

DUKE POWER COMPANY
McGUIRE NUCLEAR STATION
PUMP INSERVICE TESTING PROGRAM
ASME SECTION XI, SUBSECTION IWP

The inservice testing of ASME Code Class 1, 2, and 3 pumps provided with an emergency power source will be tested as required by Section XI, Subsection IWP, of the ASME Boiler and Pressure Vessel Code 1977 Edition and Addenda through summer 1978, except where specific written relief has been granted by the Commission. A description of the proposed inservice testing program, as well as specific requests for relief from code requirements determined to be impractical, is described by the following.

- I. The following specific requests for relief from certain code requirements are to be applicable for all pumps.
 - A) IWP-4120 requires the full scale range of each instrument to be three times the reference value or less. This was changed from four times the reference value in the edition of Section XI that was in effect prior to unit licensing. 10CFR, Section 50.55a(g)(4) states that design provisions are excluded from the requirement to upgrade to subsequent editions of Section XI. Since any cases where the three-times reference value criterion is not met would require design changes in instrumentation, we will continue to apply the four-times reference value criterion, as interpreted in B) below, for instrument accuracy evaluation.
 - B) In several cases, instrumentation does not meet the four times reference value criterion. These cases predominantly involve suction pressure gauges where a larger range is required to accommodate varying conditions at the suction of the pump. In all cases where the four-times reference value criterion cannot be met, an instrument error evaluation is performed to demonstrate that the overall accuracy of the differential pressure measurement is within the limits established by IWP.
 - C) Table IWP-3100-1 establishes the parameters that are to be measured. The previous edition of Section II specified that in a fixed resistance system, either ΔP or Q was to be measured, not both. There are two systems that are tested using fixed resistance flow paths, with no flow indication provided. Based on the design change exclusion provided by 10CFR50.55a(g)(4), we will continue to apply the criterion that it is not required to measure flow in a fixed resistance system.
 - D) IWP 4320 provides that the temperature of the pumped liquid be recorded. Since this value is not used in determining the acceptability of the pump, and has in fact been deleted from later revisions of the code, we do not plan to record this parameter.

REV. 2

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II. The following Safety Class 1, 2, and 3 pumps (See Attachment #1 for specific safety class and available instrumentation) will be tested in accordance with the intent of Subsection IWP of the ASME code:

NUCLEAR SERVICE WATER PUMPS (1A, 1B)
CONTAINMENT SPRAY PUMPS (1A, 1B)
SAFETY INJECTION PUMPS (1A, 1B)
MOTOR-DRIVEN AUX. FEEDWATER PUMPS (1A, 1B)
TURBINE-DRIVEN AUX. FEEDWATER PUMP (NO. 1)
CENTRIFUGAL CHARGING PUMPS (1A, 1B)
COMPONENT COOLING PUMPS (1A1, 1A2, 1B1, 1B2)
FUEL POOL COOLING PUMPS (1A, 1B)

III. The following Safety Class 1, 2, and 3 pumps (See Attachment #1 for specific safety class and available instrumentation) will be tested in accordance with the intent of Subsection IWP, except for the request for relief for the specific requirements determined to be impractical as described below.

A) PUMP:	BORIC ACID TRANSFER PUMPS (1A, 1B)
SAFETY CLASS:	3
FUNCTION:	Boric Acid Tank recirculation, boric acid makeup and boric acid delivery to Centrifugal Charging pump suction
TEST REQUIREMENT:	<ol style="list-style-type: none">1. Measure pump bearing temperature during inservice testing.2. Annually, run pump until bearing temperatures stabilize.3. Observe proper lubricant level or pressure during inservice testing.
BASIS FOR RELIEF:	<p>There is no instrumentation installed to measure pump bearing temperature. The subject pump/motor is of the completely enclosed "canned" type and therefore no meaningful temperature data can be obtained from pump surface temperature.</p> <p>There is no lubricant level or pressure indication associated with the subject pumps as they are lubricated by the boric acid solution which they pump.</p>
ALTERNATE TESTING:	<p>The inservice testing of the Boric Acid Transfer pumps will be in accordance with the intent of subsection IWP except for the following exceptions:</p> <p style="padding-left: 40px;">Bearing temperature will not be monitored and subsequently the pumps will not annually be run until temperature stabilization. The mechanical condition of the pumps will be determined from vibration data.</p>

Lubricant level or pressure will not be observed as they are not applicable to this pump design.

- B) PUMP: CONTROL AREA CHILLED WATER PUMPS (CRA-P-1, CRA-P-2)
- SAFETY CLASS: 3
- FUNCTION: To provide chilled water to air handling units supplying control area air conditioning.
- TEST REQUIREMENT:
1. Measure pump bearing temperature during inservice testing.
 2. Annually run pumps until bearing temperatures stabilize.
- BASIS FOR RELIEF: There is no instrumentation installed to measure bearing temperature, and no meaningful data can be obtained from bearing housing surface temperature measurements.
- ALTERNATE TESTING: The inservice testing of the Control Area Chilled Water Pumps will be in accordance with the intent of Subsection IWP except that bearing temperature will not be monitored and subsequently the pumps will not be run annually until bearing temperatures stabilize. The mechanical condition of the subject pumps will be determined from vibration data.
- C) PUMP: BORON INJECTION RECIRCULATION PUMPS (1A, 1B)
- SAFETY CLASS: 3
- FUNCTION: Recirculation of boric acid through Boron Injection Tank.
- TEST REQUIREMENT:
1. Measure pump bearing temperature during inservice testing.
 2. Annually run pump until bearing temperatures stabilize.
 3. Observe proper lubricant level or pressure during inservice testing.
- BASIS FOR RELIEF: There is no instrumentation installed to measure pump bearing temperature. The subject pump/motor is of the completely enclosed "canned" type and therefore no meaningful temperature can be obtained from pump surface temperature.

There is no lubricant level or pressure associated with the subject pumps as they are lubricated by the boric acid solution which they pump.

ALTERNATE TESTING:

The inservice testing of the Boron Injection Recirculation Pumps will be in accordance with the intent of subsection IWP except for the following exceptions:

Bearing temperature will not be monitored and subsequently the pumps will not annually be run until bearing temperatures stabilize. The mechanical condition of the pumps will be determined from vibration data.

Lubricant level or pressure will not be observed as they are not applicable to this pump design.

- IV. The following Safety Class 1, 2, and 3 pumps are provided with insufficient instrumentation to perform any meaningful testing in accordance with the intent of Subsection IWP and therefore the following alternate testing methods, as well as requests for relief from compliance with Subsection IWP, are described by the following.

A) PUMP: D/G JACKET WATER HEATER CIRCULATING PUMPS (1A, 1B)
D/G JACKET WATER PUMPS (1A, 1B)
D/G INTERCOOLER WATER PUMPS (1A, 1B)
D/G LUBE OIL FILTER PUMPS (1A, 1B)
D/G BEFORE AND AFTER LUBE OIL PUMPS (1A, 1B)
D/G FUEL OIL TRANSFER PUMPS (1A, 1B)
D/G FUEL OIL BOOSTER PUMPS (1A, 1B)

SAFETY CLASS: 3 (All pumps)

FUNCTION: Diesel generator auxiliary support

TEST REQUIREMENT: Test pumps in accordance with Subsection IWP

BASIS FOR RELIEF: Pumps contain insufficient instrumentation (See Attachment #1) to perform any meaningful testing in accordance with the intent of Subsection IWP.

ALTERNATE TESTING: Monthly Diesel Generator starting and loading as required by McGuire Technical Specifications is sufficient in assessing the hydraulic condition of the subject auxiliary pumps and demonstrating the capability of the individual components to perform their design function.

The mechanical condition of the subject pumps will be determined from vibration data to be gathered monthly.

- B) PUMP: D/G ROOM SUMP PUMPS (1A2, 1A3, 1B2, 1B3)
- SAFETY CLASS: 3
- FUNCTION: Water removal from Diesel Generator rooms
- TEST REQUIREMENT: Test pumps in accordance with Subsection IWP
- BASIS FOR RELIEF: Pumps contain insufficient instrumentation. (See Attachment #1) to perform any meaningful testing in accordance with Subsection IWP.
- ALTERNATE TESTING: Due to the anticipated infrequent normal operation of these pumps, quarterly, each pump will be verified to be capable of performing their design function of removing water from the sump at a rate greater than or equal to 419 gpm.
- C) PUMP: GROUND WATER DRAINAGE PUMPS (A, B IN SUMP A; A, B IN SUMP B; A, B IN SUMP C)
- SAFETY CLASS: 3
- FUNCTION: Removal of station ground water
- TEST REQUIREMENT: Test pumps in accordance with Subsection IWP
- BASIS FOR RELIEF: Pumps contain insufficient instrumentation (See Attachment #1) to perform any meaningful testing in accordance with Subsection IWP.
- ALTERNATE METHOD: No alternate testing proposed. The ability of these pumps to perform their design function is assured by observations that acceptable sump levels are being maintained during routine plant inspections.
- D) PUMP: A/C SYSTEM COMPRESSOR OIL PUMPS (CRA-C-1, CRA-C-2)
- SAFETY CLASS: 3
- FUNCTION: Control Room area air conditioning chiller auxiliary support.
- TEST REQUIREMENT: Test pumps in accordance with Subsection IWP.
- BASIS FOR RELIEF: Pumps contain insufficient instrumentation (See Attachment #1) to perform any meaningful testing in accordance with Subsection IWP.

ALTERNATE TESTING:

No alternate testing proposed. The ability of these pumps to perform their design function is assured by acceptable Control Room area chiller operation, as these chillers are in operation almost continuously during normal plant operation.

SAFETY RELATED CLASS 1, 2 AND 3 PUMPS PROVIDED WITH AN
EMERGENCY POWER SOURCE

PUMPS	SAFETY CLASS	TEST FREQUENCY	SPEED, N	INLET PRESSURE, P_i	DIFF. PRESSURE, ΔP	FLOW RATE, Q	VIB. AMPLITUDE, V	LUBRICANT LEVEL	BEARING TEMP., T_b	DISCHARGE PRESSURE, P_d	DUKE FLOW DIAGRAM
Nuclear Service Water Pumps (1A, 1B)	3	MO	NR	X	X	X	X(1)	X	X	X	MC-1574-1.1
Containment Spray Pumps (1A, 1B)	2	MO	NR	X	X	X	X(1)	X(3)	X(2)	X	MC-1563-1.1
Residual Heat Removal Pumps (1A, 1B)	2	MO	NR	X	X	X	X(1)	X(3)	X(2)	X	MC-1561-1.0
Safety Injection Pumps (1A, 1B)	2	MO	NR	X	X	X	X(1)	X	X	X	MC-1562-3.0
M/D Aux. Feedwater Pumps (1A, 1B)	3	MO	NR	X	X	X	X(1)	X	X	X	MC-1592-1.1
T/D Aux. Feedwater Pump (No. 1)	3	MO	X	X	X	X	X(1)	X	X	X	MC-1592-1.1
Cent. Charging Pumps (1A, 1B)	2	MO	NR	X	X	NR	X(1)	X	X	X	MC-1554-3.1
Component Cooling Pumps (1A1, 1A2, 1B1, 1B2)	3	MO	NR	X	X	X	X(1)	X	X	X	MC-1573-1.0
Fuel Pool Cooling Pumps (1A, 1B)	3	MO	NR	X	X	X	X(1)	X	X	X	MC-1570-1.0
Boric Acid Transfer Pumps (1A, 1B)	3	MO	NR	X	X	NR	X(1)	-	-	X	MC-1554-5.0
Control Area Chilled Water Pumps (CRA-P-1,2)	3	MO	NR	X	X	X	X(1)	X	-	X	MC-1618-1.0
Boron Injection Recirc. Pumps (1A, 1B)	3	MO	NR	X	X	X	X(1)	-	-	X	MC-1562-1.0
A/C System Compressor Oil Pump (CRA-C-1,2)	3	-	NR	-	-	-	-	-	-	X	MC-1618-4.0
D/G Jacket Water Heater Circ. Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-1.0, 1.1

System: Main Steam
Main Steam Vent To Atmosphere
Flow Diagram: MC-1593-1.0
Revision: 6
Change Order: 10

VALVE NUMBER	CLASS	COORDINATES	VALVE CATEGORY							SIZE (INCHES)	VALVE TYPE	ACTUATOR TYPE	NORMAL REQUIREMENTS	TEST REQUIREMENTS	RELIEF REQUEST	TESTING ALTERNATIVE	REMARKS
			A	B	C	D	E	NS	OC								
1CA-111	3	B-6					X			4	GA	M	LC	PC			
1CA-112	3	B-8					X			4	GA	M	LC	PC			
1CA-59	3	D-1					X			4	GA	M	LO	PC			
1CA-60	3	G-1		X						4	GA	AD	O	MT Q			
1CA-61	2	H-1			X					4	CK	SA	O	MT Q			
1CA-62A	2	I-1		X						4	GA	EL	O	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-66A	2	J-1		X						4	GA	EL	O	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-65	2	K-1			X					4	CK	SA	O	MT Q			
1CA-64	3	L-4		X						4	GA	AD	O	MT Q			
1CA-63	3	L-6					X			4	GA	M	LO	PC			
1CA-55	3	C-2					X			4	GA	M	LO	PC			
1CA-56	3	C-4		X						4	GA	AD	O	MT Q			

VALVE NUMBER	CLASS	COORDINATES	VALVE CATEGORY							SIZE (INCHES)	VALVE TYPE	ACTUATOR TYPE	NORMAL REQUIREMENTS	TEST REQUIREMENTS	RELIEF REQUEST	TESTING ALTERNATIVE	REMARKS
			A	B	C	D	E	NS	OC								
1CA-57	2	C-6			X					4	CK	SA	0	MT Q			
1CA-58A	2	D-7		X						4	GA	EL	0	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-54A	2	G-7		X						4	GA	EL	0	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-53	2	H-7			X					4	CK	SA	0	MT Q			
1CA-52	3	K-7		X						4	GA	AD	0	MT Q			
1CA-51	3	K-7					X			4	GA	M	LO	PC			
1CA-43	3	C-12					X			4	GA	M	LO	PC			
1CA-44	3	C-11		X						4	GA	AD	0	MT Q			
1CA-45	2	C-9			X					4	CK	SA	0	MT Q			
1CA-46B	2	D-8		X						4	GA	EL	0	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-50B	2	G-8		X						4	GA	EL	0	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-49	2	H-8			X					4	CK	SA	0	MT Q			

VALVE NUMBER	CLASS	COORDINATES	VALVE CATEGORY							SIZE (INCHES)	VALVE TYPE	ACTUATOR TYPE	NORMAL REQUIREMENTS	TEST REQUIREMENTS	RELIEF REQUEST	TESTING ALTERNATIVE	REMARKS
			A	B	C	D	E	NS	OC								
1CA-48	3	I-8		X						4	GA	AD	0	MT Q			
1CA-47	3	K-8					X			4	GA	M	LO	PC			
1CA-39	3	D-13					X			4	GA	M	LO	PC			
1CA-40	3	G-13		X						4	GA	AD	0	MT Q			
1CA-41	2	H-13			X					4	CK	SA	0	MT Q			
1CA-42B	2	I-13		X						4	GA	EL	0	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-38B	2	J-13		X						4	GA	EL	0	CT Q	X	CT CS	10 seconds maximum op. time 2
1CA-37	2	I-13			X					4	CK	SA	0	MT Q			
1CA-36	3	L-10		X						4	GA	AD	0	MT Q			
1CA-35	3	L-9					X			4	GA	M	LO	PC			

TESTING ALTERNATIVE

RELIEF REQUEST

TEST REQUIREMENTS

NORMAL REQUIREMENTS

ACTUATOR TYPE

VALVE TYPE

SIZE (INCHES)

VALVE
CATEGORY

OC

NS

E

D

C

B

A

COORDINATES

CLASS

VALVE
NUMBER

REMARKS

2

Isol. Time <15 second

RF*

LT

0

EL

GA

4

CT

Q

2

K-12

X

X

2

INF-233B

2

Isol. Time <15 second

RF*

LT

0

P

GA

4

CT

Q

2

K-13

X

X

2

INF-234A

2

Isol. Time <15 second

RF*

LT

0

P

GA

4

CT

Q

2

H-13

X

X

2

INF-228A

Valve has been deleted.

1

INF-235

MT

Q

-

SA

CK

4

LT

X

X

X

2

F-13

X

2

INF-229

RF*

VALVE NUMBER	CLASS	COORDINATES	VALVE CATEGORY							SIZE (INCHES)	VALVE TYPE	ACTUATOR TYPE	NORMAL REQUIREMENTS	TEST REQUIREMENTS	RELIEF REQUEST	TESTING ALTERNATIVE	REMARKS
			A	B	C	D	E	NS	OC								
INI-154	2	I-2						X		1	GL	AD	C				Not required for reactor shutdown/accident consequences
INI-216	2	H-3							X	3/4	GL	M	C				
INI-183B	2	G-3		X						12	GA	EL	C	CT Q			20 seconds maximum op. time Valve is de-energized during op. per Tech. Specifications. 2
INI-210	2	D-7							X	3/4	GL	M	C				
INI-152B	2	D-6	X	X						4	GA	EL	C	CT Q			10 seconds maximum op. time Valve is de-energized during op. per Tech. Specifications.*
INI-211	2	D-6							X	3/4	GL	M	C				
INI-416	2	D-5							X	1	GL	M	C				
INI-420	2	D-5							X	1	GL	M	C				
INI-390	2	D-4							X	1	GL	M	C				
INI-389	2	D-4							X	1	GL	M	C				
INI-153	2	D-4						X		2	GL	AD	C				Not required for reactor shutdown/accident consequences
INI-158	2	C-4					X			2	GL	M	LO	PC			1

*Leak test per Technical
Specification

VALVES: IVP1B, IVP2A, IVP3B, IVP4A, IVP6B, IVP7A, IVP8B, IVP9A, IVP10A, IVP11B, IVP12A, IVP13B, IVP15A, IVP16B, IVP17A, IVP18B, IVP19A, IVP20B

CATEGORY: A

CLASS: 2

FUNCTION: Provide containment isolation

TEST REQUIREMENT: Cycle and time valves every 3 months.

BASIS FOR RELIEF: Technical Specification 4.6.3.4 requires a leak rate test on these valves whenever they are cycled. In addition, Technical Specification 4.6.1.9 places severe restrictions on the operational time and alignment permitted for this system during normal operation. Because of these restrictions, it is not practical to cycle and time these valves quarterly.

ALTERNATE TESTING: Valves will be timed whenever the system is operated or whenever the valves are cycled, and the elapsed time since the previous test has been 3 months or greater.

PUMPS	SAFETY CLASS	TEST FREQUENCY	SPEED, N	INLET PRESSURE, P _i	DIFF. PRESSURE, ΔP	FLOW RATE, Q	VIB. AMPLITUDE, V	LUBRICANT LEVEL	BEARING TEMP., T _b	DISCHARGE PRESSURE, P _d	DUKE FLOW DIAGRAM
D/G Jacket Water Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-1.0, 1.1
D/G Intercooler Water Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-1.0, 1.1
D/G Lube Oil Filter Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-2.0, 2.1
D/G B&A Lube Oil Filter Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-2.0, 2.1
D/G Fuel Oil Transfer Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-3.0, 3.1
D/G Fuel Oil Booster Pumps (1A, 1B)	3	MO	NR	-	-	-	X(1)	-	-	X	MC-1609-3.0, 3.1
D/G Room Sump Pumps (1A2, 1A3, 1B2, 1B3)	3	QU	NR	-	-	-	-	-	-	X	MC-1609-7.0
Ground Water Drainage Pumps (A, B in Sump A; A, B in Sump B; A, B in Sump C)	3	-	NR	-	-	-	-	-	-	-	MC-1581-1.0

NOTES

1. Vibration to be measured with portable instrumentation (Accuracy +20%).
2. Pump contains no bearings, but is close coupled, therefore motor bearings will be monitored.
3. Pump is close coupled, therefore motor lubricant level will be observed.

LEGEND

X - Instrumentation	MC - Monthly
- - Instrumentation not available	QU - Quarterly
NR - Not required for IWP Compliance	() - Note