable to a horizontal, triplex, reciprocating pump.

b. A light rub/impact could generate 0.5X (102.5 cpm) vibration components, but would also usually generate a sequence of integer and half integer running speed components. A heavy rub generates increased integer values of multiple running speed components, as well as processing the 1X phase measurement. In either case the overall vibration level would still show an increase from both the attenuated sub-synchronous and 1X vibration components as well as the higher harmonic vibration components.

c. Looseness in the power train would likely be indicated by increasing 1X and 2X vibration components. These signals would be slightly attenuated but not completely cut off.

The ICW pumps rotate at approximately 885 cpm. Therefore, the minimum frequency response to comply with the Code is 442.5 cpm. The TK-81's frequency response is low enough to meet

the Code requirements for the ICW pumps, therefore this relief is no longer required and has been deleted.

The Hydrazine pumps are characterized as metering pumps and operate at extremely slow speeds (as low as 37 cpm). This equates to a rotational frequency of 0.62 Hz. In accordance with the Code, the frequency response of the vibration instruments would have to be one half of this or 0.31 Hz. Instruments satisfying this frequency response requirement are commercially unavailable.

At the time of their purchase, the Bently Nevada 270 cpm probes with the portable TK-81 instrument had one of the lowest frequency responses available. In the subsequent years following the purchase, improvements have been made in lowering the frequency cutoff of vibration instruments. However, St. Lucie cannot justify the expense of purchasing new vibration equipment each time some new instrument appears on the market with a lower frequency response. The amount of possible gain provided by new instruments is not justified. The present use of the Bently Nevada 270 cpm probes with the portable TK-81 instrument is capable of collecting reliable data to identify changes from baseline readings to indicate possible problems with the pumps.

Revised pump relief requests PR-12 for the reactor coolant charging pumps and PR-14 for the Hydrazine pumps have been forwarded to the NRC for approval. They will be included in the IST program when approved by the NRC.

NRC Recommended Action 4.8:

In Pump Relief Request PR-17 for the Containment Spray Hydrazine Pumps, the licensee is proposing to measure pump flow rate and vibration quarterly but not alert trend the flow rate. At refueling, the pump flow rate and vibration will be measured.

Referring to the licensee's basis, it is assumed that the licensee will not take any corrective actions based on the measured flow rate exceeding the alert or required action values. The licensee should evaluate the establishment of required action ranges for quarterly testing.

The licensee has referenced Section XI, IWP-4150 in the relief request, however the licensee has not discussed the possible use of a symmetrical damping device to provide for flow rate averaging. Additionally, the licensee has not discussed the impact or burden of installing flow instrumentation that could be used effectively for the quarterly test.

Reference to the licensee's Appendix A, Pump Program Table, Revision 2, 08/01/92, indicates that the licensee will not measure the pump inlet pressure or differential pressure. The ASME/ANSI Code OMa-1988, Part 6, Table 3b, requires that pump discharge pressure be measured for positive displacement pumps. The licensee has not provided a basis for not measuring pump differential or discharge pressure.

Provided the licensee determines that there is no practical means of installing flow instrumentation that is adequate for in-service testing purposes, deferring flowrate measurement

to refueling outages may be considered acceptable. The licensee should evaluate the procurement of damping devices or new flow instrumentation and measure and evaluate quarterly pump differential or discharge pressure as well as vibration. Immediate imposition of the Code requirements is impractical due to lack of adequate installed flow instrumentation, and it would be an undue burden to require the plant to declare these pumps inoperable until the availability of new instrumentation could be reviewed. Therefore, it is recommended that relief be granted for an interim period of one year, or until the next refueling outage, whichever is later. The interim relief remains in effect into the next ten-year interval due to begin August 9, 1993. In the interim, the licensee should establish acceptance criteria for RPM vs. flow rate correlation and measure discharge pressure, if possible.

St. Lucie Response 4.8:

The Hydrazine pumps are reciprocating positive displacement pumps with variable speed control. These pumps are normally in a standby condition and are only operated during surveillance testing. They are classified as metering pumps and are designed to accurately displace a predetermined volume of liquid in a specific period of time. The pump has a single plunger and makes only one suction stroke and only one discharge stroke during each cycle.

The pumps operate at a very slow speed (as low as 37 rpm) to produce the Technical Specification required hydrazine flowrate of 0.71 to 0.82 gpm. Pump flow is continuously accelerating and decelerating following a sinusoidal waveform as shown in Figure 1. Each cycle of the pump is approximately 1.6 seconds in duration with no flow produced during the pumps 0.8 second suction stroke. This characteristic intermittent and oscillating flowrate is obviously impractical to physically dampen the observed reading to within 2% using symmetrical damping devices.

The installed flow instrumentation has been demonstrated to be inadequate for in-service testing purposes. This instrumentation utilizes a differential pressure orifice located in the suction line common to both pumps to measure flow. Flow through this orifice pulsates sharply with each stroke of the pump. The flow orifice also senses pressure feedback during each cycle of the pump stroke as illustrated in Figure 2. This feedback has been determined to be echoes of the pressure pulsations produced by the pump stroke which have reflected back to the orifice by the system piping and valves.

Refueling outage testing has demonstrated that techniques used to average the indicated flow readings are inconsistent and inaccurate when compared to actual flow. Trending the flow rate using the installed instrumentation is impractical due to the inherent inaccuracies and instability in measuring the pump flow as described above. The requirement that indicated flow be recorded during the quarterly tests has been removed from Relief request PR-17. Flow instrumentation which can accurately measure the Hydrazine pump intermittent and oscillating flowrate has not been located. Even if such instrumentation were found to be available the costs associated with procuring and installing such instrumentation could not be justified. The Hydrazine pumps are standby pumps. There is virtually no means for the mechanical condition of the pump to become degraded between refueling outages with the pump only run for quarterly surveillance testing. Accurate flow measurement performed each refueling outage as outlined

in revised Relief Request PR-17 is considered by PSL to be appropriate for detecting any pump hydraulic degradation.

Relief Request PR-17 has been revised to establish acceptance criteria for flowrate at a set RPM during refueling outage tests. Pump discharge pressure, RPM, and vibration will be measured during the quarterly and refueling outage tests.

NRC Recommended Action 4.9:

In Valve Relief Request VR-13, the licensee is proposing to disassemble and inspect every 10 years each of the four 12 in. discharge line check valves in the lines from the Safety Injection Tanks (SIT) to the Reactor Coolant System (RCS). Exercising closed is to be in accordance with the Technical Specifications regarding pressure isolation valves (PIV).

Disassembly and inspection should only be used if testing with flow is impractical. The licensee should provide an analysis or test results to show that the nominal 52 seconds stroke time for the SIT discharge isolation motor-operated valves to open is too long to permit sufficient flow to cause the check valves to reach their full-open position. If a full-open position can be reached, the licensee should perform the test with flow to confirm disk position. To substantiate the acceptability of any alternative technique for verifying that the valves are fully open, licensees must, as a minimum, address and document certain items in the IST program, as described in Position 1.

However, if the licensee determines that full-stroke exercising with flow is impractical, the licensee may, as discussed by the NRC in Generic Letter Position 2, perform valve disassembly and inspection as a positive means of determining that a valve's disk will full-stroke exercise open or of verifying closure capability.

The licensee is currently proposing to meet Position 2. Assurance of proper reassembly will be provided by performing a leak test or partial-flow test prior to returning a valve to service following disassembly. However, the licensee intends to inspect each check valve only once in the 10 year In-Service Inspection program interval. As defined in Position 2, in order to support extension of the valve disassembly/inspection intervals to longer than once every 6 years, i.e., in cases of "extreme hardship," licensees should perform a review of the installation of each valve addressing the "EPRI Applications Guidelines for Check Valves in Nuclear Power Plants" for problematic locations. The licensee should justify the extreme hardship, including a discussion on why non-intrusive techniques cannot be used.

Additionally, the licensee states that valve will be leak tested or partial-flow tested following disassembly. If possible, partial valve stroking quarterly or during cold shutdowns, or after reassembly, must be performed.

Relief is granted per Generic Letter 89-04, Position 1, to full-stroke exercise the valves open with less than the accident flow rate, provided all criteria in Position 1 are met. If the licensee determines that full-stroke exercising is impractical, relief is granted per Position 2 to disassemble/inspect these check valves, provided the licensee meets all the criteria in Position 2, including reviewing the installation of the valves, demonstrating extreme hardship, and partial-stroke exercising following reassembly and at cold shutdown if practical.

With respect to exercising the valve closed, OMa-1988 Part 10, 4.3.2.2 allows full-stroke exercising that is not practicable during operation or cold shutdown to be deferred to refueling outages. Relief to use the Technical Specification requirements is not required pursuant to 50.55a 11(f)(4)(iv), provided the licensee implements 4.3.2.2 and all related requirements, including

Part 10, 4.3.2.2(h) and 6.2; Implementation of these related requirements is subject to NRC inspection. (TER Section 3.2.2)

St. Lucie Response 4.9:

St. Lucie is planning to full-stroke exercise the valves open with less than the accident flow rate in accordance with Generic Letter 89-04, Position 1. Non-intrusive test equipment will be used to verify the check valves stroke fully open during these tests. The test equipment planned to be used is supplied by ITI MOVATS which employs acoustic and eddy-current diagnostic technology to verify proper check valve operation.

The test will be performed by filling and pressurizing the associated safety injection accumulator while isolated from the RCS loop. The SIT discharge isolation valve will then be opened to dump the contents of the SIT to the refueling cavity.

Engineering analysis has concluded that sufficient flow to fully open the check valves can be achieved during the proposed tests. The ITI MOVATS test equipment planned to be used during these tests has been procured. Evaluations have determined that the tests can safely be performed with the steam generator nozzle dams and core internals in place. Performing the test with the steam generator nozzle dams and core internals in place significantly reduces the impact of the testing on the outage schedule.

Should for some unforeseen reason the alternate testing described above be determined to be impractical or an extreme hardship, the check valves will be disassembled and inspected in accordance with Generic Letter 89-04, Position 2 as follows:

During each refueling outage, each of these valves will be partial-stroke exercised. Each refueling outage at least one of these valves will be disassembled, inspected, and manually stroked to verify operability. Should a valve under inspection be found to be inoperable, then the other valves will be inspected during the same outage, after which the rotational inspection schedule will be reinitiated. Proper reassembly will be assured by performing a partial-flow test prior to returning a valve to service following disassembly.

These valves will be verified closed following cold shutdowns in accordance with Technical Specification 4.4.6.2.2.

NRC Recommended Action 4.10:

In Valve Relief Request VR-14, the licensee is proposing to partial-stroke exercise at cold shutdowns and refueling outages the four 12 in. Safety Injection check valves which open to provide flow paths from the safety injection headers to the RCS and close to isolate the headers from the high pressure of the reactor coolant system.

The licensee should evaluate if the valves will achieve a full-open position with the proposed reduced test flow rate of 3,000 gpm. If a full-open position can be reached, the licensee should perform the testing with flow. The use of alternate techniques, such as non-intrusive techniques,

to verify that valves will fully open is acceptable, as discussed in Generic Letter 89-04, Position 1.

If the valves cannot be full-stroke exercised, the NRC defined an acceptable alternative to the full-stroke exercising requirement in Position 2, wherein it is stated that the NRC staff position is that valve disassembly and inspection can be used as a positive means of determining that a valve's disk will full-stroke exercise open or of verifying closure capability.

The licensee is currently proposing to meet Position 2. Assurance of proper reassembly will be provided by performing a leak test or partial-flow test prior to returning a valve to service following disassembly. However, the licensee intends to inspect each check valve only once in the 10 year In-Service Inspection program interval. As defined in Position 2, in order to support extension of the valve disassembly/inspection intervals to longer than once every 6 years, i.e., in cases of extreme hardship," licensees should perform a review of the installation of each valve addressing the "EPRI Applications Guidelines for Check Valves in Nuclear Power Plants" for problematic locations. The licensee should also include a discussion on why non-intrusive techniques cannot be used.

Additionally, the licensee states that the valve will be leak tested or partial-flow tested following disassembly. Position 2 requires that, if possible, partial valve stroking quarterly or during cold shutdowns, or after reassembly, must be performed.

Relief is granted per Generic Letter 89-04, Position 1, to full-stroke exercise the valves open with less than the accident flow rate, provided all criteria in Position 1 are met. If the licensee determines that full-stroke exercising is impractical, relief is granted per Position 2 to disassemble/inspect these check valves, provided the licensee meets all the criteria in Position 2, including reviewing the installation of the valves, demonstrating extreme hardship, and partial-stroke exercising following reassembly and at cold shutdown if practical.

With respect to exercising the valve closed, verification that a valve is in the closed position can be done by visual observation, by an electrical signal initiated by a position-indicating device, by observation of appropriate pressure indication in the system, by leak testing, or by other positive means. The licensee does have instrumentation to continuously monitor upstream pressure. Based on the Technical Specifications, it appears that following the partial-stroke exercise at cold shutdowns, verification that the valves have closed will be performed and relief would not be required. The licensee should exercise these valves closed at cold shutdowns or revise the request accordingly. (TER Section 3.2.3)

St. Lucie Response 4.10:

PSL is planning to full-stroke exercise the valves open with less than the accident flow rate in accordance with Generic Letter 89-04, Position 1. Non-intrusive test equipment will be used to verify the check valves are stroked fully open during these tests. The test equipment planned to be used is supplied by ITI MOVATS which employs acoustic and eddy-current diagnostic technology to verify proper check valve operation.

The valve manufacturer has indicated that a minimum flow velocity of 11.5 feet per second is required to fully open these valves. This correlates to a minimum flowrate of 4054 gpm which is significantly above the maximum flowrate that can be achieved by the LPSI pumps during shutdown cooling operation. Sufficient flowrates to fully open the valves can be achieved by dumping the contents of the SITs to the RCS. The test will be performed by filling and pressurizing the associated safety injection accumulator while isolated from the RCS loop. The SIT discharge isolation valve will then be opened to dump the contents of the SIT to the refueling cavity.

Engineering analysis has concluded that sufficient flow to fully open the check valves can be achieved during the proposed tests. The ITI MOVATS test equipment planned to be used during these tests has been procured. Evaluations have determined that the tests can safely be performed with the steam generator nozzle dams and core internals in place. Performing the test with the steam generator nozzle dams and core internals in place significantly reduces the impact of the testing on the outage schedule.

Should for some unforeseen reason the alternate testing described above be determined to be impractical or an extreme hardship, the check valves will be disassembled and inspected in accordance with Generic Letter 89-04, Position 2 as follows:

During each refueling outage, each of these valves will be partial-stroke exercised. Each refueling outage at least one of these valves will be disassembled, inspected, and manually stroked to verify operability. Should a valve under inspection be found to be inoperable, then the other valves will be inspected during the same outage, after which the rotational inspection schedule will be reinitiated. Proper reassembly will be assured by performing a partial-flow test prior to returning a valve to service following disassembly.

These valves will be verified closed following cold shutdowns in accordance with Technical Specification 4.4.6.2.2.

NRC Recommended Action 4.11:

In Valve Relief Request VR-18, the licensee is proposing to verify the Makeup Water Supply containment isolation valve (CIV) closed at least once every two (2) years, in conjunction with the Appendix J leak testing program. Valve Relief Request VR-19 is a similar request for the Instrument Air Header CIV.

The relief requested by the licensee is covered by rule making, effective September 8, 1992, and relief is not required, provided that the proposed alternative testing is performed at least during every refueling, even if the refueling interval is less than 2 years, and that OMa-1988 Part 10, 4.3.2.2 and all related requirements are implemented. Approval is recommended pursuant to 50.55a(f)(4)(iv). Implementation of related requirements is subject to NRC inspection. (TER Sections 3.3.2, 3.3.3)

St. Lucie Response 4.11:

Appendix J leak testing is performed once each refueling outage or every 2 years, which ever is shorter. The portions of OMa-1988, Parts 6 and 10 utilized pursuant to 50.55a(f)(4)(iv) are referenced in Section 1.0 of Revision 1 of the St. Lucie Unit 2 IST Program, Second Ten-Year Interval. Relief requests VR-18 and VR-19 have been deleted with their individual refueling outage justifications documented in new Appendix F of the Program.

NRC Recommended Action 4.12:

In Valve Relief Request VR-24, for the check valves in the Hydrazine Pump discharge to the Containment Spray System pump suction, the licensee is proposing to flow test these valves at every refueling.

Since each of the Hydrazine pumps discharge through its check valve into the suction piping of its corresponding Containment Spray pump, the licensee states to flow test the check valves, each Containment Spray pump must be operated and flow recirculated back to the Refueling Water Tank (RWT). The licensee also states that continued testing would build up concentration of Hydrazine in the RWT and deplete the level in the Hydrazine Storage Tank (HST). The licensee should explain specifically why Hydrazine buildup in the RWT is detrimental and could not be reduced or removed. Also, the licensee has not explained why the level of Hydrazine in the HST could not be restored.

Additionally, upon review of the flow diagrams it appears that the valves could be tested at cold shutdowns without operating the containment spray pumps by isolating the containment spray pumps manual suction and discharge valves and collecting the Hydrazine through the 1 inch test connection at the pumps suction. The licensee should consider this test configuration.

OMa-1988 Part 10, 4.3.2.2 allows full-stroke exercising that is not practicable during plant operation or cold shutdowns to be deferred to refueling outages. Accordingly, relief is not required, provided that the licensee clarify the impracticality of testing caused by buildup of Hydrazine in the RWT and the depletion of the level in the HST, and determines that testing using the 1 inch pump suction drain connection is impractical. Approval is recommended pursuant to 50.55a 11(f)(4)(iv). Implementation of related requirements is subject to NRC inspection. (TER Section 3.4.1)

St. Lucie Response 4.12:

Hydrazine is a known carcinogen, with cumulative toxic affects when absorbed through the skin, inhaled, or ingested. Hydrazine build up in the RWT is undesirable do to the increased potential for exposing personnel to the chemical or releasing it to the environment. Personnel would additionally be exposed to hydrazine while restoring level in the tank. Due to the personnel hazards associated with handling the hazardous chemical hydrazine, testing quarterly or during cold shutdowns is impractical.

NRC Recommended Action 4.13:

In Valve Relief Request VR-26, for the Diesel Air Start System flow control and solenoid valves, the licensee is proposing that these valves will be exercised in conjunction with testing of the emergency diesel generators. Both the 2A and 2B diesel generators will be started each month. Every 6 months, these 16 air start system valves will be tested for proper operation by observing the operation of each associated pair of air start motors. The stroke times of the individual valves will not be measured.

Although the valves' stroke times cannot be measured by conventional means, the stroke times can be measured indirectly by monitoring diesel start times or by non-intrusive methods, e.g., by using acoustic or diagnostic systems. Using diesel start times, any degradation in the valves' stroke times would result in longer diesel start times. A maximum limiting start time should be specified that is less than or equal to the Technical Specification requirement. If this limiting start time is exceeded due to degradation or failure of the air start system valves or motor operators, they should be declared inoperable and repaired or replaced.

With respect to test frequency, the licensee has not adequately demonstrated any undue burden caused by quarterly testing. Further information regarding the reason why a 6 month test interval provides an acceptable level of quality and safety should also be provided. It is recommended that interim relief be granted. In the interim, the licensee should evaluate the establishment of a maximum limiting start time or some other method to detect degradation and the performance of testing in accordance with the Code required frequency.

Additionally, the licensee should review the Code classification of these valves. As discussed in Question 54 of the minutes of the public meeting on Generic Letter 89-04, diesel generator air start systems are not typically Class 1, 2, or 3, and are, therefore, not required by 10 CFR 50.55a to be tested in accordance with Section XI. If the licensee determines that these valves are not required to be Class 1, 2, or 3; relief from Section XI is not required. (TER Section 3.5.1)

St. Lucie Response 4.13:

The diesel air start system has been reevaluated. The diesel air start system was optionally constructed to Class 3. Therefore, the system does not fall within the required scope of the IST program (IWA-1320(e)). Appropriate testing will continue, but not under the jurisdiction of the ASME IST program. This relief request has been deleted from the IST program.

NRC Recommended Action 4.14:

Valve relief requests VR-8, VR-10, and VR-12 state that full-flow exercising at each refueling outage "satisfies the requirement of Generic Letter 89-04, Position 1." Position 1 addresses alternate full-stroke exercising methods when full-flow exercising is impractical. Position 1 does not address alternate test frequencies, and therefore the Generic Letter does not grant relief from testing valves quarterly or at cold shutdowns.

However, OMa-1988, Part 10, 4.3.2.2 allows testing that is impractical during plant operation and cold shutdowns to be deferred to refueling outages. Therefore, provided that the licensee uses 4.3.2.2 and all related requirements, including 6.2 which requires documentation of the justification for deferring testing, relief is not required. Approval of the alternative is recommended pursuant to 50.55a (f)(4)(iv). As discussed above, implementation of related requirements is subject to NRC inspection.

St. Lucie Response 4.14:

Relief requests VR-8, VR-10, and VR-12 have been deleted with their individual refueling outage justifications documented in new Appendix F of the IST Program. OMa-1988, Part 10, 4.3.2.2 will be used to justify deferring the testing to refueling outages.

NRC Recommended Action 4.15:

Relief Requests VR-17 and VR-25 propose testing containment isolation valves closed at cold shutdowns. This complies with the requirements of Section XI and relief is not required. The basis for testing at cold shutdowns should however be documented.

St. Lucie Response 4.15:

Relief Requests VR-17 and VR-25 have been deleted. The justifications for testing the subject valves closed during cold shutdowns are described in Appendix E of the IST Program.

St. Lucie Unit 2
Docket No. 50-389
In-Service-Test Program
Response to SE Open Items

ATTACHMENT 2

Summary of Changes for St. Lucie Unit 2
Second Ten-year Interval
In-Service Testing Program
Revision 1

1.0 Introduction:

The Introduction section has been revised to describe the processes used to develop and maintain the IST program and identify the testing requirements. Included are the portions of OM-6 and 10 to which the program has been upgraded pursuant to 10 CFR 50.55a(f)(4)(iv). Also included is the addition of a basic scope document which explains the steps taken to review plant systems for inclusion in the IST program.

1.1 IST Program Testing Requirement Guidelines:

This section has been added to this revision to list the 17 guidelines used for the evaluation of system components (pumps and valves).

1.2 IST Program Implementation:

This section has been added by this revision.

2.0 Applicable Documents:

Additional references have been added to address the increased number of documents used in the generation of this revision.

Appendix A Pump Program Relief Tables:

References to deleted relief requests have been removed.

Appendix B Pump Program Relief Requests:

All Pump Relief Requests - A section describing the approval status was added to each relief request.

PR-1 - Relief request PR-1 has been withdrawn. Measurement of bearing temperatures as required by IWP-3300 and IWP-4310 is not required by ASME/ANSI OMa-1988, Part 6, for in-service testing of pumps. Therefore, the measurement of bearing temperatures is not a requirement of the IST Program.

PR-12 and PR-14 - Pump relief requests PR-12 for the reactor coolant charging pumps and PR-14 for the Hydrazine pumps have been revised to address the concerns noted in the NRC's August 23, 1993, and May 2, 1994 Safety Evaluations. These relief requests have been resubmitted in this revision and NRC approval is requested.

PR-13 - The frequency response of the vibration instrumentation used at PSL has been reevaluated and found to be low enough to meet the Code requirements for the ICW pumps, therefore this relief is no longer required and has been deleted.

PR-17 - Revised pump relief request PR-17 for the Hydrazine pumps has been revised to address the concerns noted in the NRC August 23, 1993, and May 2, 1994, Safety Evaluations. This relief request has been resubmitted in this revision and NRC approval is requested.

Appendix C Valve Program Relief Tables:

Several valve test frequencies and relief request requirements listed in the table have been revised to specifically cross reference the applicable cold shutdown justifications, refueling justifications, and relief requests.

The functions of the valves listed below have been reviewed. This review has determined that these valve are not required to perform a specific function in shutting down the reactor to the cold shutdown condition or in mitigating the consequences of an accident. These valves have been removed from the IST program.

V-2598, MV-09-13, MV-09-14, MV-14-1, MV-14-2, MV-14-3, MV-14-4, MV-14-9, MV-14-10, MV-14-11, MV-14-12, MV-14-13, MV-14-14, MV-14-15, MV-14-16, MV-14-19, and MV-14-20

The test frequencies for valves V-3463, V-3664, and V-3665 have been changed from each cold shutdown to quarterly.

Valve V-2190 is not required to close to shut down the reactor to the cold shutdown condition or to mitigate the consequences of an accident. The requirement to test this valve to close has been removed from the IST program.

The coordinate locations for valves V-09120, V-09136, V-09152, and V-09158 have been corrected.

Appendix D Valve Program Relief Requests:

VR-1 - Relief request VR-1 has been withdrawn. OMa-1988, Part 10, 4.2.1.2 (g) and 4.3.2.2 (g) have been authorized for implementation. These paragraphs allow plant startup without the completion of all cold shutdown frequency testing, provided the licensee commences testing within 48 hours.

VR-2, VR-4, and VR-29 - Relief requests VR-2, VR-4 and VR-29 have been withdrawn. OMa-1988, Part 10, 4.2.2.3 (e) and (f) have been authorized for implementation. The analysis of leakage rate and corrective action requirements of IWV-3426 and IWV-3427 are no longer required and relief is not necessary.

VR-5, 6, 7, 8, 9, 10, 11, 12, 15, 18, 19, 21, 24, 28 and 32 - The valve exercising requirements of ASME/ANSI OMa-1988, Part 10, 4.2.1.2 and 4.3.2.2 will be followed as alternatives to IWV-3412(a) and IWV-3522 not including IWV-3522(a) and (b). These relief requests have been deleted with their individual refueling outage justifications documented in new Appendix F of the Program.

VR-13 and VR-14 - These relief requests have been revised in response to concerns noted in the NRC August 23, 1993, and May 2, 1994, Safety Evaluations.

VR-33 and VR-34 - Relief requests VR-33, and VR-34 have been withdrawn. Testing of the valves listed in these relief requests will be performed in accordance with IWV-3417(a).

Appendix E Cold Shutdown Justifications:

Deleted the cold shutdown justification for V-2598. Review has determined that this valve is not required to perform a specific function in shutting down the reactor to the cold shutdown condition or in mitigating the consequences of an accident.

Added Cold Shutdown justifications for the valves listed below. The justifications for testing these valves during cold shutdowns were previously documented in the individual relief requests.

V-2177, V-2190, V-2191, V-2526, V-3101, V-3414, V-3522, V-3113, V-3133, V-3143, V-3766, V-3524, V-3525, V-3526, V-3527, V-3215, V-3225, V-3235, V-3245, V-3217, V-3227, V-3237, V-3247, V-3258, V-3260, V-3259, and V-3261

Deleted the cold shutdown justifications for the following valves which are now tested quarterly:

V-3463, V-3664, V-3665

Appendix F Refueling Outage Justifications:

This appendix has been added to this program by this revision. The justifications contained therein were previously documented in the individual relief requests.