INSERVICE TESTING PROGRAM

CALLAWAY NUCLEAR PLANT

REVISION 13

ATTACHMENT 2

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VLV NUMBER	P & ID	CRD	I	CAT	SIZE	TYPE	AT	POS	DIR	TST	TM	MAX	*R/R	*NOTES*
BB8378A	M-02BB01	E-4	1	C	3	CK	SA	O	C	CVT	RR		BB-12	
BB8378B	M-02BB01	E-4	1	C	3	CK	SA	O	C	CVT	RR		BB-12	
BB8379A	M-02BB01	E-7	1	C	3	CK	SA	O	C	CVT	RR		BB-12	
BB8379B	M-02BB01	E-7	1	C	3	CK	SA	O	C	CVT	RR		BB-12	
BB8948A	M-02BB01	E-4	1	A,C	10	CK	SA	C	O	AT	CS		V05	7
BB8948A	M-02BB01	E-4	1	A,C	10	CK	SA	C	O	CVT	RR		BB-1,V07	5
BB8948B	M-02BB01	D-4	1	A,C	10	CK	SA	C	O	AT	CS		V05	7
BB8948B	M-02BB01	D-4	1	A,C	10	CK	SA	C	O	CVT	RR		BB-1,V07	5
BB8948C	M-02BB01	C-6	1	A,C	10	CK	SA	C	O	AT	CS		V05	7
BB8948C	M-02BB01	C-6	1	A,C	10	CK	SA	C	O	CVT	RR		BB-1,V07	5
BB8948D	M-02BB01	E-6	1	A,C	10	CK	SA	C	O	AT	CS		V05	7
BB8948D	M-02BB01	E-6	1	A,C	10	CK	SA	C	O	CVT	RR		BB-1,V07	5
BB8949A	M-02BB01	E-5	1	A,C	6	CK	SA	C	O	AT	CS		V05	7
BB8949A	M-02BB01	E-5	1	A,C	6	CK	SA	C	O	CVT	RR		BB-2,V07	5
BB8949B	M-02BB01	C-5	1	A,C	6	CK	SA	C	O	AT	CS		V05	7
BB8949B	M-02BB01	C-5	1	A,C	6	CK	SA	C	O	CVT	CS		BB-3,V07	5
BB8949C	M-02BB01	C-6	1	A,C	6	CK	SA	C	O	AT	CS		V05	7
BB8949C	M-02BB01	C-6	1	A,C	6	CK	SA	C	O	CVT	CS		BB-3,V07	5
BB8949D	M-02BB01	G-6	1	A,C	6	CK	SA	C	O	AT	CS		V05	7
BB8949D	M-02BB01	G-6	1	A,C	6	CK	SA	C	O	CVT	RR		BB-2,V07	5
BBPV8702A	M-02BB01	E-4	1	A	12	GA	MO	C	C	AT	CS		V05	7
BBPV8702A	M-02BB01	E-4	1	A	12	GA	MO	C	C	BT	CS	105	BB-6	5,6
BBPV8702A	M-02BB01	E-4	1	A	12	GA	MO	C	C	PIT	RR			
BBPV8702B	M-02BB01	H-6	1	A	12	GA	MO	C	C	AT	CS		V05	7
BBPV8702B	M-02BB01	H-6	1	A	12	GA	MO	C	C	BT	CS	105	BB-6	5,6
BBPV8702B	M-02BB01	H-6	1	A	12	GA	MO	C	C	PIT	RR			
BBV0001	M-02BB01	D-5	1	A,C	1.5	CK	SA	C	C	AT	CS		V05	7
BBV0001	M-02BB01	D-5	1	A,C	1.5	CK	SA	C	O	CVT	RR		BB-4,V07	5
BBV0022	M-02BB01	D-4	1	A,C	1.5	CK	SA	C	C	AT	CS		V05	7
BBV0022	M-02BB01	D-4	1	A,C	1.5	CK	SA	C	O	CVT	RR		BB-4,V07	5
BBV0040	M-02BB01	D-6	1	A,C	1.5	CK	SA	C	C	AT	CS		V05	7
BBV0040	M-02BB01	D-6	1	A,C	1.5	CK	SA	C	O	CVT	RR		BB-4,V07	5
BBV0059	M-02BB01	E-6	1	A,C	1.5	CK	SA	C	C	AT	CS		V05	7
BBV0059	M-02BB01	E-6	1	A,C	1.5	CK	SA	C	O	CVT	RR		BB-4,V07	5

INSERVICE TESTING PROGRAM

SY	VLV-NUMBER	*-P+ID-*	CRD	I	CAT	*SIZE	TYP	AT	POS	DIR	TST	TM	MAX	*R/R	*NOTES-*
EP	8818A	M-02EP01	G-3	1	A,C	6"	CK	SA	C	O/C	AT	CS		V05	7
EP	8818A	M-02EP01	G-3	1	A,C	6"	CK	SA	C	O/C	CVT	CS		EP-1,V07	5
EP	8818B	M-02EP01	F-3	1	A,C	6"	CK	SA	C	O/C	AT	CS		V05	7
EP	8818B	M-02EP01	F-3	1	A,C	6"	CK	SA	C	O/C	CVT	CS		EP-1,V07	5
EP	8818C	M-02EP01	D-3	1	A,C	6"	CK	SA	C	O/C	AT	CS		V05	7
EP	8818C	M-02EP01	D-3	1	A,C	6"	CK	SA	C	O/C	CVT	CS		EP-1,V07	5
EP	8818D	M-02EP01	C-3	1	A,C	6"	CK	SA	C	O/C	AT	CS		V05	7
EP	8818D	M-02EP01	C-3	1	A,C	6"	CK	SA	C	O/C	CVT	CS		EP-1,V07	5
EP	8855A	M-02EP01	H-7	2	C	1"	RV	SA	C	O	RVT				2
EP	8855B	M-02EP01	F-7	2	C	1"	RV	SA	C	O	RVT				2
EP	8855C	M-02EP01	D-7	2	C	1"	RV	SA	C	O	RVT				2
EP	8855D	M-02EP01	C-7	2	C	1"	RV	SA	C	O	RVT				2
EP	8956A	M-02EP01	G-4	1	A,C	10"	CK	SA	C	O	AT	CS		V05	7
EP	8956A	M-02EP01	G-4	1	A,C	10"	CK	SA	C	O	CVT	RR		EP-2,V08	5
EP	8956B	M-02EP01	E-4	1	A,C	10"	CK	SA	C	O	AT	CS		V05	7
EP	8956B	M-02EP01	E-4	1	A,C	10"	CK	SA	C	O	CVT	RR		EP-2,V08	5
EP	8956C	M-02EP01	C-4	1	A,C	10"	CK	SA	C	O	AT	CS		V05	7
EP	8956C	M-02EP01	C-4	1	A,C	10"	CK	SA	C	O	CVT	RR		EP-2,V08	5
EP	8956D	M-02EP01	B-4	1	A,C	10"	CK	SA	C	O	AT	CS		V05	7
EP	8956D	M-02EP01	B-4	1	A,C	10"	CK	SA	C	O	CVT	RR		EP-2,V08	5
EP HV	8808A	M-02EP01	G-5	2	B	10"	GA	MO	O	O	BT	CS	15	EP-5	5,6
EP HV	8808A	M-02EP01	G-5	2	B	10"	GA	MO	O	O	PIT	RR			
EP HV	8808B	M-02EP01	E-5	2	B	10"	GA	MO	O	O	NA				1,3
EP HV	8808C	M-02EP01	C-5	2	B	10"	GA	MO	O	O	NA				1,3
EP HV	8808D	M-02EP01	B-5	2	B	10"	GA	MO	O	O	BT	CS	15	EP-5	5,6
EP HV	8808D	M-02EP01	B-5	2	B	10"	GA	MO	O	O	PIT	RR			
EP HV	8875A	M-02EP01	H-6	2	B	1"	GL	AO	C	C	NA				3
EP HV	8875B	M-02EP01	F-6	2	B	1"	GL	AO	C	C	NA				3
EP HV	8875C	M-02EP01	D-6	2	B	1"	GL	AO	C	C	NA				3
EP HV	8875D	M-02EP01	C-6	2	B	1"	GL	AO	C	C	NA				3
EP HV	8877A	M-02EP01	F-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8877B	M-02EP01	E-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8877C	M-02EP01	C-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8877D	M-02EP01	A-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8878A	M-02EP01	G-5	2	B	1"	GL	AO	C	C	NA				3
EP HV	8878B	M-02EP01	E-5	2	B	1"	GL	AO	C	C	NA				3
EP HV	8878C	M-02EP01	D-5	2	B	1"	GL	AO	C	C	NA				3
EP HV	8878D	M-02EP01	B-5	2	B	1"	GL	AO	C	C	NA				3
EP HV	8879A	M-02EP01	G-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8879B	M-02EP01	E-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8879C	M-02EP01	D-4	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8879D	M-02EP01	C-2	2	B	.75"	GL	AO	C	C	NA				3
EP HV	8880	M-02EP01	A-4	2	A	1"	GL	AO	C	C	AT	RR		V04	10
EP HV	8880	M-02EP01	A-4	2	A	1"	GL	AO	C	C	BT	OP	5		
EP HV	8880	M-02EP01	A-4	2	A	1"	GL	AO	C	C	FST	OP			
EP HV	8880	M-02EP01	A-4	2	A	1"	GL	AO	C	C	PIT	RR			
EP HV	8950A	M-02EP01	H-7	2	B	1"	GL	SO	C	O	BT	CS	5	EP-4	5
EP HV	8950A	M-02EP01	H-7	2	B	1"	GL	SO	C	O	PIT	RR			
EP HV	8950B	M-02EP01	F-8	2	B	1"	GL	SO	C	O	BT	CS	5	EP-4	5
EP HV	8950B	M-02EP01	F-8	2	B	1"	GL	SO	C	O	PIT	RR			
EP HV	8950C	M-02EP01	F-7	2	B	1"	GL	SO	C	O	BT	CS	5	EP-4	5
EP HV	8950C	M-02EP01	F-7	2	B	1"	GL	SO	C	O	PIT	RR			

RELIEF REQUEST #EP-2

VALVE: EP-8956A, B, C, D

CATEGORY: A,C

CLASS: 1

FUNCTION: Opens on flow from the cold leg accumulators to provide flow to the reactor coolant system cold legs.

TEST REQUIREMENT: Exercise check valve (full stroke) to the position required to fulfill its function every 3 months.

BASIS FOR RELIEF: These valves cannot be full or part stroke exercised during power operation since cold leg accumulator pressure (approximately 600 psig) cannot overcome Reactor Coolant System pressure. Exercising these valves during cold shutdown could result in a low temperature overpressurization of the Reactor Coolant System.

ALTERNATE TESTING: A different valve of this group will be disassembled, inspected, and manually full stroked every other refuel until the entire group has been tested (see Justification #V08). If the full stroke capability of the disassembled valve is in question the remainder of valves in this group will be disassembled, inspected, and manually full stroked during the same refuel outage.

ALTERNATIVE TO CHECK VALVE
FULL FLOW TESTING JUSTIFICATION
#VO7

VALVE: BB-V-0001,0022,0040,0059
BB-8948A,B,C,D
BB-8949A,B,C,D
EJ-8841A,B
EM-V-0001,0002,0003,0004
EP-V-0010,0020,0030,0040
EP-8818A,B,C,D

CATEGORY: A,C

CLASS: 1

FUNCTION: These valves open to provide cooling or recirculation flow from the Emergency Core Cooling System.

TEST REQUIREMENT: Measure flow through each individual valve to ensure it strokes open and passes accident level flows.

JUSTIFICATION FOR ALTERNATE TESTING USING ACOUSTIC MONITORING TECHNIQUES:

As described in Generic Letter 89-04, an acceptable method for verifying a check valve's full stroke to the open position is to pass accident level flows through the valve. However, knowledge of only the total flow through multiple parallel lines does not provide verification of flow rates through the individual valves and consequently does not represent a valid full stroke exercise.

Callaway currently has several configurations where total flow to multiple leg ECCS injection lines, containing the subject valves which require full open position indication verification, is measured; however, the individual leg flowrates are not measured. It is impractical to measure the individual leg flowrates for several reasons. First, no permanently installed flow instrumentation exists for these systems; therefore, temporary instrumentation would need to be installed. This would require considerable time and incur unnecessary radiation exposure. Furthermore, a high

likelihood of personnel contamination exists since a system breach is required for flow indicator installation. Another problem is the lack of adequate pressure reduction flow measuring devices. The Residual Heat Removal System does not have flow elements, but instead uses a flow orifice in each leg to prevent system pump run-out.

Since measuring the flowrate in each individual injection line of the aforementioned ECCS configuration is impractical an alternate method of proving these check valves full open is proposed using acoustic monitoring techniques. The proposed alternative involves the use of Liberty Technology Center's Quickcheck system. The acoustic monitoring testing will be performed with total header flow established at accident levels for ECCS multiple leg check valves. An acoustic signal designating a metal to metal impact of the check valve disc/plunger striking its backseat will be used to verify that the check valve strokes full open. A program verifying this equipment's capabilities was conducted by the Nuclear Industry Check Valve Group (NIC) at the Utah State University flow test loop as witnessed by various representatives from the Nuclear Reactor Regulators. Extensive testing was performed on various valves to verify the test equipment could indicate full open position and detect internal valve degradation.

The acoustic monitoring equipment consists of accelerometer field sensors and a portable data acquisition unit used in conjunction with computer based data analysis software. The data acquisition equipment will be calibrated on an 18-month frequency to meet the National Bureau of Standards criteria. This frequency is chosen to parallel the 18-month refueling outage schedule.

The nature of acoustic monitoring testing for check valves is non-intrusive to avoid disassembly and inspection. This test methodology is used to determine if the valve is in good working order and therefore baseline disassembly is unnecessary. The test engineers responsible for acoustic data review have been trained by vendor representatives so that accurate interpretations can be obtained. The week long course gives signal analysis training which is based on prototype testing performed at the NIC Phase I testing at the Utah State University flow loop.

Acceptance criteria for check valve full open testing is based on several factors. First, a raw acceleration spike in engineering units of earth accelerations must exist. This spike should be accompanied by a characteristic structural "ringdown" signal. This ringdown signal is shown by a time-dependent acoustic signal decay and is representative of a metal to metal impact. Finally, a corresponding spike in the high frequency component of the raw acceleration must exist. This vendor specific high frequency component is indicative of metal to metal impacting as proven by the NIC Phase I testing at Utah State University.

JUSTIFICATION #V08

JUSTIFICATION FOR THE EXTENSION OF THE DISASSEMBLY INTERVAL OF THE ACCUMULATOR CHECK VALVES

ASME XI Section IWV-3522 requires check valves to be exercised to the positions in which they perform their safety functions to verify their operability. A check valve's full stroke to the open position may be verified by passing the maximum required accident flow through the valve. However, passing design basis accident flow is impractical for certain valves - this is the case with the Callaway Safety injection Accumulator Discharge Check Valves (EP-8956A,B,C,D). Therefore, Relief Request #EP-2 was granted to allow the use of disassembly/inspection to verify the open capability of these check valves. This relief request requires disassembly/inspection of one Accumulator Discharge Check Valve each refueling outage. Generic Letter 89-04 states that extending the check valve disassembly interval to one valve every other Refuel may be considered in cases of extreme hardship where the extension is supported by actual in plant data from previous testing. To justify this extension the licensee needs to develop the following information:

a. Disassemble and inspect each valve in the valve grouping and document in detail the condition of each valve and the valves capability to be full-stroked.

b. A review of industry experience, for example, as documented in NPRDS, regarding the same type of valve used in similar service.

c. A review of the installation of each valve addressing the "EPRI Applications Guidelines for Check Valves in Nuclear Power Plants" for problematic locations.

This document provides the information to support the extension of the Accumulator Discharge Check Valve disassembly interval.

The disassembly of the Accumulator Discharge Check Valves is considered an extreme hardship for the following reasons. The main hardship involves maintaining radiation exposure ALARA. During Refuel 5 a total of 1.298 man-rem was expended performing the disassembly/inspection surveillance of Accumulator Discharge Check Valve Loop C (EP-8956C). Exposure data for previous Refuels is not available as this exposure was included with similar work being performed in the same area. Health Physics considers 1.298 man-rem to be a mid-range value with respect to the exposure that would be expended to disassemble and inspect the other loop valves. The A&B loops would probably require less exposure and D loop require more exposure than the mid-range value given above. Additionally, disassembling these valves requires the core to be off-loaded with a freeze seal installed or the RCS level must be at mid-loop. Finally, these valves are hard to get at and require scaffolding which interferes with other work in containment adding to the time and radiation exposure required to complete other jobs.

All of the Accumulator Discharge Check Valves have been disassembled/inspected on a refueling interval (one valve per refuel). There was free movement of the disk/clapper arm during all of these surveillances. There were no problems affecting the open capability of these valves. During the most recent disassembly (EP-8956C), measurements of the hinge pin and bearing block were recorded (this was the first surveillance in which these measurements were recorded). The vendor drawing shows a manufactured hinge pin diameter of 0.715 to 0.716 inches and a bearing block hole diameter of 0.718 to 0.725 inches. The measurements obtained during the surveillance were 0.713" on both sides of the hinge pin and 0.722" for both bearing block hole diameters. This shows that little or no wear has occurred, which is especially significant as this is the last valve in the group to be disassembled.

Callaway's Accumulator Discharge Check Valves are Westinghouse 10" swing check valves. A review of the industry experience with the same type of valves has been done using NPRDS. There have been no failures with respect to the open capabilities of this type valve. The only failures identified were leaks (body/bonnet and disc/seat). These failures have no bearing on the extension of the valve disassembly interval as these failures would be identified without disassembling the valve.

The "EPRI Guidelines for Check Valves in Nuclear Power Plants" has been reviewed for problematic locations of these valves. Problematic locations are configurations/ applications that could cause or accelerate wear. The two main areas addressed are incorrect valve application/installation and wear due to the existence of flow disturbances near the check valve. Neither of these two situations pose a concern since these valves are correctly applied and installed. Also, these valves are normally maintained in the closed position and are not subject to accelerated wear caused by disk flutter from inadequate flow or upstream disturbances.

RELIEF REQUEST #BB-12

VALVE: BB-8378A,B
BB-8379A,B

CATEGORY: B,C

CLASS: 1

FUNCTION: Close to maintain RCS pressure boundary

TEST REQUIREMENT: Exercise check valve to the position required to fulfill its safety related function every 3 months.

BASIS FOR RELIEF: Testing these check valves in the safety related direction requires isolating the normal or alternate charging paths. The normal charging path is in continuous operation with the alternate charging line as a backup. These valves are located behind the bioshield and entry behind the bioshield during normal power operation would cause unnecessary radiation exposure and would not support ALARA. Also, failure of one of these valves during testing at normal operation could cause a LOCA.

ALTERNATE TESTING: Valves will be exercised to their safety related closed position during reactor refueling outages.

RELIEF REQUEST #P07

SYSTEM: Safety Related

COMPONENT: All pumps listed in the program except PJE01A & B

CLASS: 2 & 3

FUNCTION: To provide flow to safety related systems

TEST REQUIREMENT: The full-scale range of each instrument shall be 3 times the reference value or less.

BASIS FOR RELIEF: Vibration analyzers generally have multiple over-lapping scales rather than a single full scale range. For vibrations in the lowest range of Table IWP 3100-2, when $0 \leq Vr \leq 0.5$ mil, if a gauge of 3 Vr were used we would not be able to reach the Required Action Range of > 1.5 mil. It is not feasible, for example, to require a meter with a range of 0 - 0.6 mils for a reference vibration of 0.2 mils when Alert range is 1.0 - 1.5 mils. On digital vibration meters that have autoscaling capabilities the subject full scale range requirements are not applicable.

ALTERNATE TESTING: Will use either analog vibration meters with multiple over-lapping scales, the actual scale used will be determined by the amplitude of the vibration for each test or digital vibration meters meeting the required accuracy.