REVIEW AND APPROVAL RECORD

PLANT ST. LUCIE UNIT 1 AND 2

TITLE: ST. LUCIE PLANT DESIGN REVIEW SAFETY RELATED RELIEF VALVES

LEAD DISCIPLINE: MECHANICAL

ENGINEERING ORGANIZATION: PRODUCTION ENGINEERING GROUP

REVIEW/APPROVAL:

GROUP	INTERFACE TYPE			PREPARED	VERIFIED	APPROVED	FPL APPROVED*
	INPUT	REVIEW	N/A				
MECH	X						
ELECT			X				
I&C			X				
CIVIL			X				
NUC**			X				
ESI			X				
NUC FUEL			X				

* For Contractor Evals As Determined By Projects ** Review Interface As A Min On All 10CFR50.59 Evals and PLAs

FPL PROJECTS APPROVAL: _____ DATE: 8/30/95

OTHER INTERFACES

_____ _____

_____ _____

Form 24, Rev 6/94

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1.0 BACKGROUND AND INTRODUCTION

Problems of significance to operations have been experienced with Unit 1 relief valves V3439 (Unit 1 Low Pressure Safety Injection discharge header) and V2345 (Unit 1 Letdown header between the Letdown Control Valves and the Pressure Control Valves).

In the case of V3439, in August, 1995 the valve opened after alignment and initiation of shutdown cooling. This valve relieved due to a "normal" LPSI pump start pressure spike of approximately 30 psi over normal operating pressure and did not reseat until the LPSI pump was secured. Review of the design parameters for the relief valve revealed that nominal setpoint for the valve inadequately considered normal operating conditions. Further, the blowdown setting would not allow the valve to reseat once the system pressure returned to normal pump curve performance. Note that this issue was the subject of LER 95-006.

In the case of V2345, there has been a long standing problem with the relief valve lifting during system transients such as switching from the P to Q Letdown Control Valves. The relief valve has lifted in response to system transients and has at times not reseated without securing letdown or reducing letdown operating pressure. Review of design information reveals that the blowdown setting for the valve will not allow it to reseat even after system pressure is restored to normal values following transients.

As a result of the above issues and informal reviews of other relief valves, a comprehensive review of the St. Lucie Unit 1 and Unit 2 Nuclear Safety Related relief valves was conducted. The purpose of the review was to confirm that adequate margins exist for all Nuclear Safety Related relief valves in the areas of the lift setpoints and blowdown settings. The review was performed by a plant team, headed by Engineering, and consisted of members from Maintenance, Operations, Technical Staff and Engineering. The team members were as follows:

S.T. Hale - Engineering (Team Leader)
J. Totton - Operations
R.J. Young - Technical Staff, System Engineering
R. Dietz - Plant Licensing
N. Ireland - Engineering
J. LaDuca - Engineering
R. Dunlea - Engineering
J. Kagan - Mechanical Maintenance
R. Custis - Engineering
J. Porter - Engineering
W. Neff - Engineering

This review excluded the Main Steam Safety Valves (MSSVs) and Pressurizer Code Safeties and Power Operated Relief Valves (PORVs). The MSSVs and the Pressurizer Code Safeties are tested under unique procedures and the basis for their design lift and blowdown parameters are well understood and incorporated into plant documents including the FSAR, Design Basis and Maintenance procedures. The PORVs are not true relief valves in that they are not "passive" devices and are pilot actuated by a solenoid valve which uses

pressurizer pressure as an input.

2.0 METHODOLOGY

The review effort employed the following process:

(a) A list of Nuclear Safety Related relief valves was developed using the valve list within Passport/TEDB.

(b) A worksheet was developed for each valve to evaluate the lift setpoint margin and blowdown margin. As an initial step, the design basis for each valve was established by a detailed review of available reference information including the FSARs, the DBDs, vendor drawings, and Maintenance and IST Procedures. The basis for the lift setpoint and blowdown were also established. Specific parameters were then evaluated on the forms as follows:

-**Maximum system operating pressure**: The application for each valve was reviewed to determine a bounding value for operating pressure. Consideration was given to such factors as operation of systems in normal and post accident modes, single and multiple pump operation, and manual operations. Discussions were held with Operations and in some cases actual plant readings were used in establishing the maximum system operating pressure. Except where specifically noted on the worksheets, the established maximum operating pressure was further increased by 10% to account for pressure transients from factors such as pump starts.

-**Lowest relief valve setpoint pressure**: The nominal lift pressure for each valve was determined from a detailed review of available design information. The design value was then reduced by 3% to account for specified tolerances. Physical factors which could impact setpoint pressure were considered in the value determined. The actual relief valve setpoint pressure was utilized in cases where the design value resulted in limited or negative lift margin.

-**Lift setpoint analysis**: The lowest relief valve setpoint pressure was then compared to the maximum system operating pressure (plus any assumed pressure transients) to establish the margin to setpoint lift.

-**Blowdown analysis**: The blowdown was calculated by multiplying the specified blowdown percentage times the design setpoint. This blowdown value was then subtracted from the lowest relief valve setpoint to determine the pressure at which the relief valve would be expected to reseat. This calculated pressure was then compared to the highest system operating pressure to determine reseat margin.

-**Additional Information**: Flow capacity, actual maintenance settings, maintenance history, and the location of relief valve discharges were determined.

(c) Industry and In-house event information was collected and reviewed for applicability.

(d) The Safety Related relief valves identified in 2 (a) were reviewed using the above process to establish the margins for lift setpoint and reseating following lift. The inputs collected and reflected on the review sheets and all calculations performed were verified.

The results of the evaluation are provided below.

3.0 RESULTS

A total of 53 relief valves were reviewed for Unit 1 and 61 valves on Unit 2. The results of the lift setpoint and reseat pressure analyses are provided in Attachment 1 for Unit 1 and Attachment 2 for Unit 2. The documentation for valves with negative but acceptable reseat margin is incorporated on the summary sheets. These were typically gas or air relief valves on tanks which relieve to protect the tanks from overpressure but reseat well above minimum required pressure for safety functions. Of the valves reviewed, 8 valves on Unit 1 and 5 valves on Unit 2 have negative margins from a lift setpoint and/or blowdown perspective which require further evaluation. The tables below provide valve lift and reseat values compared to system conditions. The calculated margins, a brief evaluation and a summary of short and long term recommendations for each of these valves follows the tables:

TABLE 1-UNIT 1 SUMMARY

VALVE NO.	DESCRIPTION	DESIGN PRESS (psig)	MAX OPER PRESS +TRANS (psig)	LIFT PRESS (psig)	MAX OPER PRESS (psig)	RESEAT PRESS (psig)
V2345	Letdown	600	550-600	582	500	432
V2324, V2325, V2326	Charging Pump Discharge	2735	2463	2513	2413	2256
V3412	HPSI Header B	1750	1489	1750	1354	1316
V3417	HPSI Header A	2485	2341	2410	2291	1810
V3468	SDC Suction Line A	320	309	324	279	292
V3483	SDC Suction Line B	320	309	329	279	297

TABLE 2-UNIT 2 SUMMARY

VALVE NO.	DESCRIPTION	DESIGN PRESS (psig)	MAX OPER PRESS +TRANS (psig)	LIFT PRESS (psig)	MAX OPER PRESS (psig)	RESEAT PRESS (psig)
2-V2345	Letdown	600	550-600	582	500	432
2-V3412	HPSI Header B	1585	1398	1600	1271	1204
2-V3417	HPSI Header A	2485	2340	2400	2290	1808
2-V3439	LPSI Header A	500	492	510	436	460
2-V3507	LPSI Header B	500	488	505	436	455

3.1 UNIT 1

3.1.1 Chemical Volume and Control System:

3.1.1.1 V2324, V2325, and V2326-Charging Pump Discharge Relief Valves

Margin Summary

Design Lift Margin=+50 psi - These valves have positive lift margin. This margin considers the transient condition of starting a third charging pump while two pumps are operating. These valves are uncompensated, so the margin also takes into account the difference between the design superimposed back pressure of 165 psig and the actual back pressure of 30 psig (Note that these valves relieve from the discharge of the charging pumps back to the suction at a capacity equal to the charging pump flow, so there is no loss of inventory from the charging system itself). This results in the valve actually lifting 135 psi lower than its design setpoint. Actual operation of three pumps has not lifted these reliefs valves confirming the conclusions of the calculations that the present lift margin is acceptable. For transients such as isolation of the charging discharge header from events such as solenoid valve closure the relief valves will lift by design to protect the piping and the pumps themselves from over pressure (positive displacement pumps).

Reseat Margin=-157 psi - These valves have negative reseat margin indicating actions would have to be taken in order to reseat the valves under certain scenarios..

Evaluation

The specific conditions which could cause these relief valves to lift are (1) isolation of the charging header, and (2) operation of three charging pumps at elevated RCS pressures. In either case, if the relief valves do lift, then the charging pumps would be secured by procedure (reseating the relief valves) until the flow path is reopened, or the RCS has returned to lower pressure conditions. Once this has occurred, a charging pump can be restarted. Based on the above, lift margin is the critical parameter, and negative reseat margin is not pose a serious concern. This is not an issue from a nuclear safety perspective because the relief valves are performing their design function and charging can be restored. Engineering has issued a package to improve both the lift and reseat margins.

Immediate Actions (prior to Unit startup)

MEP 107-195M was issued 8/25/95 to modify the design superimposed back pressure from 165 to 115 psig (suction line pressure during emergency boration with the Boric Acid Makeup Pumps). This will add another 50 psi lift margin and reseat pressure margin. This package should be implemented during the present outage prior to Unit startup.

Long Term Actions

None

3.1.1.2 V2345-Letdown Relief Valve

Margin Summary

Design Lift Margin=+32 psi - This valve has positive lift margin by the calculation methodology used in this review. This valve has been known to lift, however, indicating there are significantly larger pressure transients under certain conditions than the 50 psi spike assumed in the analysis. It is thought that the occasional instabilities in the letdown control system contribute to these pressure transients. The valve relief capacity is 165 gpm and relieves to the Holdup Tanks.

Reseat Margin=-68 psi - This valve has negative reseat margin indicating actions would have to be taken in order to reseat the valve.

Evaluation

As noted above, this valve has lifted in the past and actions were underway to improve the situation prior to the design review activity described herein. The condition on V2345 does not pose a nuclear safety concern because the valve relieves to the Holdup Tanks and can be reseated by either lowering

the setting on the pressure control valve downstream of the relief valve, or securing letdown. It does, however, represent an operator workaround which should be corrected.

Immediate Actions (prior to Unit startup)

PCM 108-195 has been issued to lower the letdown back pressure control set pressure to 430 psig and reduce the blowdown setting on V2345 from 25% to 15%. This modification will improve margin to lift and ensure positive reseat margin. This package should be implemented during the present outage prior to unit startup.

Long Term Actions

The performance of this valve as well as that of the letdown control system should continue to be monitored to verify acceptable corrective actions. Additionally, the actions implemented to improve the stability of the letdown control system on Unit 2 should be considered for Unit 1.

3.1.2 Safety Injection System

3.1.2.1 V3412-HPSI 1B Discharge High Pressure Header Relief Valve

Margin Summary

Design Lift Margin=+194 psi Design, +261 psi Actual - This valve has significant lift margin, even considering the maximum pressure conditions of Containment Spray/High Pressure Safety Injection (HPSI) Pump "piggy-back" operation. Under this configuration, the Containment Spray pump is assumed to be at "dead-headed" conditions and the HPSI Pump at normal operating conditions because the HPSI Pump has significantly lower flow. This margin also considers a 135 psi pump start transient. Based on the actual valve setpoint, the valve has an additional 67 psi of lift margin. This valve has a minimum required capacity of 5 gpm (30 to 50 gpm actual) and relieves to the floor of the safeguards pump room.

Reseat Margin=-105 psi Design, -38 psi Actual - This valve has negative reseat pressure margin in a "piggy-back" configuration with the Containment Spray and HPSI Pumps.

Evaluation

Considering this valve has significant reseat margin, it is extremely unlikely it will lift under the maximum operating pressure conditions. Therefore, the valve will perform its design function and the function of the HPSI system is not adversely affected. The negative reseat margin is undesirable, however, and considering the safety significance of the HPSI system, it is recommended the valve be modified to achieve positive reseat margin.

Immediate Actions (prior to Unit startup)

EP 115-95 was issued on 8/27/95 to increase the Design Setpoint of V3412 from 1735 psig to 1750 psig (the design pressure of the piping) and reduce the blowdown from 25% to 10%. With these changes, this valve will have positive reseat pressure margin. This package should be implemented during the present outage prior to Unit startup.

Long Term Actions

None.

3.1.2.2 V3417-HPSI Pump 1A Discharge High Pressure Header Relief Valve

Margin Summary

Design Lift Margin=-12 psi Design, +69 psi Actual - This valve has negative design lift margin, but positive actual lift margin. This margin considers the worst case pressure condition which is in an alternate charging line-up (for situations where the normal charging system may not be available) through the A HPSI header. The valve has significant lift setpoint and reseat pressure margin for all other operating modes including HPSI Post-LOCA Recirculation. This valve has 132 gpm of capacity equal to 3 charging pumps. The valve relieves to the holdup tanks.

Reseat Margin=-562 psi Design, -481 psi Actual-psi - This valve has negative reseat margin indicating actions would have to be taken in order to reseat the valves under certain scenarios.

Evaluation

This valve has limited lift setpoint margin and negative reseat pressure margin in an alternate charging line-up for situations where the normal charging system may not be available. The valve has significant lift setpoint and reseat pressure margin for all other operating modes including HPSI Post-LOCA Recirculation. Considering the valve has actual lift margin, the valve will perform its design function and the function of the HPSI system is not adversely affected. An operability evaluation, however, should be performed to address the negative reseat margin.

Immediate Actions (prior to Unit startup)

EP 113-195 was issued on 8/26/95 to increase the Design Setpoint of V3417 from 2400 psig to 2485 psig (the design pressure of the piping) and reduce the blowdown from 25% to 15%. With these changes, this valve will have improved lift margin, but will still have negative reseat margin (-254 design, -79 actual). STAR 1-950996 was written and the operability of V3417 was addressed in the disposition to the STAR. This disposition was issued on 8/28/95. Engineering also prepared an

evaluation of operating procedures as a result of the remaining negative reseat margin on V3417, and this evaluation was included in the STAR disposition.

Long Term Actions

None

3.1.2.3 V3468 and V3483-Shutdown Cooling Suction Line Relief Valves

Margin Summary

Design Lift Margin V3468= +1 psi Design, +15 psi Actual
Design Lift Margin V3483= +1 psi Design, +20 psi Actual

These valves have slightly positive design lift margins, but actual values provide more margin to lift. These margins also consider a 30 psi transient in addition to Shutdown Cooling System maximum entry pressure on cooldown.

Reseat Margin V3468= -1 psi Design, +13 psi Actual
Reseat Margin V3483= -1 psi Design, +18 psi Actual

These valves have negative design reseat margin, but actual values provide positive margin.

Evaluation

These valves have posed problems in the past with lifting when initiating Shutdown Cooling. The valve lift setpoints were revised to improve the lift margin, but further improvement in both lift and reseat pressure margin is recommended. With the revised setpoints, Shutdown Cooling can be initiated without lifting these relief valves. STAR 950430 was assigned to Engineering to make recommendations on improving these margins.

Immediate Actions (prior to Unit startup)

None

Next Refueling Outage

Implement the recommendations of STAR 950430

3.2 UNIT 2

3.2.1 Chemical Volume and Control System

3.2.1.1 V2345-Letdown Relief Valve

Margin Summary

Design Lift Margin=+32 psi - This valve has positive lift margin by the calculation methodology used in this review. As is the case on Unit 1, this valve has been known to lift indicating there are significantly larger pressure transients under certain conditions than the 50 psi spike assumed in the analysis. It is thought that the occasional instabilities in the letdown control system contribute to these pressure transients. The valve relief capacity is 165 gpm and relieves to the Holdup Tanks.

Reseat Margin=-68 psi - This valve has negative reseat margin indicating actions would need to be taken in order to reseat the valve.

Evaluation

As noted above, this valve has lifted in the past and actions were underway to improve the situation prior to the design review activity described herein. The condition on V2345 does not pose a nuclear safety concern because the valve can be reseated by either lowering the setting on the pressure control valve downstream of the relief valve, or securing letdown. Also, enhancements have been made to the letdown control system which should aid in reducing the magnitude of the transients. The condition does, however, represent an operator work around which should be corrected.

Immediate Actions

None.

Next Refueling Outage

An EP is being prepared for issue on 10/1/95 to implement the Unit 1 V2345 modifications on Unit 2.

Long Term Actions

The performance of this valve as well as that of the letdown control system should continue to be monitored to verify acceptable corrective actions.

3.2.2 Safety Injection System

3.2.2.1 V3412-HPSI 2B Discharge High Pressure Header Relief Valve

Margin Summary

Design Lift Margin=+139 Design, +202 Actual - This valve has significant lift margin, even considering a 127 psi pump start transient. Unit 2 does not have a Containment Spray/HPSI Pump "piggy-back" configuration. Based on the actual valve setpoint, the valve has an additional 63 psi of lift margin. This valve has a minimum required capacity of 5 gpm (actual capacity is 10 to 30 gpm) and relieves to the floor.

Reseat Margin=-130 Design, -67 Actual - This valve has negative reseat pressure margin. Therefore, if the valve were to lift, actions would have to be taken under certain scenarios to reseat the valve.

Evaluation

Considering this valve has significant reseat margin, it is extremely unlikely it will lift under the maximum operating pressure conditions. Therefore, the valve will perform its design function and the function of the HPSI system is not adversely affected. The negative reseat margin is undesirable, however, and considering the safety significance of the HPSI system, it is recommended the valve be modified to achieve positive reseat margin. Until modifications can be made, an operability evaluation should be prepared.

Immediate Actions

Engineering Evaluation JPN-PSL SENP-95-103 was issued 8/27/95 addressing HPSI system operability with V3412 at its present lift and blowdown settings.

Next Refueling Outage

An EP will be issued by 10/1/95 which will reduce the blowdown on V3412 from 25% to 10%. With this change, this valve will have positive reseat pressure margin.

Long Term Actions

None

3.2.2.2 V3417-HPSI Pump 2A Discharge High Pressure Header Relief Valve

Margin Summary

Design Lift Margin=-11 psi Design, +60 psi Actual - This valve has negative design lift margin, but positive actual lift margin. This margin considers the worst case pressure condition which is an alternate charging line-up (for situations where the normal charging system may not be available) through the A HPSI header. The valve has significant lift setpoint and reseat pressure margin for all other operating modes including HPSI Post-LOCA Recirculation. This valve has a capacity of 132 gpm equal to 3 charging pumps and relieves to the Holdup Tanks.

Reseat Margin=-553 psi Design, -482 Actual - This valve has negative reseat margin indicating actions would have to be taken in order to reseat the valves under certain scenarios.

Evaluation

This valve has limited lift setpoint margin and negative reseat pressure margin in an alternate charging line-up for situations where the normal charging system may not be available. The valve has significant lift setpoint and reseat pressure margin for all other operating modes including HPSI Post-LOCA Recirculation. Considering the valve has positive actual lift margin, the valve will perform its design function and have no adverse affect on the HPSI system. If the valve were to lift, however, the charging pumps would have to be secured in order to reseat the valves. Until modifications can be made, an operability evaluation should be prepared.

Immediate Actions

Engineering Evaluation JPN-PSL-SENP-95-103 was issued 8/27/95 addressing HPSI system operability with V3417 at its present lift and blowdown settings. Engineering also prepared an evaluation of operating procedures as a result of the negative reseat margin on V3417. This evaluation was included in the STAR disposition for V3417 on Unit 1.

Next Refueling Outage

An EP will be issued by 10/1/95 which will increase the design setpoint of V3417 from 2400 psig to 2485 psig (design pressure of the piping) and reduce the blowdown from 25% to 10%.

Long Term Actions

None

3.2.2.3 V3439 and V3507-Low Pressure A and B Discharge Relief Valves

Margin Summary

Design Lift Margin V3439=-24 Design, +18 Actual
Design Lift Margin V3507=-24 Design, +17 Actual

These valves have negative design lift margin, but positive actual lift margin. The design lift margin considers the worst case pressure condition of LPSI Pump dead head conditions and a 30 psi pump start transient.

Reseat Margin V3439=-1 Design, +24 Actual
Reseat Margin V3507=-1 Design, +19 Actual

These valves have negative reseat margin indicating actions would have to be taken in order to reseat the valves under certain scenarios.

Evaluation

Based on the conservative approach on calculating lift margin and actual lift setpoint data, these valves will not lift upon initiation of Shutdown Cooling (worst case condition) so the function of the system is not adversely affected. The negative reseat margin is undesirable, however, and considering the event on Unit 1 where this same valve lifted and would not reseat, it is recommended that the valves be modified to achieve positive design reseat margin. An operability evaluation should also be prepared to address the present conditions until modifications can be implemented.

Immediate Actions

Engineering Evaluation JPN-PSL-SENP-95-103 was issued 8/27/95 addressing Shutdown Cooling system operability with V3439 and V3507 at their present lift and blowdown settings.

Next Refueling Outage (prior to going on Shutdown Cooling)

An EP will be issued by 10/1/95 which will increase the design lift setpoint on these valves from 500 to 535 similar to what was done on Unit 1. With this change, this valve will have positive design reseat pressure margin.

Long Term Actions

None

4.0 ACTION PLAN

An action plan matrix for Unit 1 and Unit 2 summarizing the above actions is provided in Attachment 3.

5.0 FOLLOW-ON ACTIVITIES

A maintenance specification/standard will be developed by 10/1/95 to reflect the current relief valve setpoints and provide guidance on the selection of lift and reseat values on relief valves. Additionally, Operations (Jim Totten) is interviewing operators and will provide a list of problem non-Safety Related relief valves which have had lift problems. Engineering will evaluate these valves following the methodology outlines above and provide recommendations.

6.0 REFERENCES

6.1 Safety Relief Valve Review Forms

6.2 Engineering Evaluation JPN-PSL-SENP-95-103

6.3 PCM 107-195M

6.4 PCM 108-195

6.5 PCM 113-195

6.6 PCM 115-195

7.0 ATTACHMENTS

7.1 Unit 1 Relief Valve Summary Sheets-10 Pages

7.2 Unit 2 Relief Valve Summary Sheets-10 Pages

7.3 Action Plan Matrix-5 Pages

ATTACHMENT 1

VALVE NUMBER	DESCRIPTION (Part 21)	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
V2115	Volume Control Tank Outlet (✓)	65	N/A	72.75	7.75	65.25	0.25	
V2199	RCP Bleedoff to Quench Tank (✓)	129	N/A	145.5	16.5	130.5	1.5	Pressure regulated manually during starup
V2311	Primary Makeup Water to the Volume Control Tank	75	N/A	145.5	70.5	108	33	
V2315	Charging Pump 1A Discharge to Equipment Drain Tank (✓)	75	50	145.5	20.5	108	33	
V2318	Charging Pump 1B Discharge to Equipment Drain Tank (✓)	75	50	145.5	20.5	108	33	
V2321	Charging Pump 1C Discharge to Equipment Drain Tank (✓)	75	50	145.5	20.5	108	33	
V2324 V2325 V2326	Charging Pump 2A, 2B, and 2C Discharge-3 pump operation (✓)	2413	50	2513	50	2256	[redacted]	3 Pump Operation
V2345	Letdown Control Valve Station	500	50	582	[redacted]	432	[redacted]	Problems have been experienced with lifting this relief valve due to pressure transients. There is an effort presently underway to resolve this issue.
V2354	Letdown to Holdup Tanks Downstream of FE-2202	65	50	194	79	144	79	
V2446	VCT Inlet Downstream of V2512	75	N/A	194	119	144	69	
V2447	VCT Inlet Upstream of V2512	110	50	194	34	144	34	

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
V3211	Safety Injection Tank 1A2 (✓)	230	N/A	242.5	12.5 26 Actual	218	-12/18 1 Actual	While the reseat margin is negative relative to the maximum operating pressure, the valve will reseat well above the 200 psig pressure required by safety analysis.
V3221	Safety Injection Tank 1A1 (✓)	230	N/A	242.5	12.5 24 Actual	218	-12/18 0 Actual	While the reseat margin is negative relative to the maximum operating pressure, the valve will reseat well above the 200 psig pressure required by safety analysis.
V3231	Safety Injection Tank 1B1 (✓)	230	N/A	242.5	12.5	218	-12/18	While the reseat margin is negative relative to the maximum operating pressure, the valve will reseat well above the 200 psig pressure required by safety analysis.
V3241	Safety Injection Tank 1B2 (✓)	230	N/A	242.5	12.5 25 Actual	218	-12/18 0 Actual	While the reseat margin is negative relative to the maximum operating pressure, the valve will reseat well above the 200 psig pressure required by safety analysis.
V3407	SIT Outlet Drain to RWT	250	50	437	137	324	74	
V3412	HPSI Pump 1B Discharge High Pressure Header	1354	135	1683/1750	194/261	1249/1316	[illegible]	Design/Actual-Margin to lift during SI is 347 psi. Maximum pressure based on CS/HPSI "piggy-back" operation.

UNIT 1-SAFETY INJECTION SYSTEM

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
V3417	HPSI Pump 1A Discharge High Pressure Header	2291 1354	50 135	2329/2410	-12/69 840	1729/1810	-562/-481 375	Alt chg line-up/Act HPSI Post-LOCA Recirc
V3430	Containment Spray Header to HPSI Pump 1B Suction	432	30	485/510	23/48	435/460	3/28	Design/Actual
V3431	Containment Spray Header to HPSI Pump 1A Suction	432	30	485/512	23/50	435/462	34788	Design/Actual
V3439	Low Pressure Header	462	30	519	27	476	14	
V3466	Safety Injection Tank Outlet Drain to [illegible]NT	230	50	340	60	252	22	
V3468	Loop 1B SDC Return to LPSI Pump 1B	279	30	310 324	[illegible] 15	278 292	[illegible] 13	Design-STAR 950430 Actual
V3469	Loop 1B SDC Return to Quench Tank	2248	0	2410	162	2161	-87	Operating pressure is relieved during the lift. As a result the valve will reseat.
V3482	Loop 1A SDC Return to Quench Tank	2248	0	2410	162	2161	-87	Operating pressure is relieved during the lift. As a result the valve will reseat.
V3483	Loop 1A SDC Return to LPSI Pump 1A	279	30	310 329	[illegible] 20	278 297	[illegible] 18	Design-STAR 950430 Actual

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-14-7A	Shutdown Cooling Heat Exchanger 1A, CCW Inlet	122	12.2	145.5	11.3	130.95	9	
SR-14-7B	Shutdown Cooling Heat Exchanger 1B, CCW Inlet	120	12	145.5	13.5	130.95	11	
SR-14-8A	Containment Fan Cooler HVS-1A CCW Outlet	122	12.2	145.5	11.3	130.95	9	
SR-14-8B	Containment Fan Cooler HVS-1B CCW Outlet	122	12.2	145.5	11.3	130.95	9	
SR-14-8C	Containment Fan Cooler HVS-1C CCW Outlet	120	12	145.5	13.5	130.95	11	
SR-14-8D	Containment Fan Cooler HVS-1D CCW Outlet	120	12	145.5	13.5	130.95	11	

UNIT 1-CONTAINMENT SPRAY SYSTEM

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-07-1A	LPSI and HPSI Pump 1A Suction	27.2	2.7	58	28.1	52	24.8	
SR-07-1B	LPSI and HPSI Pump 1B Suction	27.2	2.7	58	28.1	52	24.8	
SR-07-2	Sodium Hydroxide Storage Tank	5	0.5	7.8	2.3	2.8	-2.2	While reseat pressure is less than maximum operating pressue, this valve being open will not impact the ability of the NaOH tank to perform its function.

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-59-1A	Radiator Expansion Tank on Diesel Engine 1A1	8	N/A	9.7	1.7	8.7	0.7	Operating pressure range is 6.5 to 8 psig
SR-59-1A	Radiator Expansion Tank on Diesel Engine 1A2	8	N/A	9.7	1.7	8.7	0.7	Operating pressure range is 6.5 to 8 psig
SR-59-1B1	Radiator Expansion Tank on Diesel Engine 1B1	8	N/A	9.7	1.7	8.7	0.7	Operating pressure range is 6.5 to 8 psig
SR-59-1B2	Radiator Expansion Tank on Diesel Engine 1B2	8	N/A	9.7	1.7	8.7	0.7	Operating pressure range is 6.5 to 8 psig
SR-59-3A	Start-up Air Tank 1A4	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)
SR-59-3B	Start-up Air Tank 1B4	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)
SR-59-4A	Start-up Air Tank 1A3	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)
SR-59-4B	Start-up Air Tank 1B3	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)
SR-59-5A	Start-up Air Tank 1A2	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-59-5B	Start-up Air Tank 1B2	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)
SR-59-6A	Start-up Air Tank 1A1	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)
SR-59-6B	Start-up Air Tank 1B1	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 56.4 psi above the minimum required pressure (135 psig)

UNIT 1-INST' .MENT AIR SYSTEM

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-18-6A	Instrument Air to Maintenance Hatch Door Seal A	30	0.3	34	3.7	30.5	0.5	
SR-18-6B	Instrument Air to Maintenance Hatch Door Seal B	30	0.3	34	3.7	30.5	0.5	

UNIT 1-INTAKE C OLING WATER SYSTEM

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-21-1A	CCW Heat Exchanger 1A Inlet	45.5	4.6	87.3	37.2	78.6	33.1	
SR-21-1B	CCW Heat Exchanger 1B Inlet	45	4.5	87.3	37.8	78.6	33.6	

ATTACHMENT 2

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
V2115	Volume Control Tank Outlet	65	N/A	72.75	7.75	65.25	0.25	VCT operates at a much lower (20 to 30 psig) and very rarely reaches 65 psig.
V2199	RCP Bleedoff to Quench Tank	129	N/A	145.5	16.5	130.5	1.5	
V2311	Primary Makeup Water to the Volume Control Tank	75	N/A	145.5	70.5	108	33	
V2318	Charging Pump 2B Discharge to Equipment Drain Tank	75	50	145.5	20.5	108	33	
V2321	Charging Pump 2A Discharge to Equipment Drain Tank	75	50	145.5	20.5	108	33	
V2324 V2325 V2326	Charging Pump 2A, 2B, and 2C Discharge-3 pump operation	2413	N/A	2653	240	2379	-34	3 Pump Operation-The relief valves will reseat after the condition which caused the lift (solenoid valve closure) is cleared. The charging pumps are secured on isolation of the charging header by procedure.
V2345	Letdown Control Valve Station	500	50	582	[redacted]	432	[redacted]	Problems have been experienced with lifting this relief valve due to pressure transients. There is an effort presently underway to resolve this issue.
V2446	VCT Inlet Downstream of V2512	75	N/A	194	119	144	69	
V2447	VCT Inlet Upstream of V2512	110	50	194	34	144	34	
V2531	Letdown to Holdup Tanks Downstream of FE-2202	130	50	194	14	144	14	
V2588	Charging Pump 2C Discharge to Equipment Drain Tank	75	50	145.5	20.5	108	33	

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
V3211	Safety Injection Tank 2A2	570	57	649	22	582	12	
V3221	Safety Injection Tank 2A1	570	57	649	22	582	12	
V3231	Safety Injection Tank 2B1	570	57	649	22	582	12	
V3241	Safety Injection Tank 2B2	570	57	649	22	582	12	
V3407	Safety Injection Tank Outlet Drain to RWT	570	57	630	3	468	183	Hi Pressure-SIT Outlet press alrm Flowing Pressure is 285 psig
V3412	HPSI Pump 2B Discharge High Pressure Header	1271 1198	127 120	1537/1600	139/202 219	1141/1204	[redacted]	Injection Mode Recirc Mode Cap=5 gpm
V3417	HPSI Pump 2A Discharge High Pressure Header	2290 1271	50 127	2329/2400	[redacted]	1737/1808	[redacted]	Alternate Chg/Actual HPSI Post LOCA Recirc
V3430	SDC Heat Exchanger 2B Outlet	431	30	485	24	435	4	
V3431	SDC Heat Exchanger 2A Outlet	431	30	485	24	435	4	
V3439	Low Pressure Header A	479/462 436 After Flow Adj	30	485/510	[redacted]	435/460	[redacted]	Design/Actual Note: flow is adjusted immediately after pump start
V3466	Safety Injection Tank Outlet Drain to RWT	600	60	679	19	504	-96	Check valve back leakage protection. Only in service during SIT fill
V3468	Loop 2B SDC Return to LPSI Pump 2B	286	30	325	9	292	6	
V3469	Loop 2B SDC Return to Quench Tank	2250	0	2411	161	2162	-88	
V3482	Loop 2A SDC Return to Quench Tank	2250	0	2411	161	2162	-88	
V3483	Loop 2A SDC Return to LPSI Pump 2A	280	30	325	15	292	12	
V3513	SDC Heat Exchanger 2B Outlet to RWT	431	30	485	24	435	4	
V3507	Low Pressure Header B	479/458 436 After Flow Adj	30	485/505	[redacted]	435/455	[redacted]	Design/Actual Note: flow is adjusted immediately after pump start
V3570	Alt. Charging Feed to SI	1274	127	2329	928	1729	455	
V3667	Loop 2A SDC Return to Sump	278	30	325	17	292	14	
V3666	Loop 2B SDC Return to Sump	278	30	325	17	292	14	

UNIT 2-CONTAI. .MENT SPRAY SYSTEM

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-07-1A	LPSI and HPSI Pump 2A Suction	25.7	2.6	58.2	29.9	55.2	29.5	
SR-07-1B	LPSI and HPSI Pump 2B Suction	25.7	2.6	58.2	29.9	55.2	29.5	
SR-07-1C	Hydrazine Storage Tank	15	1.5	19.4	2.9	18.4	3.4	
SR-07-2A	Hydrazine Pump 2A Discharge	25.7	2.6	58.2	29.9	55.2	29.5	
SR-07-2B	Hydrazine Pump 2B Discharge	25.7	2.6	58.2	29.9	55.2	29.5	

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-17-221	Diesel Oil Transfer Pump 2A Discharge	82	N/A	97	15	92	10	Relief valve not required. System pressure never exceeds pump shutoff head which is less than the relief valve setpoint.
SR-17-222	Diesel Oil Transfer Pump 2A Discharge	82	N/A	97	15	92	10	Relief valve not required. System pressure never exceeds pump shutoff head which is less than the relief valve setpoint.
SR-59-3A	Start-up Air Tank 2A4	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)
SR-59-3B	Start-up Air Tank 2B4	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)
SR-59-4A	Start-up Air Tank 2A3	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)
SR-59-4B	Start-up Air Tank 2B3	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)
SR-59-5A	Start-up Air Tank 2A2	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-59-5B	Start-up Air Tank 2B2	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)
SR-59-6A	Start-up Air Tank 2A1	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)
SR-59-6B	Start-up Air Tank 2B1	200	N/A	213.4	13.4	191.4	-8.6	While reseat pressure is below maximum operating pressure, it is 62.4 psi above the minimum required press (129 psig)

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-18-6A	Instrument Air to Maintenance Hatch Door Seal A	30	0.3	34	3.7	32.2	2.2	
SR-18-6B	Instrument Air to Maintenance Hatch Door Seal B	30	0.3	34	3.7	32.2	2.2	

VALVE NUMBER	DESCRIPTION	MAX OPER PRESS (psig)	TRANS PRESS (psi)	DESIGN LIFT SETPT -3% (psig)	DESIGN LIFT SETPT MARGIN (psi)	DESIGN RESEAT PRESS (psig)	RESEAT PRESS MARGIN (psi)	REMARKS
SR-21-196	CCW Heat Exchanger 2A Inlet	45	4.5	87.3	37.8	82.9	37.9	
SR-21-243	CCW Heat Exchanger 2B Inlet	45	4.5	87.3	37.8	82.9	37.9	

ATTACHMENT 3

VALVE NUMBER	DESCRIPTION	DESIGN LIFT SETPT MARGIN (psi) Des/Act	RESEAT PRESS MARGIN (psi) Des/Act	OPERABILITY EVALVUATION?	OPERABILITY ISSUE ADDRESSED	IMMEDIATE ACTIONS PRIOR TO STARTUP	ACTIONS DURING THE NEXT REFUELING OUTAGE	FUTURE PLANS
V2324 V2325 V2326	Charging Pump 1A, 1B, and 1C Discharge-3 pump operation	50	-157	NO	-	Revise design setpoint to reflect actual backpress-**MEP Issued 8/25/95** Reset valves accordingly-MM	None	None
V2345	Letdown Control Valve Station	32	-68	NO	-	Replace valve-MM	None	Monitor performance
V3412	HPSI Pump 1B Discharge High Pressure Header	194/261	-105/-38	NO	-	-Prepare EP to modify design lift setpoint from 1735 to 1750 psig and revise blowdown from 25% to 10%-**EP Issued 8/27/95** Replace valve-MM	None	None
V3417	HPSI Pump 1A Discharge High Pressure Header	-12/69	-562/-481	YES	STAR 1-950996 was generated to address operability of the as modified negative reseat margin on V3417 (-254 Design, -79 Actual)-**STAR Disposition Issued 8/28/95**	Perform procedure evaluation and recommend changes to ONOPs and EOPs **STAR Disposition Issued 8/28/95** - Prepare EP to modify design lift setpoint from 2400 to 2485 psig and reduce blowdown from 25% to 11%-**EP Issued 8/26/95** Replace valve-MM	None	None

VALVE NUMBER	DESCRIPTION	DESIGN LIFT SETPT MARGIN (psi) Des/Act	RESEAT PRESS MARGIN (psi) Des/Act	OPERABILITY EVALVUATION?	OPERABILITY ISSUE ADDRESSED	IMMEDIATE ACTIONS PRIOR TO STARTUP	ACTIONS DURING THE NEXT REFUELING OUTAGE	FUTURE PLANS
V3468	Loop 1B SDC Return to LPSI Pump 1B	1/15	-1/13	NO	-	None-Actual margin is positive	Implement the recommendations of STAR 950430-EP **LaDuca 10/1/95**	None
V3483	Loop 1A SDC Return to LPSI Pump 1A	1/20	-1/18	NO	-	None-Actual margin is positive	Implement the recommendations of STAR 950430-EP **LaDuca 10/1/95**	None

VALVE NUMBER	DESCRIPTION	DESIGN LIFT SETPT MARGIN (psi) Des/Act	RESEAT PRESS MARGIN (psi) Des/Act	OPERABILITY EVALVUATION?	OPERABILITY ISSUE ADDRESSED	IMMEDIATE ACTIONS	ACTIONS DURING THE NEXT REFUELING OUTAGE	FUTURE PLANS
V2345	Letdown Control Valve Station	32	-68	NO	-	None-Improvements have been made on letdown control.	Implement the RV changes made on Unit 1-EP **LaDuca 10/1/95**	Monitor performance
V3412	HPSI Pump 2B Discharge High Pressure Header	139/202	-130/-67	YES	Perform operability evaluation considering existing lift margins. Recommend actions **Eval JPN-PSL-SENP-95-105 Issued 8/27/95**	None	Revise blowdown from 25% to 10%-**EP Krumins 10/1/95**	None
V3417	HPSI Pump 2A Discharge High Pressure Header	-11/60	-553/-482	YES	Perform operability evaluation considering existing lift margins-**Eval JPN-PSL-SENP-95 105 Issued 8/27/95**	Perform procedure evaluation and recommend changes to ONOPs and EOPs **STAR Disposition Issued 8/28/95**	Modify design lift setpoint from 2400 to 2485 psig and revise blowdown from 25% to 10%-**EP Krumins 10/1/95**	None
V3439	Low Pressure Header A	-24/18	-1/24	YES	Perform operability evaluation considering existing lift margins.-**Eval JPN-PSL-SENP-95 105 Issued 8/27/95**	None	Increase design setpoint from 500 to 535 psig-**EP Neff 10/1/95**	None

VALVE NUMBER	DESCRIPTION	DESIGN LIFT SETPT MARGIN (psi) Des/Act	RESEAT PRESS MARGIN (psi) Des/Act	OPERABILITY EVALVUATION?	OPERABILITY ISSUE ADDRESSED	IMMEDIATE ACTIONS	ACTIONS DURING THE NEXT REFUELING OUTAGE	FUTURE PLANS
V3507	Low Pressure Header B	-24/17	-1/19	YES	Perform operability evaluation considering existing lift margins. Recommend actions **-Eval JPN-PSL-SENP-95-105 Issued 8/27/95**	None	Increase design setpoint from 500 to 535 psig-**EP Neff 10/1/95**	None

FPL

Inter-Office Correspondence

JPN-SPSL-95-0334

To: S. A. Valdes
St. Lucie Plant

Date: August 30, 1995

From: D. J. Denver DJP
Nuclear Engineering

Department: JPN/PSL

Subject: **ST. LUCIE UNITS 1 AND 2**
DESIGN REVIEW OF SAFETY RELATED
RELIEF VALVES- JPN-PSL-SENP-95-105

Based on problems experienced on relief valves V3439 and V2345 on Unit 1, Engineering initiated and completed a review of Safety Related relief valves for Units 1 and 2. The results of that review have been incorporated into Engineering Evaluation JPN-PSL-SENP-95-105 which is attached. Note that all immediate engineering actions prescribed by this evaluation have been completed. This completes the actions assigned on STAR 0-950943. STAR 1-950430 will track the follow-on activities on Unit 1. A separate STAR is being generated by Engineering to track implementation activities on Unit 2.

If you have any questions, please contact S.T. Hale at Juno extension 3507 or PSL site extension 3634.

STH/

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