~~9/9/05 IP2-02-54811~~
IP2-02-55448

P/P

9/10/05

Entergy
Nuclear Northeast

One Site, One Team, One Fleet
Indian Point Energy Center

Procedure Use Is:	Control Copy: ________
☑ Continuous	
☐ Reference	Effective Date: 9/2/2005
☐ Information	Page 1 of 17

2-PT-3Y010, Revision 2
FLOW TEST FOR UNDERGROUND SERVICE WATER LINE 409

Indian Point Operations

Approved By:

JK Seabold
Procedure Sponsor, RPO/Designee Date

Team 2C
Procedure Owner

PARTIAL REVISION

REVISION SUMMARY

(Page 1 of 1)

1.0 REASON FOR REVISION

1.1 Upgrade procedure format to comply with IP-SMM-AD-104, IPEC Procedure Writing Manual.

1.2 Incorporate feedback IP2-6354.

2.0 SUMMARY OF CHANGES

2.1 Revised as necessary to remove all gray shading used to identify ITS changes and to delete previous P&L 3.1 and any text identified as CTS. This change is editorial in nature per Step 4.6.4 of IP-SMM-AD-102. (No change bars used)

2.2 Revised previous sections/steps as required to comply with new IPEC PT format. This change is editorial in nature per Step 4.6.14 of IP-SMM-AD-102. (No change bars used)

2.3 Deleted previous P&L 2.5, which stated: This test shall be performed by Certified Level I OR Level II examiners. There are no visual examinations performed in this test. (IP2-6354) This change is editorial in nature per Step 4.6.12 of IP-SMM-AD-102. (No change bar used)

2.4 Step 4.3.3: Changed reduction in Expected Pump Flow for 2 pump operation to obtain Minimum Expected Pump Flow from 3% to 15%. 15% provides sufficient assurance of flow. The criteria for the corresponding procedures at Unit 3, 3-PT-CS032A & B, have been changed to 15% based on the same reasoning. (IP2-6354)

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Atttachments

None

1.0 PURPOSE

1.1 This procedure establishes requirements for demonstrating integrity of the underground portion of Service Water Line 409 (1, 2, 3 header) through performance of a flow test in accordance with ASME Section XI.

1.2 This procedure applies to the underground portion of Service Water Line 409.

2.0 PRECAUTIONS AND LIMITATIONS

2.1 Precautions and Limitations

2.1.1 This test may be performed when the Service Water System is aligned for either Two or Three Header Operation.

2.1.2 WHEN data is being collected, THEN only two Essential Service Water Pumps (SWP) SHALL be in service.

2.1.3 Proper radiological precautions SHALL be observed when performing this test. IF necessary, THEN an RWP SHALL be obtained.

2.1.4 The Service Water Intake Bay is a FME area that requires enhanced controls per IP-SMM-MA-118, Foreign Material Exclusion. The Cognizant Supervisor SHALL conduct a pre-job brief regarding FME controls.

2.2 General Information

2.2.1 Personnel performing this test SHALL read it in its entirety prior to the start of testing.

2.2.2 Test personnel SHALL complete Sections 3.0, 4.0, 5.0, 6.0, and 7.0, as applicable.

2.2.3 Any discrepancies found SHALL be identified in the Comments, Section 5.0.

2.2.4 This test establishes a flow into underground lines and determines flow out. This is done in lieu of hydrostatic or other VT-2 type types due to IWA-5244 for buried piping systems. WHEN field data has been taken, THEN measured flow is compared with the known flow from pump curve information in order to find the deviation from expectation. IF flow at loads is much less than expected flow, THEN excessive leakage through piping or valves may be occurring. This may require further diagnosis in the next outage of sufficient duration.

2.2.5 This test requires that Service Water flow from the Service Water Pumps be obtained using test data and a composite pump curve for two pump operation. The use of a composite curve constructed from manufacturer data and test data is too difficult to arrange in advance for each possible pump variation prior to the test. Therefore, the curve is constructed after the data is obtained. This construction can be expected to take the next working day after field data is obtained.

2.2.6 Apart from this required testing, there are additional evaluations which are routinely made concerning this particular buried pipe. The IST Engineer may elect to provide an overview of current observations and activities in Section 8.1. Some topics for discussion include:

- The performance of any interior or exterior pipe inspections in support of Generic Letter 89-13. Also, additional examinations of this pipe planned or scheduled in the future.
- Inability of the system to maintain flow to loads as specified in station documents.
- Unexpected up-welling of water in the Transformer Yard or other locations related to this pipe.
- Any problems with this pipe known or monitored by System Engineering.

2.2.7 The test requires that Service Water flow for the Fan Cooler Units and Emergency Diesel Generators be recorded. IF instrumentation is NOT available, THEN alternate instrumentation must be installed or the test can NOT be relied upon to accurately reflect load conditions.

2.2.7.1 WHEN the flow to a particular load is between 1% and 3% of the expected total flow in two pump operation (i.e. between 100 gpm and 300 gpm), THEN it is permissible to use the last recorded flow if either of the following conditions apply: Either the flow is maintained by locked valves or the flow is maintained with valves fully open. IF neither of these conditions can be met, THEN the flow path shall be instrumented in this test. The last recorded flow must come from a controlled source such as a Surveillance Test or Post Work Test. These conditions are evaluated by the IST Engineer in the body of the test.

2.2.7.2 WHEN the flow to a particular load is less than 1% of the expected total flow in two pump operation (i.e. less than 100 gpm), THEN it is permissible to use the expected design flow provided by the System Engineer for that load. IF this flow is a range, THEN the minimum flow SHALL be used since that is the conservative flow in this case. These conditions are evaluated by the IST Engineer in the body of the test.

2.2.8 This test SHALL be performed by Certified Level I or Level II examiners.

2.2.9 Test equipment may be installed in advance of the procedure step requiring installation.

Initials

3.0 PREREQUISITES

3.1 Equipment required for test:

EQUIPMENT	SERIAL No. or M&TE No.	CAL DUE DATE	INITIALS
21 FCU SW Flow	FI-5028A	* 10-28-06	CJB
22 FCU SW Flow	FI-5032A	* 10-28-06	CJB
23 FCU SW Flow	FI-5026A	* 10-28-06	CJB
24 FCU SW Flow	FI-5030A	* 10-28-06	CJB
25 FCU SW Flow	FI-5034A	* 10-28-06	CJB
FCU Combined Motor Cooler Flow Out	FI-1130	* UT installed IP2 03 05354	CJB
SW Header Pressure	PI-1190R	* ~~5-26-~~ 9-27-05	CJB
EDG SW Flow	FIC-5919	* 7-12-07	CJB
Tethered Ruler	N/A	N/A	CJ

* For installed instrumentation, this may be performed by verifying NO overdue calibration PMs or surveillances exist and documenting this in Section 5.0, Comments.

3.2 Reason for Test – CHECK applicable listing:

☒ Normal Surveillance WR # IP2 - 02 - 54811

☐ Post Maintenance Test WR # ______

WR # ______

WR # ______

☐ Increased Test Frequency WR # ______

☐ Other ______ CJ

3.3 COORDINATE installation of Ultrasonic Flow Meters (UT) with Programs and Components Engineering (P&CE): CJ

Initials

3.4 The IST Engineer (ISTE) shall make the following determinations within seven days prior to the test:

3.4.1 IF FI-1130, total Service Water flow for the Fan Cooler Unit Motors (30 - 300 gpm) is NOT available, THEN PERFORM one of the following:

3.4.1.1 ENTER the last recorded flow and the source document for this flow:

Last recorded flow: N/A gpm

Source Document for last recorded flow: N/A — CJH ISTE

The path is UT instrumented currently due to indication problem.

OR

3.4.1.2 SPECIFY that flow path be instrumented with an ultrasonic flow meter. — CJH ISTE

3.4.2 PERFORM one of the following:

3.4.2.1 ENTER the last recorded total flow for all three Zurn Strainers for this undergroud line and the source document for this flow:

Last recorded total flow: ~~476~~ 349 Note 2 gpm CJH

Source Document for last recorded flow: IP2 Zurn Blowdown Flow dated 8-18-05 — CJH ISTE

OR

3.4.2.2 SPECIFY that flow paths be instrumented with an ultrasonic flow meters (21SWPS, 22SWPS, 23SWPS). N/A — CJH ISTE

Initials

3.4.3 RECORD the following for each load with an expected Service Water Flow less than 100 gpm:

Load	Minimum Design Flow	Source Document
IACC HX	72 GPM	DBD SW Table 1-2
Rod Monitors	30 GPM	DBD SW Table 1-2
Chlorine & Zebra Musc.	10 GPM	DBD SW Table 1-2

CJS
ISTE

3.5 DETERMINE flow penalty based on total of Recorded and Design Flows in Step 3.4.~~3~~:TYPO CT

Flow Penalty: ~~588~~ 461 gpm

NOTE 2
CT

CJD
ISTE

Initials

4.0 PROCEDURE

4.1 Initial Conditions

4.1.1 OBTAIN permission from SM or Designated Alternate to perform test.

5/5/05

SM or Des. Alt. Signature / Date

4.2 Flow Test Instructions

> **NOTE**
>
> Service Water Pumps SHALL be operated per 2-SOP-24.1, Service Water System Operation, during this test.

4.2.1 ENSURE two Service Water pumps are in operation on the Essential Header.

4.2.2 CIRCLE two operating Service Water Pumps below:

21 22 23

4.2.3 IF UT installation is required by Step 3.4.1.2, THEN INSTALL UT on Combinded FCU Motor Cooler Outlet Line.

4.2.4 IF UT installation is required by Step 3.4.2.2, THEN INSTALL UT on each Service Water Pump Zurn Strainer Blowdown Pipe on the 1-2-3 Header (3 total). N/A

4.2.5 Using a tethered ruler RECORD tide level to nearest inch by measuring from center line of Discharge Pipe to water surface.

Tide Level: 6 ft. 8 in.

Initials

4.2.6 RECORD Unit 2 Inlet River Water Temperature from River Water Temperature Monitoring System (Point 2) in CCR or at 15' monitor at condenser inlet (Fluke).

River Water Temp: 81.4 °F

4.2.7 RECORD As Found Essential Service Water Header Pressure indicated on PI-1190R on CCR Panel SJF.

SW Header Pressure: 92 psig

4.2.8 RECORD Zurn ΔP and SWP discharge pressure for 21, 22, and 23SWPs:

Pump	Differential Pressure			Discharge Pressure		
21SWP	DPI-5000S	3.4	psid	PI-1193	97	psig
22SWP	DPI-5001S	N/A	psid	PI-1192	N/A	psig
23SWP	DPI-5002S	3.4	psid	PI-1181	95	psig

4.2.9 RECORD FCU Service Water flows:

Description	Instrument	As Found Flow
21 FCU SW Flow	FI-5028A	1380 gpm
22 FCU SW Flow	FI-5032A	1320 gpm
23 FCU SW Flow	FI-5026A	1360 gpm
24 FCU SW Flow	FI-5030A	1380 gpm
25 FCU SW Flow	FI-5034A	1300 gpm
Total Flow		6740 gpm

Initials

4.2.10 RECORD FCU Motor Cooler Service Water flow:

Indication Source: FI-1130 or UT (CIRCLE one)

FCU Mtr Clr SW Flow: 377.7 gpm

dam

4.2.11 RECORD EDG Service Water flow indicated on FIC-5919 in EDG Bldg:

EDG SW Flow: 1850 gpm

SK

4.2.12 IF UT was installed on each SWP Zurn Strainer Blowdown Pipe in Step 4.2.4, THEN RECORD Service Water flows through each Zurn Strainer blowdown line:

Description	As Found Flow
21SWPS Flow	N/A gpm
22SWPS Flow	N/A gpm
23SWPS Flow	N/A gpm

N/A

4.2.13 IF UT was installed on Combinded FCU Motor Cooler Outlet Line in Step 4.2.3, THEN REMOVE UT from Combinded FCU Motor Cooler Outlet Line.

N/A (1)

4.2.14 IF UT was installed on each SWP Zurn Strainer Blowdown Pipe in Step 4.2.4, THEN REMOVE UT from each SWP Zurn Strainer Blowdown Pipe.

N/A

4.2.15 FORWARD test to IST Engineer to complete calculations.

Initials

4.3 Calculations

4.3.1 COMPLETE the following and SUM the flow readings and penalties:

Total FCU Flow measured in this test: 6740 gpm

EDG Flow measured in this test: 1850 gpm

Zurn Flow (if measured in this test): — gpm

Total FCU Motor Cooler flow (if measured in this test): 377.7 gpm

Total Penalty Flow from Step 3.5: ~~588~~ ~~349~~ 461 gpm NOTE 2 cj

Sum of Total Load Flow: ~~9556.7~~ gpm 9428.7 NOTE 2 cj ISTE

4.3.2 RECORD Expected Pump Flow for 2 pump operation:

Expected Pump Flow for 2 pump operation: 9204 gpm ISTE

4.3.3 REDUCE Expected Pump Flow for 2 pump operation by 15% to obtain Minimum Expected Pump Flow:

Minimum Expected Pump Flow: 7823 gpm ISTE

ATTACH sufficient documentation to this test to validate the record (e.g. Manufacturer Pump Curve, Vendor data, etc.). ISTE

4.3.4 COMPARE Total Load Flow to Minimum Expected Pump Flow and VERIFY Total Load Flow is greater than or equal to Minimum Expected Pump Flow:

SAT UNSAT ISTE

RETURN test to FSS for normal test closeout. ISTE

5.0 COMMENTS

(1) PREVIOUSLY INSTALLED FOR DSR-5 READINGS

(2) REDUCED FLOW TO SHOW ONLY THE TWO IN-SERVICE STRAINERS (21 AND 23) [illegible] 9-19-05

Test Performers:

Print Name:	Initials:	Signature/Date:
S. MATTESON	[illegible]	[illegible] 9-10-0.
P. CAMPBELL	[illegible]	[illegible] 9/10/05
D. Caffery	[illegible]	[illegible] 9/10/05
Don Dewey	[illegible]	[illegible] 9/10/05
SEATH Hurbanek	[illegible]	[illegible] 9/10/05

6.0 ACCEPTANCE CRITERIA

6.1 IST Program Requirements

Component	Step	Surveillance Requirement	Acceptance Criteria	Actual	Acceptable	Initials
Total Load Flow	4.3.4	ASME Section XI	Total Load Flow ≥ Min. Expected Pump Flow	SAT / UNSAT	YES NO	

7.0 TEST ACCEPTANCE

7.1 IST Program Acceptance Criteria

7.1.1 Based on recorded data, are all Acceptance Criteria of Section 6.1 satisfied?

YES NO

7.1.2 IF required acceptance criteria is NOT met, THEN:

- NOTIFY CRS/SM.
- INITIATE a CR.

7.2 IF NO is circled in Step 7.1.1, THEN LIST corrective actions taken and comments:

Comments: None

Reviewed By: 9/19/05
SM or Des. Alt. / Date

8.0 EVALUATION

8.1 IST EVALUATION

Comments: SAT

Reviewed By: Chris Bergner 10-17-05
IST Engineer / Date

8.2 PROGRAMS AND COMPONENTS REVIEW

Comments: None

Reviewed By: 10/17/05
Programs and Components Review / Date

9.0 REFERENCES

9.1 Commitment Documents

None

9.2 Development Documents

9.2.1 9321-F-2722, Flow Diagram Service Water System Nuclear Steam Supply Plant Sheet 1 of 2

9.2.2 A209762, Flow Diagram Service Wtr Sys Nuclear Stm Supply Plant Sheet 2 of 2

9.3 Interface Documents

9.3.1 2-SOP-24.1, Service Water System Operation

9.3.2 ASME Section XI

9.3.3 Generic Letter 89-13

9.3.4 IP-SMM-MA-118, Foreign Material Exclusion

10.0 RECORDS AND DOCUMENTATION

10.1 Records

The following required records are generated by this procedure and SHALL be maintained in accordance with IPEC Records Retention Schedule:

10.1.1 WHEN completed, THEN this Performance Procedure becomes a Quality Record.

10.2 Documentation

The following documentation resulting from this procedure are NOT required to be controlled and maintained in accordance with the IPEC Records Retention Schedule.

None

PEER REVIEW SHEET

PROCEDURE NUMBER: 2-PT-3Y010

DATE PERFORMED: ____________

	YES	NO*	N/A
1. Calibration due dates recorded?	✓		
2. Instrument(s) within calibration?	✓		
3. Changes documented by TPC?			✓
4. All required procedural steps completed?	for OPS		
5. All steps NOT completed noted & explained in Comments Section?			✓
6. All corrections lined out, dated and initialed?	✓		
7. All calculations correct?	✓		
8. All data properly transcribed?	✓		
9. Required CRs, WOs, PFs or CTSs, etc. initiated?			
10. Operability conclusions correct?			■
11. Overall acceptance conclusions correct?			■

* Explain all NOs

COMMENTS:

procedure not completed yet.
ISTE to complete

PEER REVIEWER: [illegible] 9/12/15
Signature/Date

Evaluation to Determine Expected SW Flow During Surveillance Test PT-3Y10
Flow Test for Underground Service Water Line 409

The pumps in service for the test were 21SWP (97JC1705S) and 23SWP (97JC1704S).

Per PT-3Y10, the recorded river water level during the test was 6 feet 8 inches below the centerline of the pump discharge pipe. An overall distance of 9 feet was used for the difference between river level and strainer gauges.

Per PT-3Y10, the 21SWP discharge pressure (PI-1193) was 97 psig, and the 23SWP discharge pressure (PI-1181) was 95 psig.

The discharge pressure in feet is;
21 SWP: 2.31 X 97 psig ~ 224 ft
23 SWP: 2.31 X 95 psig ~219 ft

The total lift is;
21 SWP: 224 ft + 9 feet = 233 ft
23 SWP: 219 ft + 9 feet = 228 ft

The flow data around the test point:

21 SWP: 4232 gpm at 242.32 ft and 4606 gpm at 220.68 ft

374 gpm / 21.64 f = 17.28 gpm/ft [233 ft -220.68 ft =12.32 ft ; 12.32 ft x 17.28 gpm/ft ~213 gpm ; 4606 gpm -213 gpm = 4393 gpm]

Interpolated Flow = <u>4393</u> gpm

23 SWP: 4606 gpm at 233.56 ft and 4842 gpm at 227.16 ft

236 gpm / 6.4 ft = 36.9 gpm/ft [228 ft -227.16 ft = 0.84 ft ; 0.84 ft x 36.9 gpm/ft = 31 gpm ; 4842 gpm – 31 gpm = 4811 gpm]

Interpolated Flow is <u>4811</u> gpm

Total SW flow is 4393 gpm + 4811 gpm = 9204 gpm

Acceptance criteria is to be within 15% of estimated pump flow. The acceptance criteria is:

<u>7823 gpm</u>

Chris Bergren
IPEC IST
9/15/2005

From: Meek, Brian
Sent: Thursday, August 18, 2005 2:45 PM
To: Galati, Anthony; Beasley, Thomas J. (IPEC); Scott, Benjamin
Cc: Vasely, Michael; Studley, Paul; McCarthy, Brian P.
Subject: Zurn Blow Down Flows

The following are the current Unit 2 Zurn Blowdown settings. 23 is the only valve currently not replaced by the MOD. As can be seen, all are within acceptable tolerances for operation.

Brian Meek

Unit 2 Zurn Blowdown Flows Following Valve Replacement

	21	22	23	24	25	26
Date	8/18/2005	8/18/2005	8/18/2005	8/18/2005	8/18/2005	8/18/2005
DP - psid	3.2	3.5	3.4	3.8	4	4.6
Flow - gpm	244	127	105	210	238	223
Pressure - psig	94	94	95	82	81	83
Header	Essential	Essential	Essential	Non-essential	Non-essential	Non-essential
CCR Header Pressure - psig	91	89	89	73	73	73

21 SWP 9/10/05

THIS DRAWING CONTAINS ITEMS WHICH MUST BE CONTROLLED WITHIN CON EDISON AS:
"CLASS A" ITEMS
PER CI-240-1

JOHNSTON PUMP COMPANY
PERFORMANCE TEST SET-UP AND TEST DATA SHEET

TC No.: 8320 Rev: 0
Job Number: 97JC1705S
Customer: Consolidated Edison - Indian Point 2
Model / Stages: 18EC / 2
Test Imp. Dia [in]: 13.25
Job Imp. Dia [in]: 0
TBF / CL.: 3/32" / Polished (Both Impellers)
Imp. Material: A744-CF3M
Bowl Material: A744-CF3M
Bowl Coating: None
Suction: Bell
Test D. Head: Lab 16" Discharge Head
Test Col.: Job Column
Test Constants:
Flow: 1735.271
Head: 2.31

Pipe Dia. @ Gage [in]: 16

Water To Floor [in]: 12
Floor To Gauge [in]: 60

psi tap on Bowl or head Bowl

Motor H.P. / R.P.M.: 500 / 1770
PH / CY / V: 3 / 60 / 2300
Motor S / N: MMJ122024
Job OR Lab Motor: Lab
Wattmeter No.: #3A
Test line Size [in]: 16
Orifice Diameter [in]: 10.9135
Pressure Gage [psi]: 0 - 200
Impeller Adjustment: Two Turns

DESIGN @ R.P.M.: 1775
G.P.M.: 5000
Head [ft]: 220
B.H.P.: 0
Efficiency: 0.00
Specific Gravity 1:
Specific Gravity 2:
Item No.:
Fluid: 0.00
Application:
End User: 0.00
Site:
Tag:
Take Shut - Off (Yes / No): YES

Water Temperature: 0

Comments: Test the bowl assy using the job column and a lab discharge head at full speed with a test lab motor.

21.64 374 .058

Test Procedure #: JP-TP-0060 Rev #6
#1. Calibration of pressure gauges to be done before and after each test or series of test (not to exceed two weeks)

Serial Number: 97JC1705S
Job Number: 97JC1705S
Chattanooga P.O. Number: TE-14216
Customer P.O. Number:
POF Number: SJC66623
Project Manager:

Test Point #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Delta "P" [inHg]	8.6	0.8	2.0	3.5	5.0	6.5	7.7	8.5	9.3	10.2	12.5	15.0	17.0	0.0
Gallons Per Minute	5089	1552	2454	3248	3880	4424	4815	5059	5292	5542	6135	6721	7155	0
Gage Reading [psi]	92.8	130.5	121.3	112.0	105.7	102.9	97.5	93.2	89.5	85.0	72.7	58.2	46.0	146.0
Head [ft]	214.4	301.5	280.2	258.7	244.2	237.7	225.2	215.3	206.7	196.4	167.9	134.4	106.3	337.3
Gage Elev.Corr. [ft]	6.00	6.00	6.00	6.00	-6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Velocity Head Loss [ft]	1.0	0.1	0.2	0.4	0.6	0.8	0.9	1.0	1.1	1.2	1.5	1.8	2.0	0.0
Total Head [ft]	222.5	307.7	286.7	265.6	251.4	245.3	233.2	223.4	215.1	204.9	177.0	144.2	116.5	343.3
Watt Reading [kW]	273.8	221.2	229.5	240.2	251.5	264.5	270.0	273.1	276.4	279.0	280.1	275.2	270.2	207.3
Input H.P.	367.0	296.5	307.6	322.0	337.1	354.6	361.9	366.1	370.5	374.0	375.5	368.9	362.2	277.9
Motor Efficiency	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
B.H.P.	348.7	280.8	291.6	305.6	320.3	336.8	343.8	347.8	352.0	355.3	356.7	350.5	344.1	262.6
Test R.P.M.:	1786.0	1789.0	1786.0	1787.0	1787.0	1786.0	1786.0	1786.0	1786.0	1786.0	1785.0	1785.0	1786.0	1789.0
ORIGINAL TEST DATA														
Rated R.P.M.:	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775
Gallons Per Minute:	5057	1540	2438	3225	3854	4397	4786	5028	5259	5508	6101	6683	7111	0
Total Discharge Head [ft]:	219.78	302.86	282.56	262.05	248.06	242.32	230.30	220.68	212.43	202.38	175.07	142.57	115.06	337.91
B.H.P.@ 1.0 Sp.Gr.:	342.3	274.3	285.3	299.4	313.9	330.6	337.5	341.4	345.5	348.8	350.7	344.6	337.8	256.5
B.H.P.@ Sp.Gr.1:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bowl Efficiency:	0.820	0.429	0.609	0.713	0.769	0.814	0.825	0.821	0.817	0.807	0.769	0.698	0.612	0.000

NEW DATA BASED ON FLOW CORRECTION

Rated R.P.M.:	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775
Gallons Per Minute:	4868	1482	2345	3103	3709	4232	4606	4839	5062	5301	5872	6432	6844	0
Total Discharge Head [ft]:	219.78	302.86	282.56	262.05	248.06	242.32	230.30	220.68	212.43	202.38	175.07	142.57	115.06	337.91
B.H.P.@ 1.0 Sp.Gr.:	342.3	274.3	285.3	299.4	313.9	330.6	337.5	341.4	345.5	348.8	350.7	344.6	337.8	256.5
B.H.P.@ Sp.Gr.1:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bowl Efficiency:	0.789	0.413	0.586	0.686	0.740	0.783	0.794	0.790	0.786	0.777	0.740	0.672	0.589	0.000

Tested By: Darryl Clark
Witnessed By:

Certified By: Terrel Graham RHD
Date of Test: March 23, 1998

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18EC-2_97JC1705S_SJC66623_TC8320_new.xls

18EC-2_97JC1705S_SJC66623_TC8320_new.xls

CONSOLIDATED EDISON CO.
NUCLEAR POWER ENGINEERING

APPROVED

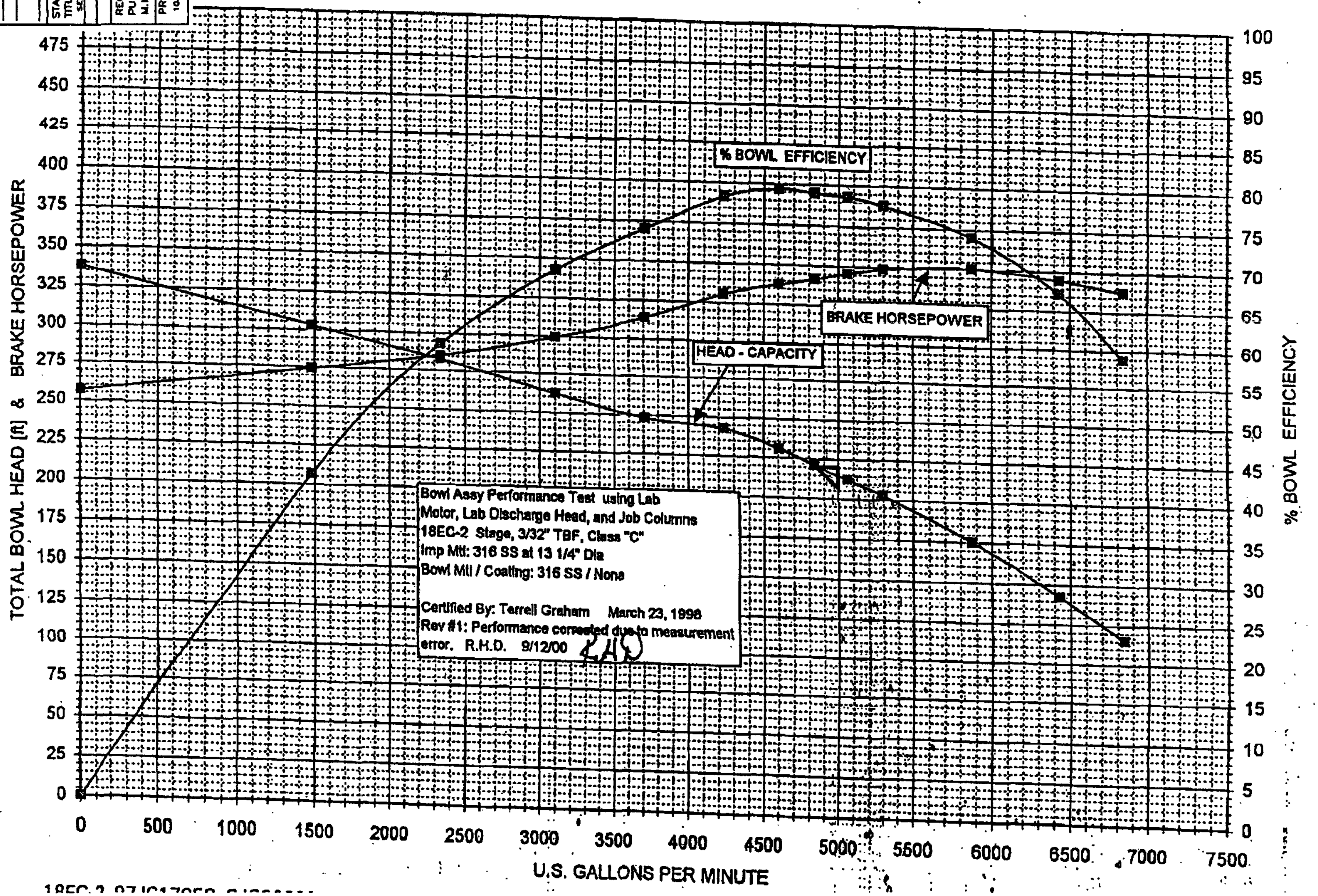
X FINAL
WITH NOTATIONS INDICATED
PROCEED WITH FABRICATION
REVISED DWG. FOR RECORD
NOT APPROVED
REVISED DWG. REQUIRED

STATION: INDIAN POINT UNIT NO. 2
TITLE: PUMP CURVE AND PERFORMANCE TEST SET-UP AND TEST DATA SHEET FOR 22SWP PUMP
MOD PROC. NO. FMX-98-10376-M
REQ.
PUR. ORD.
M.M. ITEM
PROJ. NO. 10376-94 | DESIGN | ENGINEER G. BHALLA

Johnston Pump Company

Brookshire, Texas
Customer: Consolidated Edison - Indian Point 2
Job # 97JC1705S TC #: 8320, Rev: 1
1775 rpm

TAG NO. 22SWP
MF NO. 2001MB0288



235WP 9/10/05

THIS DRAWING CONTAINS ITEMS WHICH MUST BE CONTROLLED WITHIN CON EDISON AS:
"CLASS A" ITEMS
PER CI-240-1

JOHNSTON PUMP COMPANY

PERFORMANCE TEST SET-UP AND TEST DATA SHEET

TC No.: TC-8278
Job Number: 97JC1704S
Customer: Consolidated Edison - Indian Point 2
Model / Stages: 16EC / 2
Test Imp. Dia [in]: 13.25 Inlet Modified per
Job Imp. Dia [in]: 0 Dwg#: 71287-B
TBF / CL.: 3/32" / Polished (Both Impellers)
Imp. Material: A744-CF3M
Bowl Material: A744-CF3M
Bowl Coating: None
Suction: Bell
Test D. Head: Lab 16" Discharge Head
Test Col.: Job Column
Test Constants:
Flow: 1735.271
Head: 2.31

Pipe Dia. @ Gage [in]: 16

Water To Floor [in]: 10
Floor To Gauge [in]: 60

psi tap on Bowl or head Bowl

Motor H.P. / R.P.M.: 500 / 1770
PH / CY / V: 3 / 60 / 2300
Motor S / N: MMJ122024
Job OR Lab Motor: Lab
Wattmeter No.: #3A
Test line Size [in]: 16"
Orifice Diameter [in]: 10.9135
Pressure Gage [psi]: 0 - 200
Impeller Adjustment: Two Turns

DESIGN @ R.P.M.: 1775
G.P.M.: 5000
Head [ft]: 220
B.H.P.:
Efficiency:
Specific Gravity 1:
Specific Gravity 2:
Item No.:
Fluid:
Application:
End User:
Site:
Tag:
Take Shut - Off (Yes / No): YES

Water Temperature: 0

Comments: Test the bowl assy using the job column and a lab discharge head at full speed with a test lab motor.

~~2.81~~ ~~225~~ 28.93
.336 52.5
6.4

Test Procedure #: JP-TP-0048 Rev #6
#1. Calibration of pressure gauges to be done before and after each test or series of tests (not to exceed two weeks)

Serial Number: 97JC1704S
Job Number: 97JC1704S
Chattanooga P.O. Number: TE-13780
Customer P.O. Number:
POF Number: SJC66581

Project Manager:

Test Point #	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Delta "P" [inHg]	8.6	0.8	2.0	3.5	5.0	6.5	7.7	8.5	9.3	10.2	12.5	15.0	17.0	0.0
Gallons Per Minute	5089	1552	2454	3246	3880	4424	4815	5059	5292	5542	6135	6721	7155	0
Gage Reading [psi]	96.0	133.5	123.5	114.0	107.5	105.0	99.0	96.0	92.0	88.5	76.0	61.0	48.0	148.0
Head [ft]	221.8	308.4	285.3	263.3	248.3	242.6	228.7	221.8	212.5	204.4	175.6	140.9	110.9	341.9
Gage Elev.Corr. [ft]	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83	5.83
Velocity Head Loss [ft]	1.0	0.1	0.2	0.4	0.6	0.8	0.9	1.0	1.1	1.2	1.5	1.8	2.0	0.0
Total Head [ft]	229.7	314.4	291.6	270.1	255.4	250.0	236.5	229.7	220.7	212.8	184.5	150.5	120.9	347.7
Watt Reading [kW]	277.8	224.5	229.2	242.3	256.5	268.1	274.3	277.0	281.1	283.4	285.4	280.4	273.8	210.8
Input H.P.	372.4	300.9	307.2	324.8	343.8	359.4	367.7	371.3	376.8	379.9	382.6	375.9	367.0	282.6
Motor Efficiency	1.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9
B.H.P.	353.8	285.3	291.4	308.2	326.6	341.4	349.3	352.7	358.0	360.9	363.4	357.1	348.7	267.3
Test R.P.M.:	1787.0	1790.0	1789.0	1788.0	1787.0	1787.0	1786.0	1785.0	1785.0	1786.0	1785.0	1785.0	1786.0	1789.0
ORIGINAL TEST DATA														
Rated R.P.M.:	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775
Gallons Per Minute:	5055	1539	2435	3223	3854	4394	4786	5031	5262	5508	6101	6683	7111	0
Total Discharge Head [ft]:	226.66	309.18	287.08	266.15	251.99	246.67	233.56	227.16	218.21	210.20	182.44	148.80	119.46	342.29
B.H.P.@ 1.0 Sp.Gr.:	346.7	278.2	284.6	301.6	320.1	334.6	342.9	346.9	352.0	354.3	357.4	351.1	342.3	261.1
B.H.P.@ Sp.Gr.1:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bowl Efficiency:	0.835	0.432	0.620	0.718	0.768	0.818	0.823	0.832	0.824	0.825	0.786	0.715	0.627	0.000

NEW DATA BASED ON FLOW CORRECTION

Rated R.P.M.:	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775	1775
Gallons Per Minute:	4865	1481	2343	3102	3709	4229	4606	4842	5065	5301	5872	6432	6844	0
Total Discharge Head [ft]:	226.66	309.18	287.08	266.15	251.99	246.67	233.56	227.16	[illegible]	210.20	182.44	148.80	119.46	342.29
B.H.P.@ 1.0 Sp.Gr.:	346.7	278.2	284.6	301.6	320.1	334.6	342.9	346.9	[illegible]	354.3	357.4	351.1	342.3	261.1
B.H.P.@ Sp.Gr.1:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00	0.00	0.00	0.00
Bowl Efficiency:	0.803	0.416	0.597	0.691	0.737	0.787	0.792	0.801	[illegible]	0.794	0.757	0.688	0.603	0.000

Tested By: Ray Dumesnil
Witnessed By:

Certified By: Terral Graham RHD
Date of Test: February 11, 1998

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16EC-2_97JC1704S_SJC66581_TC8278_new.xls

CONSOLIDATED EDISON CO.
NUCLEAR POWER ENGINEERING
APPROVED
X FINAL
WITH NOTATIONS INDICATED
PROCEED WITH FABRICATION
REVISED DWG. FOR RECORD
NOT APPROVED
REVISED DWG. REQUIRED

STATION: INDIAN POINT UNIT NO. 2
TITLE: PUMP CURVE AND PERFORMANCE TEST SET-UP AND TEST DATA SHEET FOR 23SWP PUMP
MOD PROC. NO. FMX-96-10376-M
REQ.
PUR. ORD.
M.M. ITEM
PROJ. NO. 10376-94 | DESIGN | ENGINEER G. BHALLA

Johnston Pump Company

Brookshire, Texas
Customer: Consolidated Edison - Indian Point 2
Job # 97JC1704S TC #: 8278 Rev: 1
1775 rpm

TAG NO. 23SWP
MF NO. 2001MB0286