Entergy

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Robert Walpole
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February 28, 2008

Re: Indian Point Unit 2
Docket No. 50-247

NL-08-047

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Response to Request for Additional Information Regarding Inservice Testing Program Relief Request P-1 for Recirculation Pump Testing (TAC MD7517)

Reference:
1. Entergy Letter NL-07-157 dated December 18, 2007 regarding Relief Request P-1 For Recirculation Pump Testing
2. NRC Letter on Request for Additional Information Regarding Relief Request for Containment Recirculation Pumps (TAC MD7517) dated February 21, 2007

Dear Sir or Madam:

Entergy Nuclear Operations, Inc (Entergy) requested relief (Reference 1), in accordance with 10 CFR 50.55a(a)(3)(i), from ASME OM Code requirements for the fourth 10-year pump and valve inservice testing program to allow alternative testing of the Containment Recirculation Pumps. The NRC staff has requested additional information, Reference 2. Entergy is providing this information in Attachment 1 and Enclosure 1.

There are no new commitments identified in this submittal. If you have any questions or require additional information, please contact Mr. R Walpole at (914) 734-6710.

Sincerely,

Robert Walpole
Licensing Manager
Indian Point Energy Center

cc: next page

A047
NRR

Attachment:

1. IPEC RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING RELIEF REQUEST P-1 FOR RECIRCULATION PUMP TESTING

Enclosure:

1. SHOP TEST RAW DATA

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
Mr. Samuel J. Collins, Regional Administrator, NRC Region 1
NRC Resident Inspector, IP2
Mr. Paul D. Tonko, President NYSERDA
Mr. Paul Eddy, New York State Dept. of Public Service

Attachment 1 to NL-08-047

IPEC RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING RELIEF REQUEST P-1 FOR RECIRCULATION PUMP TESTING

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO 50-247

RAI P-1-01

Per Section 5.10 of NUREG-1482, Rev. 1, "Guidelines for Inservice Testing at Nuclear Power Plants," please provide the following for each containment recirculation pump (21RP and 22RP):

(a) The estimated cost of any temporary or permanent system modification required to enable a comprehensive pump test (CPT) to be performed at ±20 percent of pump design flow, along with any difficulty associated with implementing the modification.

(b) Provide all details (e.g., temporary modifications of piping, containment sump, etc.), including pump performance curves, if a full-flow test was performed during preservice or service of the plant.

(c) The pump performance curve was submitted with the relief request. Provide any other data associated with the pumps' shop testing provided by the manufacturer.

(d) Provide the records and history of maintenance and repairs performed on each pump.

Response

(a) The planned modification involves a change to the plant that will increase the test line piping size from 2" to 6" and route it into the pump well. The modification is estimated at $1,400,000. The difficulties associated with implementing the modification are, 1) direct interference with installation of the Internal Recirculation (IR) sump strainer water box. Strainer water box installation involves repair of through wall bolt hole leaks (8). The repair will be performed in the pump well and about half of the test line piping and supports are located inside the pump well. 2) installation of the test line is in close proximity to LT-3301 (safety related level instrument that supports post LOCA recirculation). 3) Long lead materials. 4) the new 6" test line will penetrate the IR sump strainer waterbox installed during 2R17 to support closure of GL 2004-02. The test line is subject to thermal movement that will have to be accounted for in order to maintain the allowable gap size in the water box.

(b) The SI recirculation pumps were replaced in 1999. An in-situ full flow test has never been performed for these pumps.

(c) Raw data from the vendor tests in provided in Enclosure 1.

(d) The records and history of maintenance and repairs performed on each pump.

21 Recirculation Pump Maintenance History		
WR No.	***Date***	***Work Description***
IP2-00-13798	05-16-2000	Pump and Motor Replacement - Mod
IP2-99-08171	05-15-2000	Performed motor meggar-PM
IP2-02-60101	11-24-2002	Inspected Recirc. Pump Sump for debris
IP2-00-18293	10-31-2002	Re-greased inboard and outboard motor
IP2-04-33034	11-14-2004	Pump packing adjusted per vendor recommendation
IP2-04-30669	11-11-2004	Adjusted packing gland nuts to achieve full thread engagement.
IP2-03-15175	11-03-2004	Performed Motor Current Analysis - PM
IP2-02-59720	11-07-2004	Performed 24 month motor lube -PM
IP2-04-30049	04-24-2006	Performed Motor Current Analysis - PM
IP2-04-30504	04-30-2006	Performed 24 month motor lube -PM
22 Recirculation Pump Maintenance History		
WR No.	***Date***	***Work Description***
IP2-00-13799	05-16-2000	Pump and Motor Replacement - Mod
IP2-99-08172	05-16-2000	Performed motor meggar-PM
IP2-00-18294	10-27-2002	Re-greased inboard and outboard motor
IP2-04-33035	11-14-2004	Pump packing adjusted per vendor recommendation
IP2-04-19661	11-14-2004	Adjusted packing gland nuts to achieve full thread engagement.
IP2-03-15176	11-03-2004	Performed Motor Current Analysis- PM –UNSAT. Test was re-performed with different test equipment - SAT
IP2-02-59719	11-07-2004	Performed 24 month motor lube -PM
IP2-04-30191	04-24-2006	Performed Motor Current Analysis - PM
IP2-04-30494	04-30-2006	Performed 24 month motor lube -PM

RAI-P-1-02

Provide justification that pump degradation can be adequately assessed at the proposed CPT flow rate.

Response

The pump test flow will be set at approx. 300 gpm which is an increase over the previous flow rate of 160 gpm. The higher flow rate will not introduce a risk of pump damage due to cavitation caused by high return flow.

To provide additional assurance that both the pump and motors are operationally ready; the following predictive maintenance tasks will be performed during the unit-2 refueling outage:

1) Motor Current Analysis will be performed on each motor from there respective breakers. The analysis examines the motor for: winding resistance, insulation resistance, polarization index, and motor circuit evaluation. This methodology is used to detect

degraded insulation, high resistance shorts and grounds, and the integrity of all motor connections.

2) Vibration Spectral Analysis- this type of test will detect both mechanical and electrical degradation during pump run.

RAI-P-1-03

Provide information to show that the pumps will not be adversely affected by operating at the proposed CPT flow rate.

Response

The proposed CPT flow rate would be no less than 300 gpm and models indicate it could be as high as 500 gpm with test valve 1803 wide open. According to the manufacturer's minimum flow requirements, the SI recirculation pumps are capable of operating at 200 gpm for up to 3 hours (Report IP-RPT-08-00009, "Engineering Study for Minimum Flow Evaluation- Safety Injection Recirculation Pumps," January 2008). During surveillance testing, these pumps are in service for no longer than 1/2 hour.

Enclosure 1 to NL-08-0

SHOP TEST RAW DATA

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO 50-247

Cameron Pump Division INGERSOLL-RAND COMPANY Performance Test Record

Orifice No. 606	Orifice Meter Reading	320	403	430	468	499	535	545		
Meter Coef. 8.1	Corrected Orifice Meter Reading	8.1	8.1	8.1	8.1	8.1	8.1	8.1		
Orifice No. 0556	Suction Air Flow -	49	50.3	51.1	53.7	54.5	55.4	54		45
Elbow Coef. 0	Corrected Orifice Meter Reading									
Pipe Size 24x12	Orifice Meter Reading +	3.0	8.7	1.3	.9	.3	—	—		
	TH FT	282.1	362.5	388.3	423.3	452.9	487.7	499.1		
TOTAL HEAD @ 1170 = FT		269.0	345.7	370.3	403.6	431.9	465	475.9		
ΔP "H2O		105.4	61.4	47.8	31	11.4	.6	0		
97993-1										
GPM		4534.4	3528	3113.2	2507.2	1520.3	348	0		
TEST POINT		1	2	3	4	5	6	7		
TOTAL GPM @ 1170		4428	3445.7	3040.2	2448.4	1484.7	340.6	0		
WATER H.P.		323.0	322.9	305.2	268.0	173.8	42.8	—	WHP = TH x GPM / 3960	
Torque Meter 76	As Read INCH LBS	22080	20200	19680	17920	13820	10520	10360		
Test Speed 16	RPM 2 or 8.1	1197	1197	1197	1197	1197	1198	1198		
BRAKE H.P.		419.3	392.3	373.7	340.3	262.4	199.9	195.0	BHP = TOR x RPM / 5025	
BRAKE HP @ 1170		390.5	365.4	348.1	316.9	244.4	186.2	181.6		
LOOP OF		69	69	69	69	69	69	69		
EFFICIENCY %		77.0	88.3	81.6	78.7	66.2	21.4	—	EFF = WHP / BHP	
VIBRATION TOP MOTOR 2958	PARALLEL	MILS		1.2			1.3	1.3		
	RESPONSE	(TOTAL)		2.1			1.0	1.0		
STUFFING BOX	PARALLEL			.5			.4	.5		
	RESP			.9			.5	.5		

SPECS

Driver 350 HP M	NOTES 1000 HP TEST MOTOR	S/N 0799008	Pump Desc. 26 TAPKD 3	Date 12-20-9		
Lubes	Temps	N.V.D. 050-33168	E. .01	Customer CON ED.		
Gravity	Visc	G.P.M. 3000	TDH 360	R.P.M. 1170	Eff. 80	
Tested By	Approved By *DEAN SHAH	Inspector CERTIFIED	Date			

CAMERON PUMP DIVISION INGERSOLL-RAND COMPANY NPSH TEST RECORD

Section											
HEAD	Gage No. 0606	Disch. Hd. As Read.	203	258	252	250	246	239	231	223	190
	Elev. Corr. 8.1	Corr. Gage & Elev.	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
	Gage No. 0556	Suction as Read	-10.5	-15.1	-20.5	-22.3	-24.35	-25.9	-26.5	-27.0	-27.0
	Elev. Corr. 0	Corr. Gage & Elev.									
	Pipe Size 24 X 12	Change in Vel. Hd.	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
		TOTAL HD FT	284.6	284.2	283.6	283.4	281.4	275.9	268.6	261.1	230.3
	TOTAL HEAD - FT. @1170		271.9	271.0	270.4	270.2	268.4	263.1	256.1	249	219.6
	RPM		1197	1197	1197	1197	1197	1197	1197	1167	1?7
CAPACITY	ΔP " H_2O		100.8	101	101	101	101	100.8	100.6	100.?	100
		°F	69	69	69	69	69	69	69	69	69
	TOTAL GPM		4520	4520	4520	4520	4520	4520	4520	4520	4520
	TOTAL GPM @ 1170		4418	4418	4418	4418	4418	4418	4418	4418	4418
NPSH		Atm. Press. In. Hg	29.92	=	BAROMETER						
		Vapor Press. In. Hg —	314								
	Water Temp. Deg. F	ATM-V.P.	28.486	=	INCHES OF	MERCURY					
	69	Equiv. Ft. H_2O	32.27	32.27	32.27	32.27	32.27	32.27	32.27	32.7	??
	Suction Pipe Dia. 24	Velocity Hd.-Ft. +	.1	.1	.1	.1	.1	.1	.1	.1	.1
		Total-Ft.	32.37	32.37	32.37	32.37	32.37	32.37	32.37	32.37	32.3
	Suction Pressure (Ft.) {+} {-}		-10.5	-15.1	-20.50	-22.30	-24.35	25.8	26.5	27	27.05
	NPSHR - FT.		21.87	17.21	11.87	10.07	8.02	6.57	5.87	5.37	5.32
		ELEV +	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24	4.24
		NPSH-FT	26.11	21.51	16.11	14.31	12.26	10.81	10.1	9.61	9.5
		NPSH@1170	24.94	20.55	15.39	13.67	11.71	10.32	9.65	9.18	9.13

SPECS						
Driver 350 HPM		Notes	S/N 099108	Pump Desc. 267 APKD3		Date 12-?-?
Liquid	Temp.		B.O. 050-33168	It. .01	Customer CON ED	
Gravity 1.0	Visc.	DEAN SHAH Dean Shah (On 9d)	GPM 3000.	TDH 360	R.P.M. 1170	Eff. 80
Tested By DH	Appvd. By	NPSHR=ATM-V.P. + V.H. $\pm P_c$	Impeller		Dia.	

CERTIFIED