FLORIDA POWER & LIGHT COMPANY

ST. LUCIE UNIT NO. 1

INSERVICE TEST PROGRAM

SECTION I — VALVE TEST PROGRAM

SECTION II — PUMP TEST PROGRAM

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ABSTRACT

Section I. Inservice Valve Test Program

The Inservice Valve Test Program shall be conducted in accordance with Subsection IWV, Section XI, Division 1, of the 1983 Edition of the ASME Boiler and Pressure Vessel Code with Addenda through Summer 1983 Addenda, except for specific relief requested in accordance with 10 CFR 50.55a (g)(5)(iii). The period for this Inservice Valve Test Program starts February 11, 1988 and ends February 11, 1998.

Section II. Inservice Pump Test Program

The Inservice Pump Test Program shall be conducted in accordance with Subsection IWP, Section XI, Division 1, of the 1983 Edition of the ASME Boiler and Pressure Vessel Code with Addenda through Summer 1983 Addenda, except for specific relief requested in accordance with 10 CFR 50.55a (g)(5)(iii). The period for this Inservice Pump Test Program starts February 11, 1988 and ends February 11, 1998.

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8770-G-862		Rev 19	HVAC - Air Flow Diagram

I.A. SCOPE OF INSERVICE TEST PROGRAM - VALVES

SCOPE (IWV-1100)

The valves (including their actuating and position indicating systems) covered by this Inservice Test Program are valves which are required to perform a specific safety function in shutting down the reactor to the cold shutdown condition or in mitigating the consequences of an accident.

VALVES NOT TESTED (IWV-1200)

Valves not tested include:

- valves used only for maintenance

- valves used only for operating convenience such as manual vent, drain, instrument, and test valves

- valves used for system control, such as pressure regulating valves

NOTE:

- external control and protection systems responsible for sensing plant conditions and providing signals for valve operation are outside the scope of this inservice test program - valves.

I.B. DEFINITIONS

ACTIVE VALVES

- valves which are required to change (stem or disk) position to accomplish a specific (safety) function as specified in Subarticle IWV-1100.

EXERCISING

- the demonstration based on direct or indirect visual or other positive indication that the moving parts of the valve function satisfactorily.

INSERVICE TEST

- a special test procedure for obtaining information through measurement or observation to determine the operational readiness of a valve.

OPERATIONAL READINESS

- the capability of a valve to fulfill its (safety) function.

PASSIVE VALVES

- valves which are not required to change (stem or disk) position to accomplish a specific (safety) function as specified in Subarticle IWV-1100.

I.C. VALVE CATEGORIES (IWV-2200)

Valves within the scope of this Inservice Test Program shall be placed in one or more of the following categories. However, when more than one distinguishing category characteristic is applicable, all requirements of each of the individual categories are applicable, although duplication or repetition of common testing requirements is not necessary.

Category A - Valves for which seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their function.

Category B - Valves for which seat leakage in the closed position is inconsequential for fulfillment of their function.

Category C - Valves which are self-actuating in response to some system characteristic, such as pressure (safety and relief valves) or flow direction (check valves).

Category D - Valves which are actuated by an energy source capable of only one operation, such as rupture disks or explosively actuated valves.

I.D. INSERVICE TEST REQUIREMENTS (IWV-3700)

Active and passive valves in the categories defined in subarticle IWV-2200 shall be tested in accordance with the procedures contained in the Subarticles specified in Table IWV-3700-1.

TABLE IWV-3700-1
INSERVICE TEST REQUIREMENTS(1)

Category	Valve Function (IWV-2100)	Leak Test Procedure	Exercise Test Procedure	Special Test Procedure
A	Active	IWV-3420	IWV-3410	NONE
A	Passive	IWV-3420	NONE	NONE
B	Active	NONE	IWV-3410	NONE
C-Safety & Relief	Active	NONE	IWV-3510	NONE
C-Check	Active	NONE	IWV-3520	NONE
D	Active	NONE	NONE	IWV-3600

NOTE:
(1) No tests required for Category B, C, and D passive valves.

I.E. LEGEND FOR TABLE I-1 - INSERVICE TESTS TO CODE OR RELIEF REQUEST SYMBOLS AND ABBREVIATIONS

VALVE TYPE

BALL		
BUTFLY	=	BUTTERFLY
CHECK		
DIAPH	=	DIAPHRAGM
GATE		
GLOBE		
NEEDLE		
P/A CHECK	=	POWER ASSISTED CHECK
RELIEF		
S/CHECK	=	STOP CHECK
SAFETY		

VALVE ACTUATOR

AIR CYL	=	AIR CYLINDER (AIR OPERATED)
DO	=	DIAPHRAGM OPERATOR (AIR OPERATED)
MAN	=	MANUAL
MO	=	MOTOR OPERATED (AIR OPERATED)
PO	=	PISTON OPERATOR
S/A	=	SELF/ACTUATED
SO	=	SOLENOID OPERATOR

ASME CODE CLASS

1	=	QUALITY GROUP A
2	=	QUALITY GROUP B
3	=	QUALITY GROUP C

ASME CODE CAT.

VALVE CATEGORY, A, B, C, D OR COMBINATIONS, IN ACCORDANCE WITH SUBARTICLE IWV-2200.

NORMAL POSITION

CLOSED		
LC	=	LOCKED CLOSED
LO	=	LOCKED OPEN
OPEN		

FAILURE MODE

FAI	=	FAILS-AS-IS
FC	=	FAILS CLOSED
FO	=	FAILS OPEN

I.E. LEGEND FOR TABLE I-1 - INSERVICE TESTS TO CODE OR RELIEF REQUEST SYMBOLS AND ABBREVIATIONS (CON'T)

INSERVICE TESTS - CATEGORY A AND B VALVES (IWV-3400)

VALVE EXERCISING TEST (IWV-3410)

TEST PERIOD OR TEST FREQUENCY (IWV-3411)

QTR Each category A or B valve shall be exercised (tested), during plant operation, at least once every 3 months.

COLD Each category A or B valve shall be exercised (tested) during cold shutdown. In case of frequent cold shutdowns, these valves are not required to be tested more than once every 3 months. (IWV-3412a)

REFUEL Each category A or B valve shall be exercised (tested) during refueling shutdown.

EXERCISING (IWV-3412)

ES Each category A or B valve shall be exercised (tested) to the position required to fulfill its (safety) function. The necessary valve disk movement shall be determined by exercising the valve while observing an appropriate indicator, which signals the required change of disk position, or observing indirect evidence (such as changes in system pressure, flow rate, level, or temperature), which reflect stem or disk position. (IWV-3412)

FS Each category A or B valve with a fail-safe actuator shall be tested by observing the operation of the valves upon loss of actuator power. (IWV-3415)

MT The full-stroke time of each power operated category A or B valve shall be measured when the valve is exercised (or tested). For valves with stroke times of 10 seconds or less, measure stroke time to the nearest second. For valves with stroke times greater than 10 seconds, measure stroke time to within 10% of the maximum stroke time specified in Table I-1. (IWV-3413)

NOTE: Duplication of valve exercising tests is not required when more than one inservice test requirement is specified.

I.E. LEGEND FOR TABLE I-1 - INSERVICE TESTS TO CODE OR RELIEF REQUEST SYMBOLS AND ABBREVIATIONS (CON'T)

INSERVICE TESTS - CATEGORY A AND B VALVES (IWV-3400) (CON'T)

VALVE LEAK RATE TEST (IWV-3420)

TEST PERIOD OR TEST FREQUENCY (IWV-3422)

REFUEL Each category A valve shall be leak rate tested at least once every 2 years, during refueling shutdown.

VALVE LEAK RATE TEST (IWV-3420)

SLT Each category A valve shall be seat leak tested and the valve seat leak rate measured.

INSERVICE TESTS - CATEGORY C VALVES (IWV-3500)

SAFETY VALVE AND RELIEF VALVE TESTS (IWV-3510)

TEST PERIOD OR TEST FREQUENCY (IWV-3511)

REFUEL Safety and relief valves shall be tested at the end of each time period as defined in Table IWV-3510-1 of Subarticle IWV-3500.

SAFETY VALVE AND RELIEF VALVE SET POINT TEST (IWV-3512)

SRV Safety valve and relief valve set points shall be tested in accordance with ASME PTC 25.3-1976.

CHECK VALVE TESTS (IWV-3520)

TEST PERIOD OR TEST FREQUENCY (IWV-3521)

QTR Each category C check valve shall be exercised (tested), during plant operation, at least once every 3 months. (IWV-3521)

COLD Each category C check valve shall be exercised (tested) during cold shutdown. In case of frequent cold shutdowns, these valves are not required to be tested more than once every 3 months. (IWV-3522)

REFUEL Each category C check valve shall be exercised (tested) during refueling shutdown.

I.E. LEGEND FOR TABLE I-1 - INSERVICE TESTS TO CODE OR RELIEF REQUEST SYMBOLS AND ABBREVIATIONS (CON'T)

CHECK VALVE TESTS (IWV-3520) (CON'T)

VALVE EXERCISING TESTS (IWV-3522)

CV/O Each category C check valve, whose (safety) function is to open on reversal of pressure differential, shall be tested by proving that the disk moves promptly away from the seat when the closing pressure differential is removed and flow through the valve is initiated.

Confirmation that the disk moves away from the seat shall be by visual observation, by an electrical signal initiated by a position indicating device, by observation of substantially free flow through the valve as indicated by appropriate pressure indications in the system, or by other positive means. (IWV-3522 (b))

CV/C Each category C check valve, whose (safety) function is to prevent reversed flow, shall be tested in a manner that proves that the disk travels to the seat promptly on cessation or reversal of flow.

Confirmation that the disk is on its seat shall be by visual observation, by an electrical signal initiated by a position indicating device, by observation of appropriate pressure indications in the system, or by other positive means.
(IWV-3522 (a))

VALVES WITH REMOTE POSITION INDICATOR (IWV-3300)

PI Each Category A, B, or C valve with a remote position indicator shall be observed at least one every 2 years to verify that valve position is accurately indicated. (IWV-3300)

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I.F. INDEX - LIST OF VALVES TESTED TO CODE OR RELIEF REQUEST

FLORIDA POWER &AND LIGHT COMPANY
ST. LUCIE UNIT NO. 1
INSERVICE TEST PROGRAM-VALVES
TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Reactor Coolant System
P&ID NO. 8770-G-078
SHEET 110 REV. 8

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-1402	G-8	2 1/2"	GLOBE	SO	1	B	CLOSED OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 5.0 Sec.
V-1403	G-8	2 1/2"	GATE	MO	1	B	OPEN OPEN	YES FAI	COLD REFUEL	ES PI	MT 10.0 Sec.	
V-1404	H-8	2 1/2"	GLOBE	SO	1	B	CLOSED OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 5.0 Sec.
V-1405	H-8	2 1/2"	GATE	MO	1	B	OPEN OPEN	YES FAI	COLD REFUEL	ES PI	MT 10.0 Sec.	
V-1441	D-5	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.
V-1442	D-5	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.
V-1443	H-6	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.
V-1444	H-6	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.
V-1445	F-8	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.

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Reactor Coolant System
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SHEET 110 REV. 8

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-1446	F-8	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.
V-1449	F-8	1"	GLOBE	SO	2	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 2.0 Sec.
V-1200	G-6	6"	SAFETY	S/A	1	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-1201	G-6	6"	SAFETY	S/A	1	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-1202	G-6	6"	SAFETY	S/A	1	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

REPORT DATE: 8/31/87

Chemical and Volume Control System
P&ID NO. 8770-G-078
SHEET 120 REV. 2

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-2515	D-8	2"	GLOBE	DO	1	A	OPEN CLOSED	YES FC	COLD REFUEL	ES PI	FS SLT	MT 5.0 Sec.
V-2516	D-7	2"	GLOBE	DO	1	A	OPEN CLOSED	YES FC	COLD REFUEL	ES PI	FS SLT	MT 5.0 Sec.
SE-02-01	A-8	2"	GLOBE	SO	1	B	OPEN OPEN	YES FO	QTR REFUEL	ES PI	FS	MT 5.0 Sec.
SE-02-02	B-8	2"	GLOBE	SO	1	B	OPEN OPEN	YES FO	QTR REFUEL	ES PI	FS	MT 5.0 Sec.
SE-02-03	C-8	2"	GLOBE	SO	1	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 5.0 Sec.
SE-02-04	C-8	2"	GLOBE	SO	1	B	LC OPEN	YES FC	COLD REFUEL	ES PI	FS	MT 5.0 Sec.
V-2345	F-8	2"	RELIEF	S/A	3	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2430	B-5	2"	CHECK	S/A	1	C	OPEN OPEN	NO N/A	QTR	CV/O		
V-2431	C-8	2"	CHECK	S/A	1	C	CLOSED OPEN	NO N/A	COLD	CV/O		

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Chemical and Volume Control System
P&ID NO. 8770-G-078
SHEET 120 REV. 2

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-2432	B-8	2"	CHECK	S/A	1	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-2433	A-8	2"	CHECK	S/A	1	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-2435	A-7	2"	CHECK	S/A	1	C	CLOSED OPEN	NO N/A	COLD	CV/O		

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Chemical and Volume Control System
P&ID NO. 8770-G-078
SHEET 121 REV. 6

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
SE-01-01	H-6	3/4"	GLOBE	SO	2	A	OPEN CLOSED	YES FC	COLD REFUEL	ES PI	FS SLT	MT 5.0 Sec.
V-2505	H-6	3/4"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	COLD REFUEL	ES PI	FS SLT	MT 5.0 Sec.
FCV-2161	B-4	1"	GLOBE	DO	2	B	OPEN* CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 5.0 Sec.
*Valve may be open or closed, dependent on mode of operation.												
V-2501	E-4	4"	GATE	MO	2	B	OPEN CLOSED	YES FAI	COLD REFUEL	ES PI	MT 20.0 Sec.	
V-2504	E-5	3"	GATE	MO	3	B	CLOSED OPEN	YES FAI	COLD REFUEL	ES PI	MT 15.0 Sec.	
V-2508	B-6	3"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
V-2509	B-7	3"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
V-2510	B-6	1"	GLOBE	DO	2	B	OPEN CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 5.0 Sec.
V-2511	D-5	1"	GLOBE	DO	2	B	OPEN CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 5.0 Sec.

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Chemical and Volume Control System
P&ID NO. 8770-G-078
SHEET 121 REV. 6

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-2514	C-4	3"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
V-2525	E-7	4"	GATE	MO	2	B	CLOSED* CLOSED	YES FAI	QTR REFUEL	ES PI	MT 15.0 Sec.	
	*Valve may be open or closed, dependent on mode of operation.											
V-02132	G-2	2"	CHECK	S/A	2	C	CLOSED* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-02133	F-2	2"	CHECK	S/A	2	C	CLOSED* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-02134	E-2	2"	CHECK	S/A	2	C	CLOSED* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-2115	F-7	2"	RELIEF	S/A	3	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2118	F-7	4"	CHECK	S/A	2	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-2125	A-4	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2132	B-7	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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Chemical and Volume Control System
P&ID NO. 8770-G-078
SHEET 121 REV. 6

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-2133	B-6	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2141	C-5	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2149	C-4	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2150	D-5	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2157	C-4	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2160	B-4	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2171	B-3	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2173	B-2	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2177 See Relief Request #1	C-4	3"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		

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Chemical and Volume Control System
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SHEET 121 REV. 6

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-2188	E-6	3"	CHECK	S/A	3	C	CLOSED* OPEN	NO N/A	QTR	CV/O		
*Valve may be open or closed, dependent on mode of operation.												
V-2190 See Relief Request #1	D-6	3"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-2191 See Relief Request #2	E-6	3"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-2311	E-4	1 1/2"	RELIEF	S/A	3	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2315	H-3	1/2"	RELIEF	S.A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2318	G-3	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2321	F-3	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2324	F-2	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2325	G-2	1 1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Chemical and Volume Control System
P&ID NO. 8770-G-078
SHEET 121 REV. 6

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-2326	H-2	1 1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2426	C-4	1 1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2436	B-4	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2443	B-4	3"	CHECK	S/A	2	C	CLOSED* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-2444	B-4	3"	CHECK	S/A	2	C	CLOSED* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-2446	E-6	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-2447	E-4	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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INSERVICE TEST PROGRAM-VALVES
TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Safety Injection System
P&ID NO. 8770-G-078
SHEET 130 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-07009	H-2	2"	GLOBE	MAN	2	A	LC OPEN	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
V-3463	H-2	2"	GLOBE	MAN	2	A	LC OPEN	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
FCV-3306	E-4	10"	GLOBE	PO	2	B	LO OPEN	YES FO	COLD REFUEL	ES PI	FS	MT 10.0 Sec.
HCV-3657	F-4	12"	GLOBE	DO	2	B	LC CLOSED	YES FAI	COLD REFUEL	ES PI	FS	MT 10.0 Sec.
MV-03-2	E-4	10"	GLOBE	MO	2	B	LO OPEN	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
V-3206	F-4	10"	GATE	MO	2	B	LO OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
V-3207	E-4	10"	GATE	MO	2	B	LO OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
V-3432	E-8	12"	GATE	MO	2	B	LO OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
V-3444	F-8	12"	GATE	MO	2	B	LO OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	

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SHEET 130 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3452	G-8	12"	GATE	MO	2	B	LC CLOSED	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
V-3453	G-8	12"	GATE	MO	2	B	LC CLOSED	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
V-3456	G-3	10"	GATE	MO	2	B	LC CLOSED	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
V-3457	G-3	10"	GATE	MO	2	B	LC CLOSED	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
V-3653	B-4	4"	GATE	MO	2	B	LO OPEN	YES FAI	NA	NA		
	Passive Valve (IWV-3700)											
V-3654	B-5	6"	GATE	MO	2	B	LO OPEN	YES FAI	NA	NA		
	Passive Valve (IWV-3700)											
V-3655	C-4	4"	GATE	MO	2	B	LC CLOSED	YES FAI	NA	NA		
	Passive Valve (IWV-3700)											
V-3656	D-5	6"	GATE	MO	2	B	LO OPEN	YES FAI	NA	NA		
	Passive Valve (IWV-3700)											
V-3659	G-8	3"	GATE	MO	2	B	LO OPEN	YES FAI	COLD REFUEL	ES PI	MT 20.0 Sec.	

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SHEET 130 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3660	H-8	3"	GATE	MO	2	B	LO OPEN	YES FAI	COLD REFUEL	ES PI	MT 20.0 Sec.	
V-3662	D-7	4"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 20.0 Sec.	
V-3663	D-6	4"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 20.0 Sec.	
I-V-07000 See Relief Request #3	F-7	14"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
I-V-07001 See Relief Request #3	E-7	14"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-3101	D-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
V-3102	D-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
V-3103	D-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
V-3104	E-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		

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Safety Injection System
P&ID NO. 8770-G-078
SHEET 130 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3105	E-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
V-3106	F-5	10"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	COLD	CV/O		
V-3107	E-5	10"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	COLD	CV/O		
V-3401 See Relief Request #2	D-7	6"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-3405 See Relief Request #1	C-5	3"	S/CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-3407	H-3	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3410 See Relief Request #2	B-7	6"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-3412	B-3	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3414 See Relief Request #1	B-5	3"	S/CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		

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Safety Injection System
P&ID NO. 8770-G-078
SHEET 130 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3417	C-3	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3427 See Relief Request #1	C-5	3"	S/CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
V-3430	D-7	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3431	D-6	1/2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3439	D-3	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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Safety Injection System,
P&ID NO. 8770-G-078
SHEET 131 REV. 3

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
FCV-03-1E	B-6	3/8"	NEEDLE	SO	2	A	CLOSED CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 2.0 Sec.
FCV-03-1F	B-7	3/8"	NEEDLE	SO	2	A	CLOSED CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 2.0 Sec.
V-3480	E-5	10"	GATE	MO	1	A	LC CLOSED	YES FAI	COLD REFUEL	ES SLT	MT 60.0 Sec. PI	
V-3481	E-5	10"	GATE	MO	1	A	LC CLOSED	YES FAI	COLD REFUEL	ES SLT	MT 60.0 Sec. PI	
V-3651	D-4	10"	GATE	MO	1	A	LC CLOSED	YES FAI	COLD REFUEL	ES SLT	MT 60.0 Sec. PI	
V-3652	D-4	10"	GATE	MO	1	A	LC CLOSED	YES FAI	COLD REFUEL	ES SLT	MT 60.0 Sec. PI	
V-3113 See Relief Request #4	G-7	2"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	REFUEL	CV/O	SLT	
V-3114	H-7	6"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	COLD	CV/O	SLT	
V-3123 See Relief Request #4	F-7	2"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	REFUEL	CV/O	SLT	

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SHEET 131 REV. 3

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3124	E-7	6"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	COLD	CV/O	SLT	
V-3133 See Relief Request #4	D-7	2"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	REFUEL	CV/O	SLT	
V-3134	E-7	6"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	COLD	CV/O	SLT	
V-3143 See Relief Request #4	B-7	2"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	REFUEL	CV/O	SLT	
V-3144	C-7	6"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	COLD	CV/O	SLT	
V-3215 See Relief Request #5	F-5	12"	CHECK	S/A	2	AC	CLOSED OPEN	NO N/A	REFUEL	CV/O	SLT	
V-3217	F-5	12"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	COLD	CV/O	SLT	
V-3225 See Relief Request #5	C-3	12"	CHECK	S/A	2	AC	CLOSED OPEN	NO N/A	REFUEL	CV/O	SLT	
V-3227	F-2	12"	CHECK	S/A	1	AC	CLOSED OPEN	NO N/A	COLD	CV/O	SLT	

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Safety Injection System,
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SHEET 131 REV. 3

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3235	F-5	12"	CHECK	S/A	2	AC	CLOSED	NO	REFUEL	CV/O	SLT	
See Relief Request #5							OPEN	N/A				
V-3237	B-5	12"	CHECK	S/A	1	AC	CLOSED	NO	COLD	CV/O	SLT	
							OPEN	N/A				
V-3245	C-3	12"	CHECK	S/A	2	AC	CLOSED	NO	REFUEL	CV/O	SLT	
See Relief Request #5							OPEN	N/A				
V-3247	B-2	12"	CHECK	S/A	1	AC	CLOSED	NO	COLD	CV/O	SLT	
							OPEN	N/A				
HCV-3615	H-7	6"	GLOBE	MO	1	B	CLOSED	YES	QTR	ES	MT 15.0 Sec.	
							OPEN	FAI	REFUEL	PI		
HCV-3616	G-7	2"	GLOBE	MO	1	B	CLOSED	YES	QTR	ES	MT 10.0 Sec.	
							OPEN	FAI	REFUEL	PI		
HCV-3617	G-7	2"	GLOBE	MO	1	B	CLOSED	YES	QTR	ES	MT 10.0 Sec.	
							OPEN	FAI	REFUEL	PI		
HCV-3618	F-5	1"	GLOBE	DO	1	B	CLOSED	YES	COLD	ES	FS	MT 10.0 Sec.
							CLOSED	FC	REFUEL	PI		
HCV-3625	F-7	6"	GLOBE	MO	1	B	CLOSED	YES	QTR	ES	MT 15.0 Sec.	
							OPEN	FAI	REFUEL	PI		

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SHEET 131 REV. 3

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
HCV-3626	E-7	2"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
HCV-3627	E-7	2"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
HCV-3628	F-3	1"	GLOBE	DO	1	B	CLOSED CLOSED	YES FC	COLD REFUEL	ES PI	FS	MT 10.0 Sec.
HCV-3635	D-7	6"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 15.0 Sec.	
HCV-3636	C-7	2"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
HCV-3637	C-7	2"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
HCV-3638	B-5	1"	GLOBE	DO	1	B	CLOSED CLOSED	YES FC	COLD REFUEL	ES PI	FS	MT 10.0 Sec.
HCV-3645	B-7	6"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 15.0 Sec.	
HCV-3646	A-7	2"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	

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Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
HCV-3647	A-7	2"	GLOBE	MO	1	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 10.0 Sec.	
HCV-3648	B-3	1"	GLOBE	DO	1	B	CLOSED CLOSED	YES FC	COLD REFUEL	ES PI	FS	MT 10.0 Sec.
MV-03-1A	E-7	2"	GLOBE	MO	2	B	LC CLOSED	YES FAI	QTR REFUEL	ES PI	MT 30.0 Sec.	
MV-03-1B	D-7	2"	GLOBE	MO	2	B	LC CLOSED	YES FAI	QTR REFUEL	ES PI	MT 30.0 Sec.	
V-3614	F-5	12"	GATE	MO	2	B	LO OPEN	YES FAI	N/A	N/A		
	Passive Valve (IWV-3700)											
V-3624	F-2	12"	GATE	MO	2	B	LO OPEN	YES FAI	N/A	N/A		
	Passive Valve (IWV-3700)											
V-3634	B-5	12"	GATE	MO	2	B	LO OPEN	YES FAI	N/A	N/A		
	Passive Valve (IWV-3700)											
V-3644	B-2	12"	GATE	MO	2	B	LO OPEN	YES FAI	N/A	N/A		
	Passive Valve (IWV-3700)											
V-3211	H-5	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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Safety Injection System,
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SHEET 131 REV. 3

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-3221	H-2	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3231	D-5	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3241	D-2	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3468	D-6	2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3469	D-4	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3482	E-5	1"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-3483	E-6	2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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Fuel Pool System
P&ID NO. 8770-G-078
SHEET 140 REV. 2

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-4206	C-8	8"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
V-4207	B-8	8"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											

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Sampling System
P&ID NO. 8770-G-078
SHEET 150 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-5200	G-7	3/8"	GLOBE	DO	2	A	CLOSED	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-5201	F-7	3/8"	GLOBE	DO	2	A	CLOSED	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-5202	E-7	3/8"	GLOBE	DO	2	A	CLOSED	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-5203	G-7	3/8"	GLOBE	DO	2	A	CLOSED	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-5204	F-7	3/8"	GLOBE	DO	2	A	CLOSED	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-5205	E-7	3/8"	GLOBE	DO	2	A	CLOSED	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	

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Waste Management System
P&ID NO. 8770-G-078
SHEET 160 REV. 4

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-6301	F-6	3"	DIAPH	DO	2	A	OPEN	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-6302	F-6	3"	DIAPH	DO	2	A	OPEN	YES	QTR	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	

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Waste Management System
P&ID NO. 8770-G-078
SHEET 163 REV. 6

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-6554	F-7	1"	DIAPH	DO	2	A	OPEN	YES	COLD	ES	FS	MS 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-6555	F-7	1"	DIAPH	DO	2	A	OPEN	YES	COLD	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
V-6741	D-7	1"	GLOBE	DO	2	A	OPEN*	YES	COLD	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
	*Valve may be open or closed, dependent on mode of operation.											
V-6779	D-7	1"	CHECK	S/A	2	A	OPEN*	NO	QTR	CV/O		
							OPEN	N/A	REFUEL	SLT		
	*Valve may be open or closed, dependent on mode of operation.											

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Main Steam System
P&ID NO. 8770-G-079
SHEET 1 REV. 23

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-MV-08-13	H-9	3"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
I-MV-08-14	E-9	3"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
I-MV-08-3	M-10	4"	GATE	MO	2	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
I-HCV-08-1A	K-12	34"	P/A CHECK	AIR CYL	2	C	OPEN CLOSED	YES N/A	COLD REFUEL	ES PI	MT 6.0 Sec.	
I-HCV-08-1B	C-12	34"	P/A CHECK	AIR CYL	2	C	OPEN CLOSED	YES N/A	COLD REFUEL	ES PI	MT 6.0 Sec.	
I-V-08117 See Relief Request #1	K-12	34"	CHECK	S/A	2	C	OPEN CLOSED	NO N/A	REFUEL	N/A		
I-V-08130	G-9	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-08148 See Relief Request #1	C-12	34"	CHECK	S/A	2	C	OPEN CLOSED	NO N/A	REFUEL	N/A		
I-V-08163	F-9	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		

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Main Steam System
P&ID NO. 8770-G-079
SHEET 1 REV. 23

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-8201	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8202	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8203	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8204	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8205	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8206	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8207	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8208	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8209	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		

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Main Steam System
P&ID NO. 8770-G-079
SHEET 1 REV. 23

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-8210	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8211	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8212	K-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8213	C-11	6"	RELIEF	SA	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8214	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8215	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
V-8216	C-11	6"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
I-V-08448	E-9	4"	CHECK	S/A	2 2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-08492	J-9	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		

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Feedwater and Condensate System
P&ID NO. 8770-G-080
SHEET 3 REV. 24

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-MV-09-07	E-6	20"	GATE	MO	2	B	OPEN CLOSED	YES FAI	COLD REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-08	E-11	20"	GATE	MO	2	B	OPEN CLOSED	YES FAI	COLD REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-09	E-1	4"	GLOBE	MO	3	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-10	E-16	4"	GLOBE	MO	3	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-11	E-4	4"	GLOBE	MO	3	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-12	E-13	4"	GLOBE	MO	3	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-13	K-1	2 1/2"	GLOBE	MO	3	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 45.0 Sec.	
I-MV-09-14	M-1	2 1/2"	GLOBE	MO	3	B	CLOSED OPEN	YES FAI	QTR REFUEL	ES PI	MT 45.0 Sec.	
I-V-12174	K-11	8"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		

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Feedwater and Condensate System
P&ID NO. 8770-G-080
SHEET 3 REV. 24

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-V-12176	K-11	8"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9107	M-4	4"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9119	D-1	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9123	K-4	4"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9135	D-16	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9139	H-4	6"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9151	E-4	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9157	E-13	4"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-9252 See Relief Request #1	A-6	18"	CHECK	S/A	2	C	OPEN CLOSED	NO N/A	REFUEL	N/A		

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Feedwater and Condensate System
P&ID NO. 8770-G-080
SHEET 3 REV. 24

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-V-9294	A-11	18"	CHECK	S/A	2	C	OPEN	NO	REFUEL	N/A		
See Relief Request #1							CLOSED	N/A				
I-V-9303	I-4	2"	CHECK	S/A	3	C	CLOSED	NO	QTR	CV/O		
							OPEN	N/A				
I-V-9304	L-4	2"	CHECK	S/A	3	C	CLOSED	NO	QTR	CV/O		
							OPEN	N/A				
I-V-9305	N-4	2"	CHECK	S/A	3	C	CLOSED	NO	QTR	CV/O		
							OPEN	N/A				

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Circulating and Intake Cooling Water System
P&ID NO. 8770-G-082
SHEET 1 REV. 24

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-MV-21-2	E-5	24"	BUTFLY	MO	3	B	OPEN CLOSED	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
I-MV-21-3	F-4	24"	BUTFLY	MO	3	B	OPEN CLOSED	YES FAI	COLD REFUEL	ES PI	MT 60.0 Sec.	
I-TCV-14-4A	B-3	30"	BUTFLY	PO	3	B	OPEN OPEN	NO FO	COLD	FS		
I-TCV-14-4B	B-3	30"	BUTFLY	PO	3	B	OPEN OPEN	NO FO	COLD	FS		
I-V-21162	H-4	30"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
I-V-21205	H-5	30"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											
I-V-21208	H-7	30"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
	*Valve may be open or closed, dependent on mode of operation.											

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Circulating and Intake Cooling Water System
P&ID NO. 8770-G-082
SHEET 2 REV. 24

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-FCV-21-3A	I-4	2"	GLOBE	PO	3	B	OPEN CLOSED	NO FC	QTR	ES	FS	MT 5.0 Sec.
I-FCV-21-3B	I-4	2"	GLOBE	PO	3	B	OPEN CLOSED	NO FC	QTR	ES	FS	MT 5.0 Sec.
I-V-21005	H-4	2"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-21010	H-4	2"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-21015	J-4	2"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-21017	J-4	2"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	COLD	CV/O		
I-V-21030	H-4	1"	CHECK	S/A	3	C	OPEN OPEN	NO N/A	QTR	CV/O		
I-V-21032	H-4	1"	CHECK	S/A	3	C	OPEN OPEN	NO N/A	QTR	CV/O		
I-V-21044	H-6	1"	CHECK	S/A	3	C	OPEN OPEN	NO N/A	QTR	CV/O		

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Circulating and Intake Cooling Water System
P&ID NO. 8770-G-082
SHEET 2 REV. 24

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-V-21046	H-6	1"	CHECK	S/A	3	C	OPEN OPEN	NO N/A	QTR	CV/O		
I-V-21058	H-7	1"	CHECK	S/A	3	C	OPEN OPEN	NO N/A	QTR	CV/O		
I-V-21060	H-7	1"	CHECK	S/A	3	C	OPEN OPEN	NO N/A	QTR	CV/O		

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Component Cooling System
P&ID NO. 8770-G-083
SHEET 1 REV. 20

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-HCV-14-1	D-6	8"	BUTFLY	PO	2	A	OPEN CLOSED	YES FC	COLD REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-HCV-14-2	D-2	8"	BUTFLY	PO	2	A	OPEN CLOSED	YES FC	COLD REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-HCV-14-6	D-1	8"	BUTFLY	PO	2	A	OPEN CLOSED	YES FC	COLD REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-HCV-14-7	D-5	8"	BUTFLY	PO	2	A	OPEN CLOSED	YES FC	COLD REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-HCV-14-10	H-15	16"	BUTFLY	PO	3	B	OPEN CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 60.0 Sec.
I-HCV-14-3A	L-2	14"	BUTFLY	PO	3	B	OPEN OPEN	YES FO	COLD REFUEL	ES PI	FS	MT 60.0 Sec.
I-HCV-14-3B	M-2	14"	BUTFLY	PO	3	B	OPEN OPEN	YES FO	COLD REFUEL	ES PI	FS	MT 60.0 Sec.
I-HCV-14-8A	F-14	16"	BUTFLY	PO	3	B	OPEN CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 60.0 Sec.
I-HCV-14-8B	F-15	16"	BUTFLY	PO	3	B	OPEN CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 60.0 Sec.

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Component Cooling System
P&ID NO. 8770-G-083
SHEET 1 REV. 20

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-HCV-14-9	G-15	16"	BUTFLY	PO	3	B	OPEN	YES	QTR	ES	FS	MT 60.0 Sec.
							CLOSED	FC	REFUEL	PI		
I-MV-14-1	D-16	24"	BUTFLY	MO	3	B	CLOSED*	YES	QTR	ES	MT 90.0 Sec.	
							CLOSED	FAI	REFUEL	PI		
	*Valve may be open or closed, dependent on mode of operation.											
I-MV-14-2	D-17	24"	BUTFLY	MO	3	B	CLOSED*	YES	QTR	ES	MT 90.0 Sec.	
							CLOSED	FAI	REFUEL	PI		
	*Valve may be open or closed, dependent on mode of operation.											
I-MV-14-3	G-16	24"	BUTFLY	MO	3	B	CLOSED*	YES	QTR	ES	MT 90.0 Sec.	
							CLOSED	FAI	REFUEL	PI		
	*Valve may be open or closed, dependent on mode of operation.											
I-MV-14-4	G-17	24"	BUTFLY	MO	3	B	CLOSED*	YES	QTR	ES	MT 90.0 Sec.	
							CLOSED	FAI	REFUEL	PI		
	*Valve may be open or closed, dependent on mode of operation.											
I-MV-14-5	G-7	10"	BUTFLY	MO	3	B	OPEN	YES	COLD	ES	MT 60.0 Sec.	
							OPEN	FAI	REFUEL	PI		
I-MV-14-6	G-7	10"	BUTFLY	MO	3	B	OPEN	YES	COLD	ES	MT 60.0 Sec.	
							OPEN	FAI	REFUEL	PI		
I-MV-14-7	G-7	10"	BUTFLY	MO	3	B	OPEN	YES	COLD	ES	MT 60.0 Sec.	
							OPEN	FAI	REFUEL	PI		
I-MV-14-8	G-7	10"	BUTFLY	MO	3	B	OPEN	YES	COLD	ES	MT 60.0 Sec.	
							OPEN	FAI	REFUEL	PI		

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Component Cooling System
P&ID NO. 8770-G-083
SHEET 1 REV. 20

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-V-14143	E-16	20"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
*Valve may be open or closed, dependent on mode of operation.												
I-V-14147	E-16	20"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
*Valve may be open or closed, dependent on mode of operation.												
I-V-14151	E-17	20"	CHECK	S/A	3	C	OPEN* OPEN	NO N/A	QTR	CV/O		
*Valve may be open or closed, dependent on mode of operation.												

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Domestic & Make-up Water System
P&ID NO. 8770-G-084
SHEET 1 REV. 22

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-MV-15-1	H-16	2"	GATE	MO	2	A	CLOSED OPEN	YES FAI	COLD REFUEL	ES SLT	MT 19.0 Sec. PI	
I-V-15328	I-16	2"	CHECK	S/A	2	AC	CLOSED OPEN	NO N/A	COLD REFUEL	CV/O SLT		

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Service & Instrument Air System
P&ID NO. 8770-G-085
SHEET 1 REV. 20

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-SH-18797	K-6	1"	BALL	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-SH-18798	K-6	1"	BALL	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-18794	L-6	2"	GLOBE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-18796	L-6	2"	GLOBE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											

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Service & Instrument Air System
P&ID NO. 8770-G-085
SHEET 2 REV. 15

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-MV-18-1	F-6	2"	GLOBE	MO	2	A	CLOSED CLOSED	YES FAI	COLD REFUEL	ES SLT	MT 28.0 Sec. PI	
I-V-18195	E-5	2"	CHECK	S/A	2	AC	CLOSED OPEN	NO N/A	COLD REFUEL	CV/O SLT		

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Miscellaneous Systems
P&ID NO. 8770-G-086
SHEET 1 REV. 17

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-SE-17-1A	J-15	2"	GLOBE	SO	3	B	CLOSED CLOSED	NO FC	QTR	ES	FS	MT 2.0 Sec.
I-SE-17-1B	L-15	2"	GLOBE	SO	3	B	CLOSED CLOSED	NO FC	QTR	ES	FS	MT 2.0 Sec.
I-V-17204	J-12	1 1/2"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-17214	L-12	1 1/2"	CHECK	S/A	3	C	CLOSED OPEN	NO N/A	QTR	CV/O		

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Containment Spray and Refueling Water Systems
P&ID NO. 8770-G-088
SHEET 1 REV. 18

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-LCV-07-11A	J-11	2"	GLOBE	DO	2	A	OPEN*	YES	QTR	ES	FS	MT 10.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
	*Valve may be open or closed, dependent on mode of operation.											
I-LCV-07-11B	J-11	2"	GLOBE	DO	2	A	OPEN*	YES	QTR	ES	FS	MT 10.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
	*Valve may be open or closed, dependent on mode of operation.											
I-V-07170	J-12	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											
I-V-07189	K-14	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											
I-V-07206	K-12	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											
I-V-07188	K-14	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											
I-FCV-07-1A	G-12	12"	GATE	DO	2	B	CLOSED	YES	QTR	ES	FS	MT 10.0 Sec.
							OPEN	FO	REFUEL	PI		
I-FCV-07-1B	H-12	12"	GATE	DO	2	B	CLOSED	YES	QTR	ES	FS	MT 10.0 Sec.
							OPEN	FO	REFUEL	PI		
I-MV-07-1A	E-3	24"	BUTFLY	MO	2	B	OPEN	YES	QTR	ES	MT 120.0 Sec.	
							OPEN	FAI	REFUEL	PI		

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Containment Spray and Refueling Water Systems
P&ID NO. 8770-G-088
SHEET 1 REV. 18

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-MV-07-1B	E-2	24"	BUTFLY	MO	2	B	OPEN OPEN	YES FAI	QTR REFUEL	ES PI	MT 120.0 Sec.	
I-MV-07-2A	K-12	24"	BUTFLY	MO	2	B	CLOSED CLOSED	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
I-MV-07-2B	K-12	24"	BUTFLY	MO	2	B	CLOSED CLOSED	YES FAI	QTR REFUEL	ES PI	MT 60.0 Sec.	
I-MV-07-3A	G-13	12"	GATE	MO	2	B	LO OPEN	YES FAI	QTR REFUEL	ES PI	MT 120.0 Sec.	
I-MV-07-3B	H-13	12"	GATE	MO	2	B	LO OPEN	YES FAI	QTR REFUEL	ES PI	MT 120.0 Sec.	
I-SE-07-1A	N-4	2"	GLOBE	SO	2	B	CLOSED CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 2.0 Sec.
I-SE-07-1B	N-5	2"	GLOBE	SO	2	B	CLOSED CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 2.0 Sec.
I-SE-07-2A	N-4	2"	GLOBE	SO	2	B	CLOSED CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 2.0 Sec.
I-SE-07-2B	N-5	2"	GLOBE	SO	2	B	CLOSED CLOSED	YES FC	QTR REFUEL	ES PI	FS	MT 2.0 Sec.

FLORIDA POWER &AND LIGHT COMPANY
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INSERVICE TEST PROGRAM-VALVES
TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Containment Spray and Refueling Water Systems
P&ID NO. 8770-G-088
SHEET 1 REV. 18

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
SR-07-2	K-3	2"	RELIEF	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	SRV		
I-V-07119 See Relief Request #6	J-7	24"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
I-V-07120 See Relief Request #6	J-7	24"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	CV/O		
I-V-07129 See Relief Request #3	H-5	12"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	N/A		
I-V-07133	H-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-07141	G-5	2"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	QTR	CV/O		
I-V-07143 See Relief Request #3	G-5	12"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	N/A		
I-V-07172 See Relief Request #5	K-12	24"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	N/A		
I-V-07174 See Relief Request #5	K-12	24"	CHECK	S/A	2	C	CLOSED OPEN	NO N/A	REFUEL	N/A		

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Containment Spray and Refueling Water Systems
P&ID NO. 8770-G-088
SHEET 1 REV. 18

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-V-07192	G-14	10"	CHECK	S/A	2	C	CLOSED	NO	REFUEL	CV/O		
See Relief Request #4							OPEN	N/A				
I-V-07193	G-14	10"	CHECK	S/A	2	C	CLOSED	NO	REFUEL	CV/O		
See Relief Request #4							OPEN	N/A				
I-V-07256	J-1	2"	CHECK	S/A	2	C	CLOSED	NO	REFUEL	CV/O		
See Relief Request #1							OPEN	N/A				
I-V-07258	J-2	2"	CHECK	S/A	2	C	CLOSED	NO	REFUEL	CV/O		
See Relief Request #1							OPEN	N/A				
I-V-07269	J-2	2"	CHECK	S/A	2	C	CLOSED	NO	REFUEL	CV/O		
See Relief Request #2							OPEN	N/A				
I-V-07270	J-2	2"	CHECK	S/A	2	C	CLOSED	NO	REFUEL	CV/O		
See Relief Request #2							OPEN	N/A				

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INSERVICE TEST PROGRAM-VALVES
TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Containment Air Monitoring System
P&ID NO. 8770-G-092
SHEET 1 REV. 11

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-FCV-26-1	G-2	1"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-FCV-26-2	G-4	1"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-FCV-26-3	H-2	1"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-FCV-26-4	H-4	1"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-FCV-26-5	I-2	1"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 5.0 Sec.
I-FCV-26-6	I-4	1"	GLOBE	DO	2	A	OPEN CLOSED	YES FC	QTR REFUEL	ES SLT	FS PI	MT 5.0 Sec.

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Miscellaneous Sampling System
P&ID NO. 8770-G-092
SHEET 1 REV. 11

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-FSE-27-1	A-12	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-2	B-12	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-3	B-12	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-4	C-12	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-5	C-14	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-6	B-14	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-7	B-14	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-8	C-14	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-9	C-14	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Miscellaneous Sampling System
P&ID NO. 8770-G-092
SHEET 1 REV. 11

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-FSE-27-10	C-13	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-FSE-27-11	C-13	3/8"	GLOBE	SO	2	A	CLOSED	YES	QTR	ES	FS	MT 2.0 Sec.
							CLOSED	FC	REFUEL	SLT	PI	
I-V-27101	B-13	3/8"	CHECK	S/A	2	AC	CLOSED	NO	QTR	CV/O		
							OPEN	N/A	REFUEL	SLT		
I-V-27102	B-13	3/8"	CHECK	S/A	2	AC	CLOSED	NO	QTR	CV/O		
							OPEN	N/A	REFUEL	SLT		

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

Miscellaneous Systems
P&ID NO. 8770-G-093
SHEET 1 REV. 14

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
V-00101	F-11	8"	GATE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-00139	H-16	3/8"	GLOBE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-00140	I-1	1"	GLOBE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-00143	I-2	1"	GLOBE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-00144	I-2	3/8"	GLOBE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											

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INSERVICE TEST PROGRAM-VALVES
TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

HVAC- Air Flow Diagram
P&ID NO. 8770-G-862
SHEET 1 REV. 19

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-FCV-25-2	J-15	48"	BUTFLY	PO	2	A	CLOSED	YES	COLD	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
I-FCV-25-3	J-15	48"	BUTFLY	PO	2	A	CLOSED	YES	COLD	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
I-FCV-25-4	K-12	48"	BUTFLY	PO	2	A	CLOSED	YES	COLD	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
I-FCV-25-5	K-11	48"	BUTFLY	PO	2	A	CLOSED	YES	COLD	ES	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
I-FCV-25-7	L-12	24"	BUTFLY	DO	2	A	CLOSED	YES	QTR	ES*	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
	*Test to open, MT=8 Sec.											
I-FCV-25-8	L-12	24"	BUTFLY	DO	2	A	CLOSED	YES	QTR	ES*	FS	MT 5.0 Sec.
							CLOSED	FC	REFUEL	PI	SLT	
	*Test to open, MT=8 Sec.											
I-V-25-11	K-15	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											
I-V-25-12	K-15	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											
I-V-25-13	I-12	3"	GATE	MAN	2	A	LC	NO	REFUEL	SLT		
							CLOSED	N/A				
	Passive Valve (IWV-3700)											

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TABLE I-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

HVAC- Air Flow Diagram
P&ID NO. 8770-G-862
SHEET 1 REV. 19

Valve Number	P&ID Coord.	Size In.	Valve Type	Valve Actuator	ASME Code Class	ASME Code Cat.	Position (Normal) (Test)	Rem. Ind Fail Mode	Test Frequency	Test One	Test Two	Test Three
I-V-25-14	I-12	3"	GATE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-25-15	J-11	3"	GATE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-25-16	J-11	3"	GATE	MAN	2	A	LC CLOSED	NO N/A	REFUEL	SLT		
	Passive Valve (IWV-3700)											
I-V-25-20	L-12	24"	CHECK	S/A	2	AC	CLOSED OPEN	NO N/A	COLD REFUEL	CV/O SLT		
I-V-25-21	L-12	24"	CHECK	S/A	2	AC	CLOSED OPEN	NO N/A	COLD REFUEL	CV/O SLT		
I-FCV-25-1	J-15	48"	BUTFLY	PO	2	B	CLOSED CLOSED	YES FC	COLD REFUEL	ES PI	FS	MT 5.0 Sec.
I-FCV-25-6	K-11	48"	BUTFLY	PO	2	B	CLOSED CLOSED	YES FC	COLD REFUEL	ES PI	FS	MT 5.0 Sec.

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RESERVED FOR FUTURE USE

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I.G. TABLE I - 2 LIST OF VALVES TO BE TESTED AT COLD SHUTDOWN

REACTOR COOLANT SYSTEM

V-1402
V-1403
V-1404
V-1405
V-1441
V-1442
V-1443
V-1444
V-1445
V-1446
V-1449

SAFETY INJECTION SYSTEM

FCV-3306
HCV-3618
HCV-3628
HCV-3638
HCV-3648
HCV-3657
MV-03-02
V-3106
V-3107
V-3114
V-3124
V-3134
V-3144
V-3217
V-3227
V-3237
V-3247
V-3452
V-3456
V-3457
V-3480
V-3481
V-3651
V-3652
V-3659
V-3660

CHEMICAL & VOLUME CONTROL SYSTEM

SE-01-01
SE-02-03
SE-02-04
V-2431
V-2435
V-2501
V-2504
V-2505
V-2515
V-2516

WASTE MANAGEMENT SYSTEM

V-6554
V-6555
V-6741

MAIN STEAM SYSTEM

I-HCV-08-1A
I-HCV-08-1B

FEEDWATER & CONSENSATE SYSTEM

I-MV-09-07
I-MV-09-08
I-V-9107
I-V-9119
I-V-9123
I-V-9135
I-V-9139
I-V-9151
I-V-9157
I-V-9248

INTAKE COOLING WATER SYSTEM

I-MV-21-2
I-MV-21-3
I-TCV-14-4A
I-TCV-14-4B
I-V-21-015
I-V-21-017

COMPONENT COOLING SYSTEM

I-HCV-14-1
I-HCV-14-2
I-HCV-14-3A
I-HCV-14-3B
I-HCV-14-6
I-HCV-14-7
I-MV-14-5
I-MV-14-6
I-MV-14-7
I-MV-14-8

CONTAINMENT PRIMARY WATER SUPPLY

I-MV-15-1
I-V-15328

INSTRUMENT AIR

I-MV-18-1
I-V-18195

CONTAINMENT HEATING & VENTILATION (HVAC) SYSTEM

I-FCV-25-1
I-FCV-25-4
I-V-25-20
I-FCV-25-2
I-FCV-25-5
I-V-25-21
I-FCV-25-3
I-FCV-25-6

I.H. BASIS FOR INSERVICE VALVE TESTS AT COLD SHUTDOWN

INTRODUCTION

Valves that cannot be tested during plant operation have been specifically identified and listed in Table I-2. These valves will be exercised (tested) during cold shutdown as specified in Subparagraph IWV-3412(a), IWV-3415, or IWV-3522.

In addition, valves which when exercised (cycled) during plant operation could put the plant in an unsafe condition have been specifically identified and listed in Table I-2 in accordance with guidance provided in letters from the Nuclear Regulatory Commission (NRC) to Florida Power & Light Company (FPL). Valves that should not be tested (exercised or cycled) during plant operation include:

Valves whose failure in a non-conservative position during the exercising (cycling) test would cause a loss of system function.

Valves whose failure to close during an exercising (cycling) test would result in a loss of containment integrity.

Valves, which when exercised (cycled), could subject a system to pressures in excess of either the system design pressure or the low-temperature overpressure (LTOP) limits specified by the plant technical specifications.

PERFORMANCE OF INSERVICE TESTS DURING COLD SHUTDOWNS

Inservice testing of valves listed in Table I-2 for testing at cold shutdown (TEST PERIOD "COLD") shall commence no later than forty eight (48) hours after reaching MODE 5 (COLD SHUTDOWN) conditions or no later than sixty four (64) hours, if MODE 5 (COLD SHUTDOWN) conditions are reached between 1600 hours Friday and 0800 hours Monday.

In the case of frequent COLD SHUTDOWNS, valve testing will not be performed more often than once every three (3) months as specified in Subparagraphs IWV-3412(a) and IWV-3522. Valves that are not tested during a specific COLD SHUTDOWN will be identified to assure their testing in the event of untimely COLD SHUTDOWNS within the three (3) month time period. In any event, plant startup shall not be delayed to complete inservice valve tests.

For planned COLD SHUTDOWNS, where sufficient time is scheduled for testing all specified valves, inservice testing need not begin within the 48 hour time period.

I.H. BASIS FOR INSERVICE VALVE TESTS AT COLD SHUTDOWN (CON'T)

SYSTEM: Reactor Coolant

1. The failure of either power operated relief valve (PORV) Nos. V-1402 and V-1404 or the associated block (isolation) valve Nos. V-1403 and V-1405 in the non-closed position, by testing during plant operation, would require a unit outage to perform maintenance on the failed valve.

2. During normal plant operation the reactor coolant gas vent system (RCGVS) valves are required to be positioned closed, the power supply removed, and key-locked switches used to prevent inadvertent valve operation. The failure of either valve Nos. V-1441, V-1442, V-1443, or V-1444 in the non-closed position, coupled with the failure of either valve Nos. V-1445, V-1446, or V-1449 in the non-closed position, by testing during normal plant operation, would result in the loss of reactor coolant in excess of Technical Specification 3.4.6.2.d limits. This would require a reactor shutdown. The failure of either valve Nos. V-1445, V-1446, or V-1449 in the non-closed position, by testing during plant operation, would result in the loss of ability to isolate the RCGVS flow paths or the leakage detection flow paths.

SYSTEM: Chemical and Volume Control

3. Testing either pressurizer auxiliary spray valve Nos. SE-02-03 or SE-02-04 and the associated check valve No. V-2431, during normal plant operation, would result in RCS pressure transients. This could place the plant in an unsafe mode of operation.

4. Testing spring-loaded check valve No. V-2435, during plant operation, would require isolation of all the normal charging flow paths to the reactor coolant system (RCS). This could place the plant in an unsafe condition.

5. Testing either letdown isolation valve Nos. V-2515 or V-2516, during normal plant operation, would isolate letdown flow from the RCS. This would result in an unbalanced flow condition in the chemical and volume control system when charging and letdown flow is required, Modes 1 through 4.

6. Testing either reactor coolant pump (RCP) controlled bleedoff isolation valve Nos. SE-01-01 or V-2505, during normal plant operation, will interupt flow of the controlled bleedoff from the reactor coolant pumps. This could place the plant in an unsafe mode of operation.

I.H. BASIS FOR INSERVICE VALVE TESTS AT COLD SHUTDOWN (CON'T)

SYSTEM: Chemical and Volume Control (CON'T)

7. Failure of volume control tank (VCT) outlet valve No. V-2501 in the non-open position, by testing during normal plant operation, would isolate the VCT from the charging pump suction header. This would result in damage to the charging pumps; thereby placing the plant in an unsafe operating condition.

8. Testing refueling water tank (RWT) isolation valve No. V-2504, during normal plant operation, would result in the injection of concentrated boric acid solution from the refueling water tank (RWT) into the reactor coolant system. This would place the plant in an unsafe operating condition.

SYSTEM: Safety Injection

9. Low pressure safety injection (LPSI) pump discharge check valve Nos. V-3106 and V-3107 and LPSI header check valve Nos. V-3114, V-3124, V-3134, and V-3144 cannot be tested during normal plant operation because the LPSI pumps do not develop sufficient discharge pressure to establish a flow path to the reactor coolant system (RCS).

10. Safety Injection System (SIS) check valve Nos. V-3217, V-3227, V-3237, and V-3247 cannot be tested during normal plant operation because neither the LPSI pumps nor the HPSI pumps deveolp sufficient discharge pressure to establish a flow path to the RCS.

11. Failure of either safety injection tank (SIT) test valve Nos. HCV-3618, HCV-3628, HCV-3638, or HCV-3648 in the non-closed position, by testing during plant operation would result in draining the SIT associated with the test valve; thereby placing the plant in an unsafe mode of operation.

12. During normal plant operation the shutdown cooling (SDC) heat exchanger inlet, outlet and flow control valves are required to be positioned closed, the power supply removed, and key-locked switches used to prevent inadvertent valve operation. Failure of either SDC heat exchanger inlet valve Nos. V-3452 or V-3453 in the non-closed position, by testing during plant operation, would result in the loss of flow to the associated containment spray header, if containment spray is required. Similarly, the failure of either SDC heat exchanger outlet valve Nos. V-3456 or V-3457, coupled with the failure of HCV-3657, in the non-closed position, by testing during plant operation, would result in the loss of flow to the associated containment spray header, if containment spray is required.

I.H. BASIS FOR INSERVICE VALVE TESTS AT COLD SHUTDOWN (CON'T)

SYSTEM: Safety Injection (CON'T)

13. During normal plant operation the HPSI, LPSI, and containment spray (CS) pump minimum flow-recirculation isolation valves are required to be positioned open, the power supply removed, and key-locked switches used to prevent inadvertent valve operation. Failure of either mini-recirc isolation valve Nos. V-3659 or V-3660 in the non-open position, by testing during plant operation, would result in damage to any of the operating HPSI, LPSI, and CS pumps required to start and operate without sufficient flow through the operating pump.

14. During normal plant operation the LPSI flow control valve and the associated bypass valve are required to be positioned open, the power supply removed, and locked open to prevent inadvertent valve operation. Failure of either the LPSI flow control valve FCV-3306 or the associated bypass valve No. MV-03-02 in the non-open position, by testing during plant operation, would result in one of the required LPSI flow paths, if required.

15. During normal plant operation the shutdown cooling (SDC) system isolation valves are required to be positioned closed, the power supply removed, and key-locked switches used to prevent inadvertent valve operation. In addition, these valves are interlocked with two (2) RCS pressure measurement channels to prevent opening these valves unless the RCS pressure is less than 268 psia. Thus, SDC isolation valve Nos. V-3480, V-3481, V-3651, and V-3262 cannot be tested during plant operation.

SYSTEM: Waste Management

16. The failure of either containment vent header isolation valve Nos. V-6554 or V-6555 in the non-closed position, by testing during plant operation, would result in a loss of containment integrity as specified in Technical Specification 3.6.3.1. Similarly, the failure of the non-redundant nitrogen supply line containment isolation valve No. V-6741 in the non-closed position, by testing during plant operation would result in a loss of containment integrity as specified in Technical Specification 3.6.3.1.

SYSTEM: Main Steam

17. Main steam isolation valve (MSIV) Nos. I-HCV-08-1A and I-HCV-08-1B cannot be tested during normal plant operation because full closure of either MISV will result in a unit trip.

I.H. BASIS FOR INSERVICE VALVE TESTS AT COLD SHUTDOWN (CON'T)

SYSTEM: Feedwater and Condensate

18. Main feedwater isolation valve Nos. I-MV-09-07 and I-MV-09-08 cannot be tested during normal plant operation because full closure of either feedwater isolation valve will result in a unit trip.

19. Auxiliary feedwater check valve Nos. I-9107, I-V-9119, I-V-9123, I-9135, I-V-9139, I-V-9151, I-9157, I-V-9119, I-V-9123 and condensate storage tank (CST) check valve Nos. I-V-12174 and I-V-12176 cannot be tested during plant operation because establishing a flow path from the CST, at ambient conditions (85^{O}F), to the main feedwater system, at normal operating temperature (450^{O}F), would result in thermal shock to the main feedwater system piping.

SYSTEM: Component Cooling

20. Testing either reactor coolant pump (RCP) component cooling water supply isolation valve Nos. I-HCV-14-1 and I-HCV-14-7 or component cooling water return isolation valve Nos. I-HCV-14-2 and I-HCV-14-6, during plant operation, would result in the loss of cooling capability to the RCP motor and seal coolers. This would result in damage to the RCPs; thereby placing the plant in an unsafe operating condition.

21. Testing either containment fan cooler (heat exchanger) component cooling water supply isolation valve Nos. I-MV-14-5 and I-MV-14-6 or component cooling water return isolation valve Nos. I-MV-14-7 and I-MV-14-8, during plant operation, would result in the loss of the two (2) associated containment fan coolers.

22. Testing No. 1A shutdown cooling (SDC) heat exchanger component cooling water return isolation valve No. I-HCV-14-3A or No. 1B SDC heat exchanger component cooling water return isolation valve No. I-HCV-14-3B, during plant operation, could cause an unbalanced flow condition in the component cooling system resulting in decreased flow to essential equipment; thereby placing the plant in an unsafe condition.

SYSTEM: Containment Primary Water Supply

23. Failure of either containment primary water supply isolation valve Nos. I-MV-15-1 or I-V-15328 in the non-closed position, by testing during plant operation, would result in the loss of containment integrity as specified in Technical Specification 3.6.3.1.

I.H. BASIS FOR INSERVICE VALVE TESTS AT COLD SHUTDOWN (CON'T)

SYSTEM: Instrument Air

24. Failure of either instrument air supply isolation valve Nos. I-MV-18-1 or I-V-18195 in the non-closed position, by testing during plant operation, would result in the loss of containment integrity as specified in Technical Specification 3.6.3.1.

SYSTEM: Intake Cooling Water

25. Testing either turbine plant cooling water (TPCW) heat exchanger isolation valve Nos. I-MV-21-2 or I-MV-21-3, during normal plant operation would result in loss of intake cooling water supply to the associated TPCW heat exchanger. This could cause overheating of essential secondary system equipment; thereby placing the plant in an unsafe operating condition.

26. Closure of either component cooling water (CCW) temperature control valve Nos. I-TCV-14-4A or I-TCV-14-4B, by testing during normal plant operation, would result in interuption of intake cooling water flow to the associated CCW heat exchanger. This could place the plant in an undesirable mode of operation.

27. Check valves Nos. I-V-21-015 and I-V-21-017, which are installed in the domestic water supply lines to the intake cooling water (ICW) pump bearing lubricating system, cannot be tested during normal plant operation, because the Domestic Water System (City Water Storage Tanks) does not have sufficient discharge head to overcome the discharge head of the ICW pumps.

SYSTEM: Containment Heating, Ventilation, & Cooling (HVAC)

28. Failure of either containment purge air supply valve Nos. I-FCV-25-1, I-FCV-25-2, and I-FCV-25-3 or containment purge exhaust valve Nos. I-FCV-25-4, I-FCV-25-5, and I-FCV-25-6 in the non-closed position, by testing during plant operation, would result in the loss of containment integrity as specified in Technical Specification 3.6.3.1.

29. Failure of either containment vacuum relief check valve Nos. I-V-25-20 or I-V-25-21 in the non-closed position, by testing during plant operation, would result in the loss of containment integrity as specified in Technical Specification 3.6.5.1.

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I.I. TABLE I-3 REACTOR COOLANT SYSTEM PRESSURE ISOLATION VALVES

SYSTEM	VALVE NO	MAXIMUM (a) (b) (c) ALLOWABLE LEAKAGE -gpm
High-Pressure Safety Injection		
Loop 1A1, cold leg	V-3227	5.0
	V-3123	5.0
Loop 1A2, cold leg	V-3217	5.0
	V-3113	5.0
Loop 1B1, cold leg	V-3237	5.0
	V-3133	5.0
Loop 1B2, cold leg	V-3247	5.0
	V-3143	5.0
Low-Pressure Safety Injection		
Loop 1A1, cold leg	V-3124	5.0
Loop 1A2, cold leg	V-3114	5.0
Loop 1B1, cold leg	V-3134	5.0
Loop 1B2, cold leg	V-3144	5.0
Shutdown Cooling		
Loop 1A, hot leg	V-3480	5.0
	V-3481	5.0
Loop 1B, hot leg	V-3651	5.0
	V-3652	5.0

I.I. TABLE I-3 REACTOR COOLANT SYSTEM PRESSURE ISOLATION VALVES (CON'T)

NOTES TO TABLE I.B.

(a) Maximum Allowable Leakage (each valve)

1. Leakage rates less than or equal to 1.0 gpm are acceptable.
2. Leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are acceptable if the latest measured rate has not exceeded the rate determined by the previous test by an amount that reduces the margin between previous measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.
3. Leakage rates greater than 1.0 gpm but less than or equal to 5.0 gpm are unacceptable if the latest measured rate exceeded the rate determined by the previous test by an amount that reduces the margin between measured leakage rate and the maximum permissible rate of 5.0 gpm by 50% or greater.
4. Leakage rates greater than 5.0 gpm are unacceptable.

(b) To satisfy ALARA requirements, leakage may be measured indirectly (as from the performance of pressure indicator) if accomplished in accordance with approved procedures and supported by computations showing that the method is capable of demonstrating valve compliance with the leakage criteria.

(c) Minimum test differential pressure shall not be less than 150 psid.

I.J. TABLE I - 4 LIST OF CONTAINMENT ISOLATION VALVES TESTED TO APPENDIX J, 10CFR PART 50 REQUIREMENTS

CONTAINMENT PENETRATION NUMBER	SERVICE	VALVE NUMBER(S)	LEAKAGE RATE SCC/MIN (1)
7	CONTAINMENT PRIMARY WATER SUPPLY TO QT AND RDT	I-MV-15-1 I-V-15328	5,000 8,000
8	SERVICE AIR	I-V-18794 I-V-18796 I-SH-18797 I-SH-18798	8,000 8,000 8,000 8,000
9	INSTRUMENT AIR	I-MV-18-1 I-V-18195	5,000 8,000
10	CONTAINMENT PURGE AIR EXHAUST	I-FCV-25-4 I-FCV-25-5	200,000 200,000
11	CONTAINMENT PURGE AIR SUPPLY	I-FCV-25-2 I-FCV-25-3	200,000 200,000
14	NITROGEN SUPPLY TO SAFETY INJECTION TANKS	V-6741 V-6779	4,000 4,000
23	COMPONENT COOLING WATER SUPPLY TO RCP SEALS	I-HCV-14-1 I-HCV-14-7	40,000 40,000
24	COMPONENT COOLING WATER SUPPLY FROM RCP SEALS	I-HCV-14-2 I-HCV-14-6	40,000 40,000
26	LETDOWN FROM REACTOR COOLANT SYSTEM	V-2515 V-2516	8,000 8,000
28A	SAMPLE - SAFETY INJECTION TANK	I-FCV-03-1E I-FCV-03-1F	2,000 2,000
28B	SAMPLE - REACTOR COOLANT HOT LEG	V-5200 V-5203	2,000 2,000
29A	SAMPLE - PRESSURIZER LIQUID (SURGE)	V-5201 V-5204	2,000 2,000
29B	SAMPLE - PRESSURIZER STEAM SPACE	V-5202 V-5205	2,000 2,000

I.J. TABLE I - 4 LIST OF CONTAINMENT ISOLATION VALVES TESTED TO APPENDIX J, 10CFR PART 50 REQUIREMENTS (CON'T)

CONTAINMENT PENETRATION NUMBER	SERVICE	VALVE NUMBER(S)	LEAKAGE RATE SCC/MIN (1)
31	CONTAINMENT VENT HEADER	V-6554	4,000
		V-6555	4,000
41	SAFETY INJECTION HEADER TEST (DRAIN) LINE	V-3463	5,000
		V-07009	5,000
42	REACTOR CAVITY SUMP PUMP DISCHARGE LINE	I-LCV-07-11A	12,000
		I-LCV-07-11B	12,000
43	REACTOR CAVITY SUMP PUMP SUCTION LINE	V-6301	12,000
		V-6302	12,000
44	REACTOR COOLANT PUMP CONTROLLED BLEEDOFF	SE-01-01	4,000
		V-2505	4,000
46	REFUELING CAVITY PURIFICATION - INLET	I-V-07189	8,000
		I-V-07206	8,000
47	REFUELING CAVITY PURIFICATION - OUTLET	I-V-07170	8,000
		I-V-07188	8,000
48A	HYDROGEN SAMPLE	I-FSE-27-01	1,000
		I-FSE-27-02	1,000
		I-FSE-27-03	1,000
		I-FSE-27-04	1,000
		I-FSE-27-08	1,000
48C	HYDROGEN SAMPLE	I-FSE-27-11	1,000
		I-V-27101	3,000
51A	HYDROGEN SAMPLE	I-FSE-27-10	1,000
		I-V-27102	3,000
51C	HYDROGEN SAMPLE	I-FSE-27-05	1,000
		I-FSE-27-06	1,000
		I-FSE-27-07	1,000
		I-FSE-27-09	1,000

I.J. TABLE I - 4 LIST OF CONTAINMENT ISOLATION VALVES TESTED TO APPENDIX J, 10CFR PART 50 REQUIREMENTS (CON'T)

CONTAINMENT PENETRATION NUMBER	SERVICE	VALVE NUMBER(S)	LEAKAGE RATE SCC/MIN (1)
52A	CONTAINMENT AIR MONITOR (RADIATION)	I-FCV-26-01 I-FCV-26-02	4,000 4,000
52B	CONTAINMENT AIR MONITOR (RADIATION)	I-FCV-26-03 I-FCV-26-04	4,000 4,000
52C	CONTAINMENT AIR MONITOR (RADIATION), RETURN	I-FCV-26-05 I-FCV-26-06	4,000 4,000
52D	INTEGRATED LEAK RATE TEST CONNECTION (CONTROLLED LEAK)	I-V-00140 I-V-00143	4,000 4,000
52E	INTEGRATED LEAK RATE TEST CONNECTION (PRESSURE STA)	I-V-00139 I-V-00144	4,000 4,000
54	INTEGRATED LEAK RATE TEST CONNECTION (PRESSURE STA)	V-00101	4,000
56	HYDROGEN PURGE - OUTSIDE AIR MAKEUP	I-V-25-11 I-V-25-12	8,000 8,000
57	HYDROGEN PURGE - EXHAUST	I-V-25-13 I-V-25-14	8,000 8,000
58	HYDROGEN PURGE - EXHAUST	I-V-25-15 I-V-25-16	8,000 8,000
67	CONTAINMENT VACUUM RELIEF	I-FCV-25-7 I-V-25-20	100,000 100,000
68	CONTAINMENT VACUUM RELIEF	I-FCV-25-8 I-V-25-21	100,000 100,000

NOTES TO TABLE I-4

(1) The valve seat leakage rates, standard cubic centimeters per minute (SCC/MIN) shown in Table I-4, are the permissible leakage rates as specified in Subparagraph IWV-3426. These valve seat leakage rates are based on the required gas test differential pressure of 39.6 psi (+ 2.4 psi, - 0.0psi).

RELIEF REQUEST BASIS

SYSTEM: Chemical and Volume Control

1. Valve: V-2177 and V-2190
   Category: C
   Class: 2

   Function:

   Provides the emergency boration flow paths from the boric acid makeup (BAM) tanks to the charging pump suction header.

   Test Requirement: IWV-3520

   Basis for Relief:

   Testing these check valves, during plant operation, would result in the injection of concentrated boric acid from the BAM tanks into the reactor coolant system. This would place the plant in an unsafe operating condition.

   Failure of either check valve in the non-open position, by testing at cold shutdown would result in the loss of one of the emergency boration flow paths required during cold shutdown.

   Alternate Testing:

   These valves will be tested during refueling shutdowns when borating the RCS to the required refueling boron concentration.

RELIEF REQUEST BASIS

SYSTEM: Chemical and Volume Control

2. Valve: V-2191
   Category: C
   Class: 2

   Function:

   Provides the flow path for addition of concentrated boric acid from the refueling water tank (RWT) supply header to the charging pump suction header.

   Test Requirement: IWV-3520

   Basis for Relief:

   Testing this check valve, during plant operation, would result in the injection of concentrated boric acid from the RWT tank into the reactor coolant system. This would place the plant in an unsafe operating condition.

   Failure of this check valve in the non-open position, by testing at cold shutdown, would result in the loss of one of the emergency boration flow paths required during cold shutdown.

   Alternate Testing:

   These valves will be tested during refueling shutdowns when borating the RCS to the required refueling boron concentration.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

1. Valve: V-3405, V-3414, and V-3427
   Category: C
   Class: 2

   Function:

   Provides the flow path from the associated High Pressure Safety Injection (HPSI) Pump to the High Pressure Safety Injection System (HPSIS) supply header.

   Test Requirement: IWV-3520

   Basis for Relief:

   These stop-check valves cannot be tested during plant operation because the HPSI pumps do not develop sufficient discharge pressure to overcome the reactor coolant system (RCS) pressure to establish a flow path to the RCS.

   The HPSI pump minimum-flow recirculation flow path does not include these stop-check valves.

   Further, testing these stop-check valves during cold shutdown would subject the RCS to transient conditions exceeding the pressure-temperature limits specified in plant technical speci-ification 3.4.9

   Alternate Testing:

   These valves will be tested during refueling shutdowns.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

2. Valve: V-3401 and V-3410
   Category: C
   Class: 2

Function:

Provides the flow path from the Refueling Water Tank (RWT) supply header to the associated High Pressure Safety Injection (HPSI) Pump(s).

Test Requirement: IWV-3520

Basis for Relief:

These check valves cannot be tested during plant operation because the HPSI pumps do not develop sufficient discharge pressure to overcome the reactor coolant system (RCS) pressure to establish a flow path to the RCS.

Further, testing these check valves during cold shutdown would subject the RCS to transient conditions exceeding the pressure-temperature limits specified in plant technical specification 3.4.9

Alternate Testing:

These valves will be tested during refueling shutdowns.

Additional Testing:

These check valves will also be exercised quarterly, to the extent practical, during the performance of the associated HPSI pump test using the minimum-flow pump recirculation flow path.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

3. Valve: I-V-07000 and I-V-07001
   Category: C
   Class: 2

Function:

Provides the flow path from the Refueling Water Tank (RWT) supply header to the associated Low Pressure Safety Injection (LPSI) Pump.

Test Requirement: IWV-3520

Basis for Relief:

These check valves cannot be tested during plant operation because the LPSI pumps do not develop sufficient discharge pressure to overcome the reactor coolant system (RCS) pressure to establish a flow path to the RCS.

Further, these check valves cannot be tested during cold shutdown because the Shutdown Cooling System has insufficient letdown flow capacity to provide for both a flow path from the RWT to the reactor vessel and to provide for the removal of residual heat from the reactor core.

Alternate Testing:

These valves will be tested during refueling shutdowns.

Additional Testing:

These check valves will also be exercised quarterly, to the extent practical, during the performance of the associated LPSI pump test using the minimum-flow pump recirculation flow path.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

4. Valve: V-3113, V-3123, V-3133, and V-3143
   Category: AC
   Class: 2

   Function:

   Provides the flow path from the either the high pressure safety injection (HPSI) header or the auxiliary HPSI header to the assocated cold leg safety injection line.

   (1) Test Requirement: IWV-3520

   (1) Basis for Relief:

   These check valves cannot be tested during plant operation because the HPSI pumps do not develop sufficient discharge pressure to overcome the reactor coolant system (RCS) pressure to establish a flow path to the RCS.

   Further, testing these check valves during cold shutdown would subject the RCS to transient conditions exceeding the pressure-temperature limits specified in Technical Speciification 3.4.9.

   (1) Alternate Testing:

   These check valves will be tested during refueling shutdown when the HPSI system is used to fill the refueling cavity.

   (2) Test Requirement: IWV-3420

   (2) Basis for Relief:

   These check valves are required to be seat leak tested pursuant to an NRC order dated April 20, 1981 which modified Technical Specification 3.4.6.2 and 4.4.6.2.

   (2) Alternate Testing:

   Continue testing these check valves in accordance with the requirements of Technical Specification 4.4.6.2.e.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

5. Valve: V-3215, V-3225, V-3235, and V-3245
   Category: AC
   Class: 2

Function:

Provides the flow path from the safety injection tank (SIT) to the assocated cold leg safety injection line to the reactor coolant system (RCS).

(1) Test Requirement: IWV-3520

(1) Basis for Relief:

These check valves cannot be tested during plant operation because the SITs do not have sufficient gas (nitrogen) pressure to overcome the RCS pressure to establish a flow path to the RCS.

Further, these check valves cannot be tested during cold shutdown because the shutdown cooling system has insufficient letdown flow capacity to provide for the additional liquid volume from the discharge of the associated SIT and to provide for the removal of residual heat from the core.

(1) Alternate Testing:

These check valves will be tested during refueling shutdown using an approved procedure developed by Combustion Engineering Inc.

(2) Test Requirement: IWV-3420

(2) Basis for Relief:

The only sources capable of producing pressures greater than normal SIT pressure are the Reactor Coolant System (RCS) and the Safety Injection System (SIS) header.

Any leakage of reactor coolant through the SIT isolation check valves Nos. V-3217,V-3227, V-3237, and V-3247 would be detected by an associated pressure increase on the low pressure side of the check valves. Pressure indicator/alarm instrument Nos. PIA-3319, PIA-3329, PIA-3339, and PIA-3349 monitor SIS header pressure. On high pressure these instruments would annunciate alarms in the control room.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

5. Valve: V-3215, V-3225, V-3235, and V-3245 (CON'T)

(2) Basis for Relief (CON'T):

If the SIT outlet check valve disk is not seated properly, leakage of reactor coolant through the SIT check valves would be detected by:

(a) SIT Water Level
Any in-leakage of reactor coolant into the SIT produces an increase in level in the SIT. This would be detected by the SIT level indicator/alarm Nos. LIA-3311, LIA-3321, LIA-3331, and LIA-3341) which indicate SIT level in the control room. On high SIT level, these instruments would annuniciate alarms in the control room. In addition, level switch Nos. LS-3313, LS-3323, LS-3333, and LS-3343, which are located on the associated SIT, would actuate on high level and alarm in the control room. This provides for redundant and diverse SIT level indication and alarm in the control room. Further, high water level in the SIT can be corrected by using the SIT recirculation line to drain excess water to the the Radioactive Waste Management System (RMS) to maintain proper SIT level during power operation.

(b) SIT Pressure
Any in-leakage of reactor coolant into the SIT would produce an increase in level in the SIT. This would cause an increase in SIT pressure because the SIT is a relatively small closed volume with a nitrogen cover gas. This increase in pressure would be detected by SIT pressure indicator/alarm Nos. PIA-3311, PIA-3321, PIA-3331, and PIA-3341 which indicate SIT pressure in the control room. On high pressure in the SIT, these instruments would annuniciate alarms in the control room. In addition, pressure switch Nos. PS-3213, PS-3223, PS-3233, and PS-3243, which are located on the associated SIT, would actuate on high pressure and alarm in the control room. This provides for redundant and diverse SIT pressure indication and alarm in the control room. Further, high SIT pressure resulting from in-leakage and an associated increase in SIT water level can be corrected by using the SIT recirculation line to drain excess water to the Radioactive Waste Management System (RMS) to maintain proper SIT level during power operation.

(2) Alternate Testing: None.

In-leakage of reactor coolant into any of the the SITs would be detected during operation. Periodic review of SIT level and pressure will confirm that any SIT outlet check valves leakage is detected.

RELIEF REQUEST BASIS

SYSTEM: Safety Injection

6. Valve: V-3114, V-3124, V-3134, and V-3144
   Category: AC
   Class: 2

   Function:

   Provides the flow path from the the low pressure safety injection (LPSI) header to the assocated cold leg safety injection line.

   Test Requirement: IWV-3420

   Basis for Relief:

   These check valves are required to be seat leak tested pursuant to an NRC order dated April 20, 1981 which modified Technical Specification 3.4.6.2 and 4.4.6.2.

   Alternate Testing:

   Continue testing these check valves in accordance with the requirements of Technical Specification 4.4.6.2.e.

RELIEF REQUEST BASIS

SYSTEM: Containment Spray and Refueling Water

1. Valve: I-V-07256 and I-V-07258
   Category: C
   Class: 2

   Function:

   Provides the flow path from the the Spray Additive System to the associated containment spray pump suction header.

   Test Requirement: IWV-3520

   Basis for Relief:

   Testing these check valves, by placing the containment spray system in operation would result in introducing sodium hydroxide into the containment spray system piping.

   Testing these check valves, by connecting an external water source would result in the loss of ability to supply the required concentration of sodium hydroxide solution, if required.

   Alternate Testing:

   Continue testing these check valves in accordance with the requirements of Technical Specification 4.6.2.2.d.

RELIEF REQUEST BASIS

SYSTEM: Containment Spray and Refueling Water

2. Valve: I-V-07269 and I-V-07270
   Category: C
   Class: 2

   Function:

   Provides the flow path from the shutdown cooling heat exchanger outlet header to the containment spray additive system eductor.

   Test Requirement: IWV-3520

   Basis for Relief:

   Testing these check valves, by placing the containment spray system in operation would result in introducing sodium hydroxide into the containment spray system piping.

   Testing these check valves, by connecting an external water source would result in the loss of ability to supply the required concentration of sodium hydroxide solution, if required.

   Alternate Testing:

   Continue testing these check valves in accordance with the requirements of Technical Specification 4.6.2.2.d.

   Optionally, in lieu of flow testing these check valves, they will be disassembled at least once during the ten year inservice inspection interval to inspect the check valve internals and to verify the valves' freedom of motion to the open and to the closed position.

RELIEF REQUEST BASIS

SYSTEM: Containment Spray and Refueling Water

3. Valve: I-V-07129 and I-V-07143
   Category: C
   Class: 2

   Function:

   Provides the flow path from the the associated containment spray pump to the containment spray header system.

   Test Requirement: IWV-3520

   Basis for Relief:

   Testing these check valves by placing the containment spray system in operation would result in spraying the structures and components located inside the containment building with boric acid solution from the RWT.

   In the original design of the containment spray system there are no provisions for testing these containment spray pump discharge check valves at full flow conditions.

   Alternate Testing:

   These check valves will be disassembled at least once during the ten year inservice inspection interval to inspect the check valve internals and to verify the valves' freedom of motion to the open and to the closed position.

RELIEF REQUEST BASIS

SYSTEM: Containment Spray and Refueling Water

4. Valve: I-V-07192 and I-V-07193
   Category: C
   Class: 2

   Function:

   Provides the flow path from the the associated containment spray header to the containment spray nozzles located.inside the containment building.

   Test Requirement: IWV-3520

   Basis for Relief:

   Testing these check valves by placing the containment spray system in operation would result in spraying the structures and components located inside the containment building with boric acid solution from the RWT.

   In the original design of the containment spray system there are no provisions for testing these containment spray header check valves at full flow conditions.

   Alternate Testing:

   These check valves will be tested using acoustical methods to detect the disk travel from the closed to the open position when the closing pressure differential is removed and flow through the valve is initiated.

   Optionally, in lieu of flow testing with air, these check valves will be disassembled at least once during the ten year inservice inspection interval to inspect the check valve internals and to verify the valves' freedom of motion to the open and to the closed position.

RELIEF REQUEST BASIS

SYSTEM: Containment Spray and Refueling Water

5. Valve: I-V-07172 and I-V-07174
   Category: C
   Class: 2

   Function:

   Provides the flow path from the the associated containment sump to the HPSI, LPSI, and containment spray pump suction header during the post-accident recirculation phase.

   Test Requirement: IWV-3520

   Basis for Relief:

   In the original design of the containment sump recirculation system there are no provisions for testing these containment sump check valves at full flow conditions.

   Alternate Testing:

   These check valves will be disassembled at least once during the ten year inservice inspection interval to inspect the check valve internals and to verify the valves' freedom of motion to the open and to the closed position.

RELIEF REQUEST BASIS

SYSTEM: Containment Spray and Refueling Water

6. Valve: I-V-07119 and I-V-07120
   Category: C
   Class: 2

Function:

Provides the flow path from the Refueling Water Tank (RWT) supply header to the associated HPSI, LPSI and containment spray pump suction header.

Test Requirement: IWV-3520

Basis for Relief:

These check valves cannot be tested during plant operation because the neither the LPSI nor the HPSI pumps develop sufficient discharge pressure to overcome the reactor coolant system (RCS) pressure to establish a flow path to the RCS.

Further, these check valves cannot be tested during cold shutdown because the Shutdown Cooling System has insufficient letdown flow capacity to provide for both a flow path from the RWT to the reactor vessel and to provide for the removal of residual heat from the reactor core.

Alternate Testing:

These valves will be tested during refueling shutdowns.

Additional Testing:

These check valves will also be exercised quarterly, to the extent practical, during the performance of the associated LPSI or HPSI pump test using the minimum-flow pump recirculation flow path.

RELIEF REQUEST BASIS

SYSTEM: Main Steam

1. Valve: I-V-08117 and I-V-08148
   Category: C
   Class: 2

   Function:

   Provides the flow path from the associated steam generator to the main steam header.

   Test Requirement: IWV-3520

   Basis for Relief:

   In the original design of the main steam isolation valve (MSIV) there are no provisions for testing this check valve to Section XI requirements.

   Alternate Testing:

   These check valves will be disassembled at least once during the ten year inservice inspection interval to inspect the check valve internals and to verify the valves' freedom of motion to the open and to the closed position.

RELIEF REQUEST BASIS

SYSTEM: Feedwater and Condensate

1. Valve: I-V-9252 and I-V-9294
   Category: C
   Class: 2

   Function:

   Provides the flow path from the main feedwater system to the associated steam generator

   Test Requirement: IWV-3520

   Basis for Relief:

   In the original design of the main feedwater system there are no provisions for testing this check valve to Section XI requirements.

   Alternate Testing:

   These check valves will be disassembled at least once during the ten year inservice inspection interval to inspect the check valve internals and to verify the valves' freedom of motion to the open and to the closed position.

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GENERIC RELIEF REQUEST BASIS

SYSTEM: Various

1. Valve:

I-V-00139	I-V-07189	I-FCV-25-3
I-V-00140	I-HCV-14-6	I-FCV-25-4
I-LCV-07-11B	I-HCV-14-7	I-V-25-11
I-V-07009	I-MV-15-1	I-V-25-13
I-V-07188	I-MV-18-1	I-V-25-15
I-V-07189	I-V-18796	

Category: A

Class: 2

Function:

These valves provide for containment isolation.

Test Requirement: IWV-3423 and IWV-3424

Basis for Relief:

The containment isolation valves identified above are tested by pressurizing the piping or ducting between two or more valves installed in the associated containment penetration. This will result in performing the CODE Category A valve seat leakage test in a reverse direction from that specified in Subparagraph IWV-3423 on one or more valves in the associated containment penetration.

Alternate Testing:

Continue to perform the CODE Category A valve seat leakage test by pressurizing the piping or ducting between two or more valves installed in the associated containment penetration.

Nothing in Section XI of the ASME Boiler & Pressure Vessel Code shall be construed as superseding the requirements of Appendix J to 10CFR50 or the Plant Technical Specifications.

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II.A. SCOPE OF INSERVICE TEST PROGRAM - PUMPS

SCOPE

The centrifugal and positive displacement pumps covered by this inservice test program are pumps that are provided with an emergency power source and are required to perform a specific safety function in shutting down the reactor or in mitigating the consequences of an accident.

PUMPS NOT TESTED

Pumps not tested include those pumps that are supplied with emergency power solely for operating convenience.

NOTE:

Pump drivers are outside the scope of this Inservice Test Program, except where the pump bearings are in the driver and the pump and driver form an integral unit.

II.B DEFINITIONS

BYPASS LOOP

- a special test loop to be used when a pump cannot be tested in its regular circuit.

FIXED RESISTANCE SYSTEM

- a system wherein the hydraulic resistance remains unchanged from test to test.

INSERVICE TEST

- a special test to obtain information through measurement or observation to determine the operational readiness of a pump. These tests are not designed to establish complete pump performance.

OPERATIONAL READINESS

- the capability of a pump to fulfill its safety function as specified in Subarticle IWP-1100.

II.B. DEFINITIONS (CON'T)

REFERENCE VALUES

- one or more fixed set of values of the Inservice Test Quantities shown in Table IWP-3100-1 as measured or observed when the equipment is known to be operating acceptably. The test results of subsequent Inservice Tests shall be compared to these reference values, unless a new set or sets of reference values are established in accordance with Paragraph IWP-3111 and IWP-3112.

SYSTEM RESISTANCE

- the hydraulic resistance to flow in a system.

VARIABLE RESISTANCE SYSTEMS

- a system wherein the hydrulic resistance is varied to duplicate a reference flow rate or differential pressure.

II.C. INSERVICE TEST FREQUENCY - PUMPS (IWP-3400)

An inservice test shall be run on each pump covered by this Inservice Test Program nominally every three (3) months during plant operation and during shutdowns unless the pump is in a system declared inoperable or not required to be operable. Each inservice test shall include the measurement and observation of all inservice test quantities specified by plant procedures (refer to Table IWP-3100-1) except bearing temperatures which shall be measured during an inservice test at least once each year.

II.D. INSERVICE TEST REQUIREMENTS - PUMPS (IWP-3100)

An Inservice Test shall be conducted with the pump operating at nominal motor nameplate speed (constant speed drives) or at a speed adjusted to the reference speed (variable speed drives). In variable resistance systems the resistance of the system shall be varied until either the measured differential pressure or the measured flow rate equals the corresponding reference value. In variable or fixed resistance systems the test quantities required by plant procedures (refer to Table IWP-3100-1) shall be measures or observed and recorded. Each measured test quantity shall then be compared with the reference value of the same quantity. Any deviations determined shall be compared with the limits given in plant procedures (refer to Table IWP-3100-2) and the specified corrective action taken. All test data shall be analyzed within 96 hours after completion of a test.

II.E. INSERVICE TEST QUANTITIES (TABLE IWP-3100-1)

TEST QUANTITY	UNITS	SYMBOL	MEASURE	OBSERVE
SPEED (IF VARIABLE SPEED)	Revolutions per minute	N	YES	
INLET PRESSURE	Pounds per square inch (gage)	P_i	YES[1]	
DIFFERENTIAL PRESSURE	Pounds per Square inch	ΔP	YES	
FLOW RATE	Gallons per minute	Q	YES	
VIBRATION AMPLITUDE (Peak-to-	Thousands of an inch (mils)	V	YES	
PROPER LUBRICANT LEVEL OR PRESSURE	Inches or pounds per square inch	--- ---	---	YES
BEARING TEMPERATURE	Degrees Fahrenheit	T_b		

NOTE:
(1) Measure before pump startup and during test valves.

TABLE II-1 INSERVICE TESTS TO CODE OR RELIEF REQUEST

PUMP	INLET PRESSURE	DIFFERENTIAL PRESSURE	SPEED N	FLOW RATE, Q	VIBRATION V	TEMPERATURE BEARING, T	RELIEF REQUEST
BORIC ACID MAKEUP PUMP 1A	YES	YES	NA	NO (A)	YES	YES	2
BORIC ACID MAKEUP PUMP 1B	YES	YES	NA	NO (A)	YES	YES	2
COMPONENT COOLING WATER PUMP 1A	YES	YES	NA	NO (A)	YES	YES	
COMPONENT COOLING WATER PUMP 1B	YES	YES	NA	NO (A)	YES	YES	
COMPONENT COOLING WATER PUMP 1C	YES	YES	NA	NO (A)	YES	YES	
CONTAINMENT SPRAY PUMP 1A	YES	YES	NA	NO (A)	YES	YES	3
CONTAINMENT SPRAY PUMP 1B	YES	YES	NA	NO (A)	YES	YES	3
CHARGING PUMP 1A	YES	YES	NA	YES	YES	YES	
CHARGING PUMP 1B	YES	YES	NA	YES	YES	YES	
CHARGING PUMP 1C	YES	YES	NA	YES	YES	YES	
INTAKE COOLING WATER PUMP 1A	YES	YES	NA	YES	YES	YES	
INTAKE COOLING WATER PUMP 1B	YES	YES	NA	YES	YES	YES	
INTAKE COOLING WATER PUMP 1C	YES	YES	NA	YES	YES	YES	
DIESEL OIL TRANSFER PUMP 1A	YES	YES	NA	YES	YES	YES	4
DIESEL OIL TRANSFER PUMP 1B	YES	YES	NA	YES	YES	YES	4
AUXILIARY FEEDWATER PUMP 1A	YES	YES	NA	NO (A)	YES	YES	1
AUXILIARY FEEDWATER PUMP 1B	YES	YES	NA	NO (A)	YES	YES	1
AUXILIARY FEEDWATER PUMP 1C	YES	YES	YES*	NO (A)	YES	YES	1
LOW PRESSURE SAFETY INJECTION PUMP 1A	YES	YES	NA	NO (A)	YES	YES	6
LOW PRESSURE SAFETY INJECTION PUMP 1B	YES	YES	NA	NO (A)	YES	YES	6
HIGH PRESSURE SAFETY INJECTION PUMP 1A	YES	YES	NA	NO (A)	YES	YES	5
HIGH PRESSURE SAFETY INJECTION PUMP 1B	YES	YES	NA	NO (A)	YES	YES	5
HIGH PRESSURE SAFETY INJECTION PUMP 1C	YES	YES	NA	NO (A)	YES	YES	5

NOTE: (A) FIXED HYDRAULIC RESISTANCE SYSTEM TEST PERFORMED ON RECIRCULATION
REFER TO RELIEF REQUEST NO. 1.

* TURBINE DRIVEN

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RELIEF REQUEST BASIS

1. PUMPS:

AUXILIARY FEEDWATER (AFW) PUMP NO. 1A
AUXILIARY FEEDWATER (AFW) PUMP NO. 1B
AUXILIARY FEEDWATER (AFW) PUMP NO. 1C

Test Requirement: Measure flow rate during the quarterly inservice pump test (IWP-3300).

Basis for Relief:

During auxiliary feedwater injection, a large (as much as 380°F) temperature differential occurs which can create a large thermal shock and additional fatigue cycling of the nozzle. Clearly this is not desirable on a test basis, making the use of the main feedwater flow path impractical for test purposes.

Given the required test time duration per CODE and the design pump flow rate of approximately 275 gallons per minute, the RCS would experience a cooldown and contraction induced by steam generator secondary side cooldown. This cooldown can cause reactivity variations and power fluctuations during power operation which are clearly undesirable.

No alternative flow paths for testing on a quarterly basis other than the AFW pump minimum-flow recirculation (mini-recirc) flow path (by-pass test loop) which is provided with a flow limiting orifice but is not instrumented to measure flow rate.

The Technical Evaluation of the practicality of flow rate measurement testing of the AFW pumps conducted by the NSSS vendor (Combustion Engineering) concludes that measuring ΔP using the mini-recirc flow path, provides as accurate an indication of pump performance as measuring flow rate in this test loop.

A comprehensive technical justification for relief from flow rate measurement, during quarterly inservice testing, for the AFW pumps is provided in "Technical Evaluation - Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant, July 31, 1987" which is attached.

Alternate Testing:

Measure differential pressure (ΔP) across the pump, while testing in a fixed hydraulic resistance system, during the inservice pump tests conducted nominally every three (3) months during normal plant operation. This provides for an indirect measure of flow and verifies the operational readiness of the AFW pumps.

RELIEF REQUEST BASIS

2. PUMPS:

BORIC ACID MAKEUP (BAM) PUMP NO. 1A
BORIC ACID MAKEUP (BAM) PUMP NO. 1B

Test Requirement: Measure flow rate during the quarterly inservice pump test (IWP-3300).

Basis for Relief:

Using the main boric acid makeup system flow path for the inservice pump test would cause excess boron addition to the RCS with a resultant decrease in core reactivity.

Further, the maximum instrumented flow rate measured in the main boric acid makeup system flow path is only 30 gpm, which is significantly less than the BAM pump design flow of 142 gpm.

The installed flow rate meter is not capable of satisfying the 2% accuracy requirements of the CODE.

One of the two possible alternative flow paths is the makeup flow path from the BAM tank to the refueling water tank (RWT). This flow path utilizes a section of the normal boric acid makeup flow path which contains the installed flow rate meter with 30 gpm maximum flow rate capacity. In addition, a portion of this flow path is not heat traced, creating the possibility for boron precipitation difficulties. Thus, it is impractical to use this flow path for quarterly flow rate measurement tests of the BAM pumps.

The second alternative flow path is the the BAM pump minimum-flow recirculation (mini-recirc) flow path which is provided with a flow limiting orifice but no instrumentation for measuring flow rate.

The Technical Evaluation of the practicality of flow rate measurement testing of the BAM pumps conducted by the NSSS vendor (Combustion Engineering) concludes that measuring ΔP using the mini-recirc flow path, provides as accurate an indication of pump performance as measuring flow rate in this test loop.

RELIEF REQUEST BASIS

2. PUMPS:

BORIC ACID MAKEUP (BAM) PUMP NO. 1A
BORIC ACID MAKEUP (BAM) PUMP NO. 1B

Basis for Relief (CON'T):

A comprehensive technical justification for relief from flow rate measurement, during quarterly inservice testing, for the BAM pumps is provided in "Technical Evaluation - Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant, July 31, 1987" which is attached.

Alternate Testing:

Measure differential pressure (ΔP) across the pump, while testing in a fixed hydraulic resistance system, during the inservice pump tests conducted nominally every three (3) months during normal plant operation. This provides for an indirect measure of flow and verifies the operational readiness of the BAM pumps.

RELIEF REQUEST BASIS

3. PUMPS:

CONTAINMENT SPRAY (CS) PUMP NO. 1A
CONTAINMENT SPRAY (CS) PUMP NO. 1B

Test Requirement: Measure flow rate during the quarterly inservice pump test (IWP-3300).

Basis for Relief:

Full flow testing of the containment spray system using the normal (flow instrumented) flow path would require actual containment spray down. Clearly, this is impractical for CS pump test purposes.

No alternative flow paths for testing on a quarterly basis exist other than the CS pump minimum-flow recirculation (mini-recirc) flow path (by-pass test loop) which is provided with a flow limiting orifice but is not instrumented to measure flow rate.

The Technical Evaluation of the practicality of flow rate measurement testing of the CS pumps conducted by the NSSS vendor (Combustion Engineering) concludes that measuring ΔP using the mini-recirc flow path, provides as accurate an indication of pump performance as measuring flow rate in this test loop.

A comprehensive technical justification for relief from flow rate measurement, during quarterly inservice testing, for the CS pumps is provided in "Technical Evaluation - Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant, July 31, 1987" which is attached.

Alternate Testing:

Measure differential pressure (ΔP) across the pump, while testing in a fixed hydraulic resistance system, during the inservice pump tests conducted nominally every three (3) months during normal plant operation. This provides for an indirect measure of flow and verifies the operational readiness of the CS pumps.

RELIEF REQUEST BASIS

4. PUMPS:

DIESEL OIL TRANSFER (DOT) PUMP NO. 1A
DIESEL OIL TRANSFER (DOT) PUMP NO. 1B

Test Requirement: Measure flow rate during the quarterly inservice pump test (IWP-3300).

Basis for Relief:

Flow rate measurement, using the normal system flow path, is impractical because of limitations imposed by the Day Tank capacity. The Day Tanks are 343 gallon tanks with a Technical Specification minimum volume of 200 gallons. Considering the 25 GPM flow rate of the DOT pumps, the remaining available volume is insufficient for the test duration requirement of the CODE when bearing temperature measurements are required.

No alternative flow path exists for testing on a quarterly basis other than the DOT pump minimum-flow recirculation (mini-recirc) flow path (by-pass test loop) which is provided with a flow limiting orifice but this flow path is not instrumented to measure flow rate.

The Technical Evaluation of the practicality of flow rate measurement testing of the DOT pumps conducted by the NSSS vendor (Combustion Engineering) concludes that measuring ΔP using the mini-recirc flow path, provides as accurate an indication of pump performance as measuring flow rate in this test loop.

A comprehensive technical justification for relief from flow rate measurement, during quarterly inservice testing, for the DOT pumps is provided in "Technical Evaluation - Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant, July 31, 1987" which is attached.

Alternate Testing:

Measure differential pressure (ΔP) across the pump, while testing in a fixed hydraulic resistance system, during the inservice pump tests conducted nominally every three (3) months during normal plant operation. This provides for an indirect measure of flow and verifies the operational readiness of the DOT pumps.

RELIEF REQUEST BASIS

5. PUMPS:

HIGH PRESSURE SAFETY INJECTION PUMP NO. 1A
HIGH PRESSURE SAFETY INJECTION PUMP NO. 1B
HIGH PRESSURE SAFETY INJECTION PUMP NO. 1C

Test Requirement: Measure flow rate during the quarterly inservice pump test (IWP-3300).

Basis for Relief:

Flow rate measurement is impractical during normal plant operation because the HPSI pumps do not develop sufficient discharge pressure to establish a flow path to the reactor coolant system (RCS).

No alternative flow path exists for testing on a quarterly basis other than the HPSI pump minimum-flow recirculation (mini-recirc) flow path (by-pass test loop) which is provided with a flow limiting orifice but is not instrumented to measure flow.

Flow rate measurement during cold shutdown is impractical because testing the HPSI pumps by establishing a flow path from the refueling water tank (RWT) to the RCS, which is instrumentated to measure flow rate, would subject the RCS to low temperature-overpressure (LTOP) conditions exceeding the pressure-temperature limits specified in technical specification 3.4.9.

The Technical Evaluation of the practicality of flow rate measurement testing of the HPSI pumps conducted by the NSSS vendor (Combustion Engineering) concludes that measuring ΔP using the mini-recirc flow path, provides as accurate an indication of pump performance as measuring flow rate in this test loop.

A comprehensive technical justification for relief from flow rate measurement, during quarterly inservice testing, for the HPSI pumps is provided in "Technical Evaluation - Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant, July 31, 1987" which is attached.

Alternate Testing:

Measure differential pressure (ΔP) across the pump, while testing in a fixed hydraulic resistance system, during the inservice pump tests conducted nominally every three (3) months during normal plant operation. This provides for an indirect measure of flow and verifies the operational readiness of the HPSI pumps.

RELIEF REQUEST BASIS

6. PUMPS:

LOW PRESSURE SAFETY INJECTION PUMP NO. 1A
LOW PRESSURE SAFETY INJECTION PUMP NO. 1B

Test Requirement: Measure flow rate during the quarterly inservice pump test (IWP-3300).

Basis for Relief:

Flow rate measurement is impractical during normal plant operation because the LPSI pumps do not develop sufficient discharge pressure to establish a flow path to the reactor coolant system (RCS).

No alternative flow path exists for testing on a quarterly basis other than the LPSI pump minimum-flow recirculation (mini-recirc) flow path (by-pass test loop) which is provided with a flow limiting orifice but is not instrumented to measure flow.

The Technical Evaluation of the practicality of flow rate measurement testing of the LPSI pumps conducted by the NSSS vendor (Combustion Engineering) concludes that measuring ΔP using the mini-recirc flow path, provides as accurate an indication of pump performance as measuring flow rate in this test loop.

A comprehensive technical justification for relief from flow rate measurement, during quarterly inservice testing, for the LPSI pumps is provided in "Technical Evaluation - Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant, July 31, 1987" which is attached.

Alternate Testing:

Measure differential pressure (ΔP) across the pump, while testing in a fixed hydraulic resistance system, during the inservice pump tests conducted nominally every three (3) months during normal plant operation. This provides for an indirect measure of flow and verifies the operational readiness of the LPSI pumps.

Attachment

Technical Evaluation

Flow Measurement of Centrifugal Pumps in Fixed Resistance Systems at St. Lucie Plant

July 31, 1987

TABLE of CONTENTS

1.0 Executive Summary

An engineering evaluation was conducted by Combustion Engineering to provide a technical justification for relief from quarterly inservice flow measurement testing of certain ASME Class 2 and 3 pumps as required by the 1980 Edition, Winter 1980 Addenda of the ASME B&PV Code Section XI. The evaluation is applicable to St. Lucie Units 1 and 2 and addresses the pumps shown in *Table 1,* which are all centrifugal pumps in fixed resistance systems. The key elements considered in the evaluation are as follows:

- Analysis of pump failures
- Assessment of flow measurement practicality
- Comparison of alternative test intervals and methods
- Qualitative analysis of flow measurement vs. differential pressure measurement.

PUMP	St. Lucie 1	St. Lucie 2
High Presure Safety Injection (HPSI A & B) (C, Unit 1 only)	Bingham Williamette	Bingham Williamette
Low Pressure Safety Injection (LPSI A & B)	Ingersol Rand	Ingersol Rand
Containment Spray (CS A & B)	Byron Jackson	Ingersol Rand
Auxilliary Feedwater (AFW A, B & C)	Byron Jackson	Ingersol Rand
Boric Acid Makeup (BAM A & B)	Goulds	Goulds
Diesel Oil Transfer (DOT A & B)	Crane	Goulds

Pump Identification
Table 1

The results of the evaluation are summarized below:

1) A review of industry failure history on similar centrifugal pumps indicates that approximately 93% of the failures are attributable to mechanical degradation or failure while only 7% of the failures affected hydraulic performance. A review of the St. Lucie maintenance records indicated that only 4% of the maintenance was attributable to hydraulic performance degradation *(See Section 2).*

2) In each instance where review of historical data revealed cases of hydraulic degradation, the data indicates that the degradation was detected through periodic testing methods other than flow measurement. Measurement of differential pressure in a fixed resistance system, along with vibration measurement and operator observation, is adequate to detect all reported degradation or failure scenarios as well as any credible postulated degradation or failures *(See Section 2).*

3) It has been determined, through system reviews, that full or partial flow testing through the main system flow paths is impractical on a quarterly basis *(see Section 3).* Furthermore, such testing would not provide any information in addition to the measurement of pump differential pressure, which is currently measured at St. Lucie *(See Sections 3 and 4).*

4) The effectiveness of differential pressure measurement as an indication of degradation is virtually independent of the flow rate (i.e. the effectiveness is as great at mini-flow rates as at the design or run out flow rates). (See Section 4).

5) In a fixed resistance system, flow is related to differential pressure by the equation

$$Q = K\sqrt{\Delta P}$$

where:

Q = Flow

ΔP = Differential Pressure

K = point where the system head curve meets the pump head curve

If flow changes in this fixed system the differential pressure also changes and vice versa. Since this relationship can be calculated, there is no additional benefit gained from measuring the flow if the differential pressure is measured. In fact, if a fixed resistance mini-recirc system could change or did change slightly, (e.g., partially closed valve, eroded or partially clogged orifice, etc.) resulting in a new recirc flow, the change in differential pressure would probably not be detectable because operation (the point where the system head curve meets the pump head curve) would remain along the flat part of the pump head curve. If there was degradation of the pump, however, a change in ΔP would be observed because degradation of the pump is reflected by a change in the pump head curve, and thus a change in ΔP, as shown in *Figure 1*. Therefore, any detectable change in differential pressure can be assumed to be attributable to hydraulic degradation. The measurement of flow provides no additional benefits nor does it enhance the level of safety. (See Section 4).

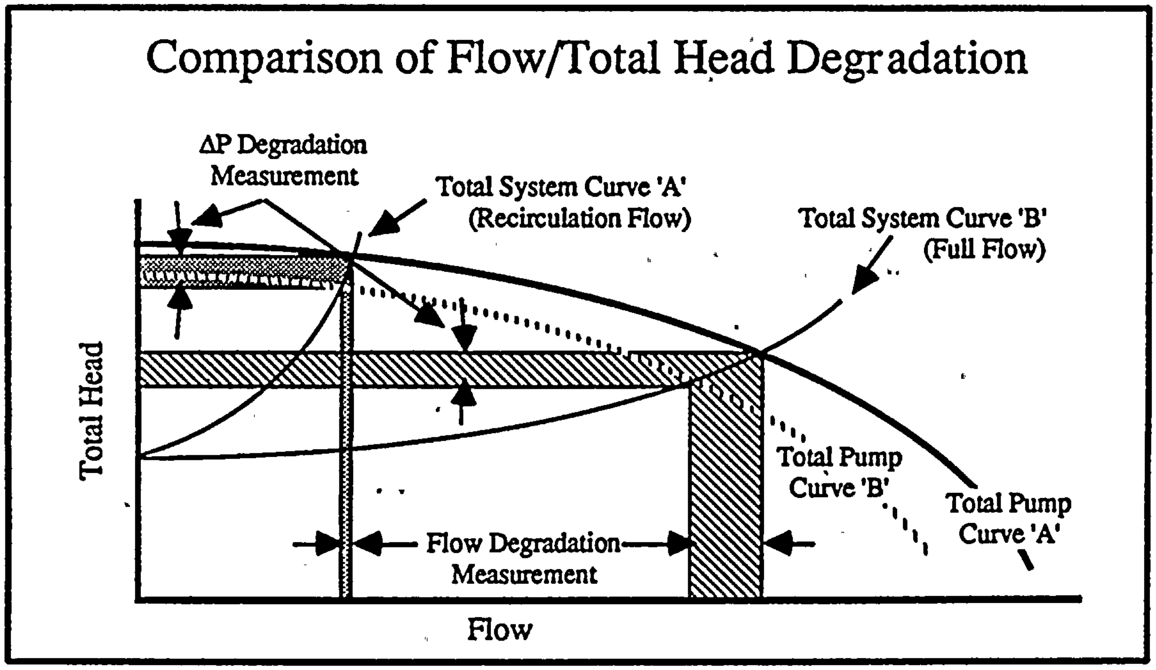

Figure 1

6) The measurement of differential pressure in a fixed resistance system provides for a more conservative indication of degradation than does the measurement of flow in that same fixed resistance system, i.e., the tolerances imposed on differential pressure per ASME Code bound the flow. This means that for a given degradation, if the differential pressure is within the limits imposed by the Code, then the flow for that same given fixed system will also be within the limits of the Code. On the other hand, if flow is within the limits imposed by the Code it does not necessarily mean that the differential pressure is within the limits of the Code. Therefore, differential pressure alone is required to establish pump operational readiness within Code limits *(See Section 4).*

2.0 Pump Failure Analysis

The failure of a pump to perform its intended function is related to degradation during its defined service. The degradation can affect hydraulic or mechanical performance. Hydraulic degradation is characteristic of the loss in the ability to deliver sufficient head or flow and is usually caused by wear of the impeller or wearing rings due to continuous operation over extended periods. Mechanical degradation is characteristic of increased vibration and/or noise, mechanical seal or packing leakage, loosening of bolting, etc.

A technical evaluation of the HPSI, LPSI, CS, AFW, BAM and DOT pumps was conducted to establish the mechanisms that could cause degradation and/or failure of centrifugal pumps and to ascertain which test methods are capable of detecting the various mechanisms for degradation and failure. The analysis is based upon review of industry historical data (*Source:* NPRDS, LERs) and St. Lucie Plant operating and maintenance experience. ***Table 2***, which summarizes the results of the evaluation, reveals that the test methods currently in use at St. Lucie are capable of detecting all credible modes of failure or degradation. A complete tabulation of historical data (excluding motor-related events) is included in Appendix 'A'.

Analysis of operating times (See *Appendix 'C'*) for St. Lucie pumps shows that operation can be considered *intermittent* based on the low service usage. Because of this low service usage, pump degradation is more likely to be mechanical in nature than hydraulic as shown in both *Appendix 'A'* and *Appendix 'B'*. This indicates that visual observation and vibration quarterly testing is adequate to detect most degradation. Because the most credible cause of hydraulic degradation is wearing ring and/or impeller wear, which are associated with high service usage and are often detectable by mechanical and hydraulic induced vibration, it is reasonable to conclude that an 18 or 24 month test interval would provide for an adequate means of detection for hydraulic degradation.

Pump Failure/Test Matrix

Component	Failure Mode	Detection Method		
		ΔP	Vibration	Observation
Seals Packing	Worn Packing			■
	Tight Packing			■
	Worn Seal			■
	Defective Seal			■
Internals	Worn Impeller	■	■	
	Casing Channel Rings Warped		■	
	Impeller Clearance	■		
Bearings/ Lubrication	Worn Bearings		■	
	Worn Bearing Retainining Screw		■	
	High/Low Lube Oil Level			■
Other	Misalignment		■	
	Loose Studs			■
	Galled Gaskets			■
	High Vibration		■	
	Low/High ΔP	■		
	Impeller Imbalance		■	
	Inadequate Venting	■		
	Loss Of Prime	■		
	Leaking Foot Valves	■		

Table 2

3.0 Assessment of Flow Measurement Practicality

Technical assessment of the practicality of flow measurement is addressed in terms of system operation with respect to pump run times, plant responses, safety implications, and thermal shock concerns. Also, a review of as-built system configurations was conducted to determine whether alternative system alignments could be employed to satisfy Section XI pump flow test requirements during normal plant operations. The results of these assessments are addressed in the following paragraphs on a pump-by-pump basis.

High Pressure Safety Injection (HPSI)

The review of the HPSI system indicates quarterly flow testing to be impractical, based upon the operational characteristics of the system. In order to flow test the HPSI pumps, sufficient pump discharge head must be developed to overcome system resistance and check valves which are back-biased by Reactor Coolant System pressure. HPSI pump shutoff head (approximately 1250 psig) is not sufficient to overcome RCS pressure during normal operation. Further, the HPSI pumps cannot be tested at Cold Shutdown (Mode 5) because it could subject the Reactor Pressure Vessel to conditions exceeding the pressure-temperature limits of Technical Specification 3.4.9.1.

The main system flow path may be used for pump flow testing only during the Refueling mode of operation, while filling the refueling cavity with the RPV head removed. Obviously, it is impractical to go to Cold Shutdown every 3-months in order to do so.

A review of the Safety Injection System P&ID shows that no alternative path exists for testing on a quarterly basis other than the mini-flow lines, which are not instrumented to measure flow. Although the mini recirc path design could be modified to include flow instrumentation, the resulting flow measurement would be high on the pump head curve. Measuring ΔP high on the pump head curve provides, as a minimum, as accurate an indication of pump performance as does measuring flow *(see Section 4)*. Thus, there is no technically justifiable basis for being required to measure both. Additionally, pump usage (≈10 hours/year) does not support hydraulic degradation as a credible failure mechanism.

Low Pressure Safety Injection (LPSI)

Review of the LPSI system shows quarterly flow testing to be impractical during normal operation based upon characteristics of the system. In order to flow test the LPSI pumps, sufficient pump discharge head must be developed to overcome system resistance and check valves which are back-biased by Reactor Coolant System Pressure. However, LPSI pump shutoff head (approximately 175-216 psig) is not sufficient to overcome RCS pressure during normal operation. Therefore, the LPSI pumps can only be full or partial flow tested during Mode 5 (Cold Shutdown) or Mode 6 (Refueling). In addition, the design flow rate of 3000 gpm dictates that a volume be available of sufficient capacity to accept the total volumetric discharge from the LPSI pump at design flow conditions over the duration of the test. This volumetric capacity requirement can be met, due to system characteristics, only by the refueling cavity volume.

Based upon the above considerations it is impractical to flow test the LPSI system on a quarterly basis during any mode of plant operation above Cold Shutdown (Mode 5). Although the LPSI system can be flow tested during Cold Shutdown, it is obviously impractical to go to Cold Shutdown every 3-months in order to do so.

Review of the Safety Injection System P&ID's reveals no alternative flow paths for testing on a quarterly basis other than the pump miniflow lines, which are not instrumented to measure flow. Although the mini recirc path design could be modified to include flow instrumentation, the resulting flow measurement would be high on the pump head curve. Measuring ΔP high on the pump head curve provides, as a minimum, as accurate an indication of pump performance as does measuring flow *(see Section 4)*. Thus, there is no technically justifiable basis for being required to measure both.

Auxiliary Feedwater (AFW)

The review of the AFW system shows quarterly flow testing to be impractical based upon two considerations. The first deals with thermal shock of the Auxiliary Feedwater nozzle at the Main Feedwater system interface. During Auxiliary Feedwater injection, a large (as much as 380°F) temperature differential occurs which can create a large thermal shock and additional fatigue cycling of the nozzle. Clearly, this is not desirable. The second consideration deals with flow testing of the AFW pump to the time duration requirements of the ASME Code. Given the required test time durations and the design pump flow rate of approximately 275 gpm, the RCS would experience a cooldown and contraction induced by steam generator secondary side cooldown. This cooldown can cause reactivity variations and power fluctuations during Mode 1 operation, which are clearly undesirable.

Testing of the AFW pump may be accomplished using the main system flow paths and installed flow meters during normal plant cooldown or during Mode 5 Cold Shutdown operation. It is obviously impractical to go to Cold Shutdown every 3-months in order to accomplish pump flow testing.

Review of the Auxiliary Feedwater System P&ID's reveals no alternative flow paths for testing on a quarterly basis other than the pump miniflow lines, which are not instrumented to measure flow. Although the mini recirc path design could be modified to include flow instrumentation, the resulting flow measurement would be high on the pump head curve. Measuring ΔP high on the pump head curve provides, as a minimum, as accurate an indication of pump performance as does measuring flow ***(see Section 4).*** Thus, there is no technically justifiable basis for being required to measure both.

Based upon the above considerations it is impractical to conduct AFW pump testing, other than miniflow ΔP testing, on a quarterly basis.

Boric Acid Makeup (BAM)

The review of the BAM system shows flow testing to be impractical. This impracticality determination is based upon the implications of injecting concentrated boric acid into the Reactor Coolant System during plant operation. Using the main system flow path for the pump test would cause excess boron addition to the RCS with a resultant decreases in core reactivity. When coupled with the test duration time requirements of the Code, a test using the main system flow path becomes prohibitive because of the large boron addition. Therefore, it is impractical to flow test the BAM pumps using the main system flow path on a quarterly basis, i.e., during plant operation.

A review of the Boric Acid Makeup System P&IDs indicates the availability of two possible flow paths for quarterly testing.

One flow path is the BAM pump recirculation line back to the BAM tank. The other flow path is the BAM flow path to the Refueling Water Tank (RWT).

Although there is a flow path back to the BAM tank using the recirculation line, the flow path is not instrumented to measure flow. This flow path also offers the possibility to determine the pump flow rate based upon a change in water level in the BAM Tank. However, the BAM tank capacity is insufficient, even when the tank level is lowered to the Technical Specification minimum, to accomodate the BAM pump design flow rate over the time duration requirement of the Code when bearing temperatures are measured.

An alternate flow path available for quarterly pump testing is the makeup flow path to the RWT. This is a restricted flow path and contains the BAM system flow instrumentation. However, the flow instrumentation is not capable of satisfying the 2% accuracy requirement of the Code. Additionally, a portion of the makeup flow path to the RWT is not heat traced, creating the possibility for boron precipitation difficulties. Also, the maximum indicated flow capacity of this path is 30 gpm; which is significantly less than system full flow (≈142 gpm). Any flow measurement taken in this flow path will thus be high on the pump curve. Measuring ΔP high on the pump curve provides, as a minimum, as accurate an indication of pump performance as does measuring flow *(see Section 4)*. Thus, there is no technically justifiable basis for being required to measure both.

Based upon all of the above considerations, quarterly flow testing in accordance with the Code requirements is impractical. The best indication of pump operational readiness is provided by employing the test method currently in use; measuring pump ΔP on a quarterly basis.

<u>Containment Spray (CS)</u>

The review of the CS system shows flow testing on a quarterly basis to be impractical based upon the system configuration and its function. The containment spray system uses its main flow path to discharge into the containment atmosphere to ensure that design values for containment temperature and containment pressure are not exceeded during a postulated loss of coolant or steamline break accident in containment. Full flow testing of the system using the normal (flow instrumented) flow path would require actual containment spray down. Clearly, this is impractical for test purposes.

Alternatively, a partial flow test path does exist for the containment spray pumps through taking a suction on the RWT, flowing RWT fluid to the containment spray pump discharge header, and to the Shutdown Cooling heat exchanger. From the Shutdown Cooling heat exchanger RWT fluid would flow through the containment spray system main piping into the Shutdown Cooling System discharge pipe and finally inject into the RCS through the low pressure safety injection headers, which are flow instrumented. This would be accomplished with containment spray header isolation valves closed to prevent containment spray down. However, there are tube side flow limitations on the Shutdown Cooling Heat Exchanger and the containment spray pump is designed for 3600 gpm flow while the Shutdown Cooling heat exchanger tubes are designed for 3000 gpm; thus, only partial flow testing is possible. Furthermore, this option for partial flow testing is available only during refueling cavity fill, Mode 6. Thus, this alternative is clearly impractical since it would involve plant shutdown and RPV head removal every 3-months.

Review of the containment spray system P&ID reveals no alternative flow paths for testing on a quarterly basis other than the pump miniflow lines, which are not instrumented to measure flow. Although the mini recirc path design could be modified to include flow instrumentation, the resulting flow measurement would be high on the pump head curve. Measuring ΔP high on the pump head curve provides, as a minimum, as accurate an indication of pump performance as does measuring flow ***(see Section 4)***. Thus, there is no technically justifiable basis for being required to measure both. Additionally, pump usage (≈5 hours/year) does not support hydraulic degradation as a credible failure mechanism.

<u>Diesel Fuel Oil Transfer (DOT)</u>

Review of the DOT System shows full flow testing to the Day Tanks to be impractical because of limitations imposed by the Day Tank capacity. The Day Tanks are 343 gallon tanks with a Technical Specification minimum volume of 200 gallons. Considering the 25 GPM flow rate of the DOT pumps, the remaining available volume is insufficient for the test duration requirement of Code when bearing temperature measurements are required. Even if flow testing to the Day Tank were possible, the tank level indicators that would be used to calculate the flow rate would fail to satisfy the 2% accuracy requirements of Code.

Based upon the Day Tank capacity limitation, the uncertainty of the level indication and the potential for inadvertently lowering the Day Tank oil level below the Technical Specification minimum, it is impractical to flow test the DOT pump while discharging to the Day Tanks.

Although there is a flow path back to the Diesel Oil Storage Tank, that flow path is not instrumented to measure flow. Flow rates as determined by a change of level over time are subject to a ±3% uncertainty, failing to satisfy the Code requirement for 2% accuracy.

Based upon the above considerations, quarterly flow testing in accordance with Code requirements is impractical. Flow testing to the Diesel Oil Storage Tank could be offered as an alternative test, although relief from the 2% accuracy requirement of the Code would be required. Lacking the accuracy of the Code required flow test, however, it does not appear that this alternative would produce meaningful results. The best indication of pump operational readiness is provided employing the test method currently in use, i.e., measuring ΔP on a quarterly basis in the recirc. flow path. Additionally, pump usage (≈4 hours/year) does not support hydraulic degradation as a credible failure mechanism.

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4. Measurement of Differential Pressure in a Fixed Resistance System

Analysis of fixed resistance systems indicates that the measurement of differential pressure always provides for as conservative an indicator of pump degradation as the measurement of flow and that the point of measurement on the curve is inconsequential. It also shows that there will be no impact on safety regardless of the point of measurement.

For a fixed set of conditions in any system there is only one total pump head for a given flow. This total head can be determined by either measuring pressure across the pump and the pump flow or by measuring the energy difference between any two points in the system, one each side of the pump, providing all losses between these two points are credited to the pump and are added to the energy-head difference.

Flow produced by a centrifugal pump varies with the system total head which, at equilibrium, must equal pump total head. The point of intersection of the pump and system curves represents the maximum flow possible with respect to the fixed system defined and provides the equilibrium conditions necessary to perform an energy balance using Bernoulli's General Equation for Fluid Flow. Any change in the system would require a new energy balance to be performed, as each condition is unique and the results obtained on one system curve cannot be used to

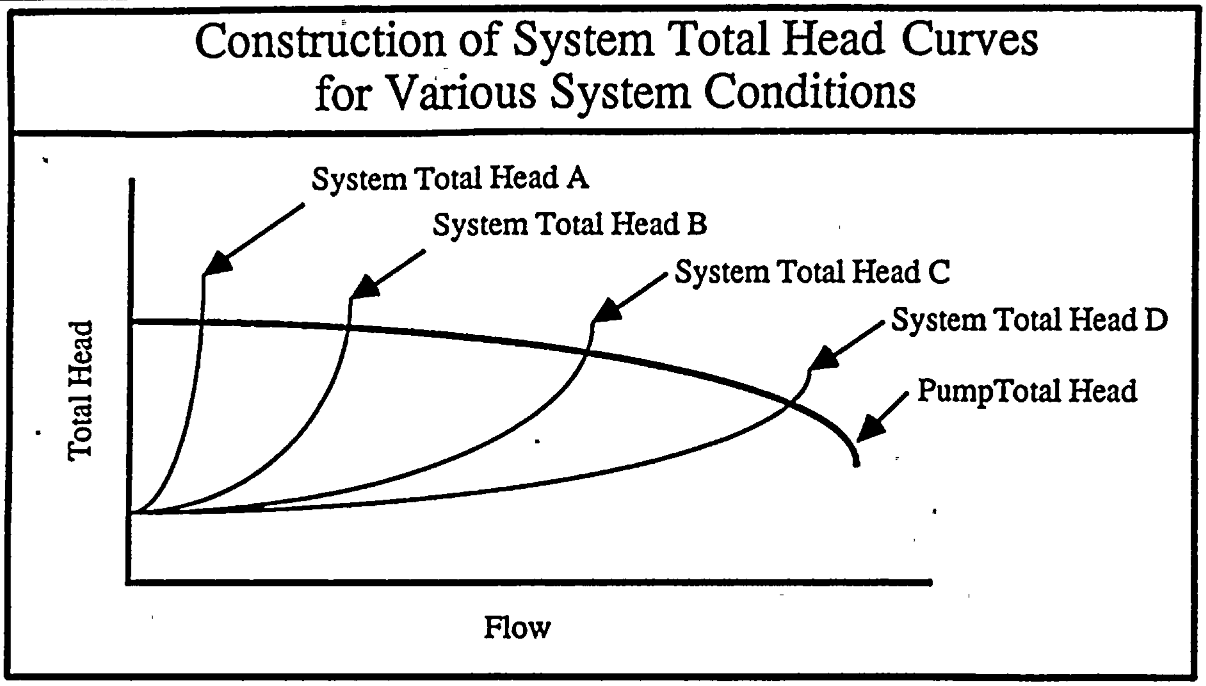

Figure 2

extrapolate conditions on another system curve, as shown in *Figure 2.* The points of intersection with the pump total head curve and system total head curve change as the system changes.

The system total head is comprised of two parts, a fixed part due to the energy required to overcome system static head and a variable part which is related to the energy required to overcome losses due to flow in the system. *Figure 3* shows this relationship.

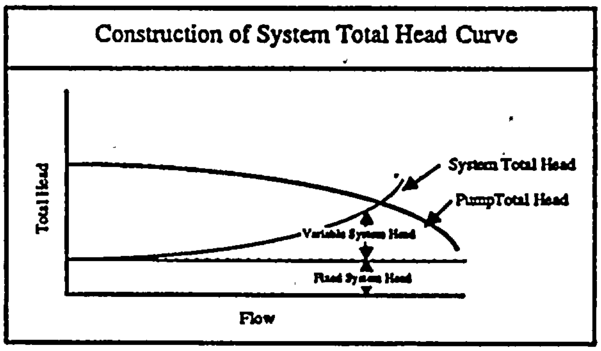

Figure 3

Variable system head and flow are described by the following relationship:

$$Q = K\sqrt{\Delta P}$$

where:

Q	=	Flow
ΔP	=	Differential Pressure
K	=	Constant defined by the fixed system

Since the variable system total head is dependent on the pump, and all energy changes are attributable to the pump, any change in flow or differential pressure would be attributed to pump degradation. This degradation would be present on any system total head curve considered. Therefore, degradation is independent of which system total head curve is used and the impact on safety would not be compromised if measurements were taken at full flow or minimum flow conditions, the only requirement being that the same system total head curve be used for comparison.

To determine pump degradation, differential pressure and/or flow is required to be measured. For centrifugal pumps, the flow degradation differences are greater when the system total head curve is flat (full flow conditions) as compared to a steep system total head curve (recirculation flow conditions). However, differences in differential pressure due to pump degradation remain relatively constant irrespective of the

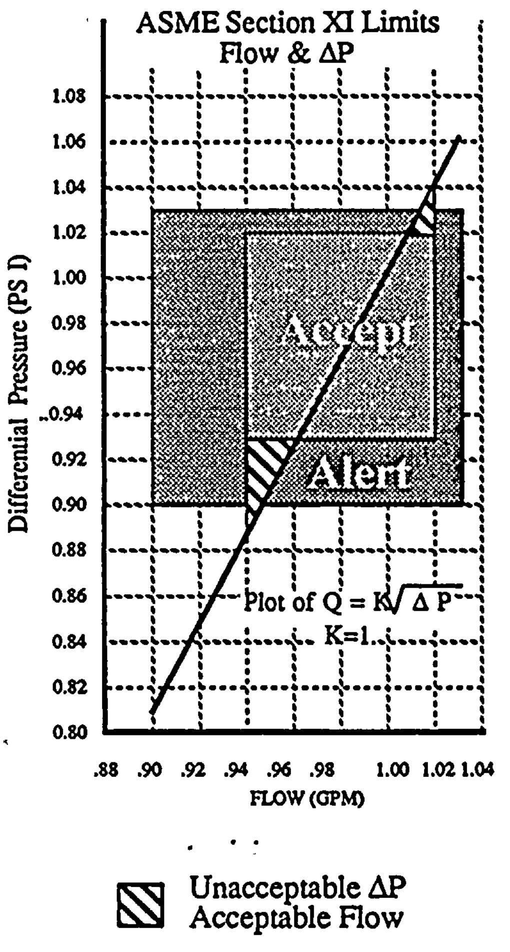

Figure 4

shape of the system total head curve. *Figure 1* shows this relationship. Since the system total head characteristics in a fixed resistance system are known and are repeatable without having to set up conditions by throttling discharge valves, the measurement of flow is not necessary to determine pump degradation. The measurement of pump differential pressure is all that is required.

In addition, the measurement of differential pressure provides for more conservatism when determining degradation than the measurement of flow. As seen in *Figure 4*, the limitations imposed by the Code for the high and low value, differential pressure alert limits bound flow in the acceptable range. However, the high and low flow alert limits would allow for differential pressures to be unacceptable.

Based upon the above discussions and analyses, the following is concluded:

- For a fixed resistance system there is one total head for a given flow.
- Centrifugal pump flow varies with the total system head.
- Losses in differential pressure are attributed to pump degradation.
- Degradation measured on one system total head curve indicates that there will be degradation on other system total head curves.
- For a fixed resistance system, only

differential pressure measurement is required to determine pump degradation, flow can be calculated by:

$$Q = K\sqrt{\Delta P}$$

where K is defined by the fixed system.

- The measurement of differential pressure always provides for conservative indication of degradation
- The point of measurement, i.e., system total head curve used, is arbitrary and will not impact safety no matter where measured.

CONCLUSIONS

1) Full or partial flow testing through main system lines for the purpose of flow measurement on a quarterly basis is impractical at St. Lucie.

2) Flow measurement testing in a fixed resistance recirc-line is not necessary to detect pump degradation or oncoming failure if pump differential pressure is measured. Therefore, the addition of flow measurement devices to the mini-recirc lines at St. Lucie would not result in an increase in the level of safety or quality.

3) FPL's present method of inservice testing without flow measurement is adequate to meet the intent of the ASME Code Section XI.

APPENDIX A
Mechanical/Hydraulic Pump Degradation

ITEM DESCRIPTION	AFW	CS	DOT	HPSI	LPSI	TOTAL EVENTS
Alignment						
Misalignment Pump/Driver (V)	2	3	2	2		9
Mechanical Seal/Packing						
Worn Packing (O)	5					5
Packing too Tight (O)		2				2
Worn Packing (O)	7	1		1	1	10
Worn Mechanical Seal (O)		3			10	13
Defective Mechanical Seal (O)					1	1
Pump Internals						
Worn Impeller (P)	1			1		2
Worn Impeller (V)		2				2
Casing/Channel Rings Warped (V)	1					1
Bearing/Lubrication						
Worn Bearings (V)			2	2	3	7
Worn Bearing Retaining Screw (V)				1		1
Low Lube Oil Level (O)	1		1			2
High Lube Oil Level (O)	1					1
Other						
Loose Studs (O)		1				1
Galled Gaskets (O)	2		1			3
High Vibrations-Cause Unk (V)		1	2			3
Low Diff Pressure-Cause Unk (P)					1	1
High Diff Pressure-Cause Unk (P)			1			1
Impeller Imbalance (V)			1			1
Total Events Related to Pump	20	13	10	7	16	66

<u>Detection Method (When Known)</u>
(V)=Vibration
(P)=Pressure
(O)=Operator Observation

Appendix B
St. Lucie 1 & 2
Operating/Maintenance History

ITEM DESCRIPTION	AFW	CS	DOT	HPSI	LPSI	BAM	LESS BAM	TOTAL EVENTS
Alignment								
Misalign, Pump/Driver (V)	1	1	1	3	2	1	8	9
Mechanical Seal/Packing								
Worn Packing (O)			6				6	6
Worn Mechanical Seal (O)		2		2		7	4	11
Pump Internals								
Worn Impeller (V)			1			1	1	2
Bearing/Lubrication								
Worn Bearings (V)	2						2	2
Other								
Loose Studs (O)		1		3	5	4	9	13
Repair Oiler Leak (O)	1					1	1	2
Adjust Oiler (O)	1						1	1
Water in Oil (O)	1						1	1
Impeller Clearance Adj. (P)			1			1	1	2
Total Maintenance Items	6	4	9	8	7	15	34	49

<u>Detection Method (When Known)</u>
(V)=Vibration
(P)=Pressure
(O)=Operator Observation

Appendix C
St. Lucie Plant
Estimated Pump Operating Hours

(Preoperational runtimes not included)

PUMP	TOTAL HOURS	TEST %	TOTAL OPER. HOURS	TOTAL TEST HOURS	AVG. OPER. HOURS BETWEEN TESTS
AFW 1A	1600	3.00%	1552	48	13
AFW 1B	1600	3.00%	1552	48	13
AFW 1C	40	67.50%	13	27	0
BAM 1A	5100	0.25%	5087	13	42
BAM 1B	5100	0.25%	5087	13	42
CS 1A	55	100.00%	0	55	0
CS 1B	55	100.00%	0	55	0
DOT 1A	40	100.00%	0	40	0
DOT 1B	40	100.00%	0	40	0
HPSI 1A	110	33.64%	73	37	1
HPSI 1B	110	33.64%	73	37	1
HPSI 1C	105	40.00%	63	42	1
LPSI 1A	10100	1.00%	9999	101	0
LPSI 1B	10100	1.00%	9999	101	0
AFW 2A	670	2.99%	650	20	11
AFW 2B	670	2.99%	650	20	11
AFW 2C	40	67.50%	13	27	0
BAM 2A	1700	0.24%	1696	4	26
BAM 2B	1700	0.24%	1696	4	0
CS 2A	20	100.00%	0	20	0
CS 2B	20	100.00%	0	20	0
DOT 2A	30	100.00%	0	30	0
DOT 2B	30	100.00%	0	30	0
HPSI 2A	45	33.33%	30	15	0
HPSI 2B	45	33.33%	30	15	0
LPSI 2A	4000	0.45%	3982	18	0
LPSI 2B	4000	0.45%	3982	18	0