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July 26, 2006
L-06-090

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

Subject: **Beaver Valley Power Station, Unit No. 1**
BVPS-1 Docket No. 50-334, License No. DPR-66
Proposed Alternative to American Society of Mechanical Engineers Code Pump Test Requirements
(Request No. PRR-12)

Pursuant to 10 CFR 50.55a(a)(3)(ii), FirstEnergy Nuclear Operating Company (FENOC) hereby requests NRC approval to use alternative test requirements for the quench spray pumps. The pump tests are to be performed during the fourth ten-year inservice test interval (to begin September 20, 2007) for Beaver Valley Power Station (BVPS) Unit No. 1. The details of the 10 CFR 50.55a request are enclosed.

FENOC anticipates submittal of the fourth ten-year interval inservice test program for NRC review no later than March of 2007. Although requirements in the 2004 Edition of the ASME Code for Operation and Maintenance of Nuclear Power Plants will not be applicable until the start of the fourth ten-year inservice test interval, FENOC requests approval of the alternative as soon as practicable, since plant modifications will be necessary (during the BVPS Unit No. 1 maintenance and refueling outage scheduled for September 2007) if the alternative is not approved. If the alternative is granted it will be implemented concurrently with the inservice test program for the fourth ten-year inservice test interval.

No new regulatory commitments are contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Gregory A. Dunn, Manager, FENOC Fleet Licensing at (330) 315-7243.

Sincerely,

James H. Lash

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Enclosure: 10 CFR 50.55a Request No. PRR-12 - Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii)

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Senior Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
Mr. D. A. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

Enclosure to Letter L-06-090

10 CFR 50.55a Request No. PRR-12, Revision 0

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii)

--Hardship or Unusual Difficulty
without a Compensating Increase in Level of Quality or Safety--

1.0 ASME CODE COMPONENTS AFFECTED

1QS-P-1A and 1QS-P-1B; Quench Spray Pumps, Code Class 2

2.0 APPLICABLE CODE EDITION AND ADDENDA

ASME Code for Operations and Maintenance of Nuclear Power Plants (ASME OM Code) 2004, No Addenda

3.0 APPLICABLE CODE REQUIREMENTS

ISTB-3100, "Preservice Testing," Paragraph ISTB-3100(a) requires preservice testing of centrifugal pumps to be performed in accordance with ISTB-5110, "Preservice Testing." Paragraph ISTB-5110(a) states that in systems where resistance can be varied, flow rate and differential pressure shall be measured at a minimum of five points. If practicable, these points shall be from the pump minimum flow rate to at least the design flow rate. A pump curve shall be established based on the measured points. At least one point shall be designated as the reference point.

ISTB-3300, "Reference Values," Paragraph ISTB-3300(e)(1) requires reference values to be established within ±20 percent of pump design flow rate for the comprehensive test.

4.0 REASON FOR REQUEST

<u>BACKGROUND INFORMATION</u>

The quench spray system at the Beaver Valley Power Station Unit No. 1 is designed to provide cold water from the refueling water storage tank (RWST) after a Containment Isolation Phase B (CIB) signal, chemically treat the water and spray containment. This function is required during post accident conditions for heat removal to reduce containment pressure. Containment depressurization is required to eliminate leakage out of containment after a CIB and to ensure containment integrity. The quench spray flow is treated with sodium hydroxide (NaOH) to improve removal of radioactive iodine from the containment atmosphere and to control containment sump pH. The system is provided with two 100 percent capacity redundant trains, each having a design discharge capacity of 2500 gpm. The quench spray pumps are manually stopped when the RWST water level drops below a predetermined level to prevent cavitation. Subsequent to stopping the quench spray pumps, recirculation spray pumps will continue spray flow to the containment.

The piping configuration for the quench spray pumps (1QS-P-1A and 1B) consists of the pumps receiving suction from the RWST and discharging to the containment through ten-inch lines supplying the quench spray headers. The pumps discharge piping is provided with four-inch recirculation test lines, which by design, are provided for intermittent testing of the quench spray pumps.

Flow testing is performed by opening the locked shut manual isolation valves in the test line thereby allowing a recirculation flow path back to the RWST. Flow instrument FI-1QS-103 is provided in the four-inch recirculation test line and flow instrument FI-1QS-104 is provided in the 1.5-inch branch connection off the four-inch recirculation test line. The 1.5-inch branch connection serves as the RWST test spray header.

The combination of local flow instrumentation provides the ability to measure total flow through the recirculation test line. During the performance of Group B and Comprehensive pump testing, containment isolation valves MOV-1QS-101A and MOV-1QS-101B (as applicable) are de-energized in the closed position to prevent inadvertent discharge of quench spray flow to the containment via the quench spray headers.

HARDSHIP OR UNUSUAL DIFFICULTY

Due to the flow restrictions associated with the existing piping configuration, ±20 percent of the 2500 gpm design flow rate cannot be achieved through the four-inch recirculation test line. Refer to Attachment 1 for a simple diagram of the quench spray pump test circuits.

Prior to initial startup, the quench spray pumps for Unit No. 1 were subject to long term full flow testing. Temporary connections were made on the quench spray headers and pipe plugs were placed in the spray nozzle sockets and the header drain lines. The quench spray pumps were started and tested, circulating water through the spray header supply lines to the spray headers and out the temporary test connections. This system capability test was conducted to ensure that the system meets flow requirements. It also provided a complete flush of the system to remove any particulate matter, which could conceivably result in plugging of the spray nozzles at a future time. At the completion of this test, the temporary test connections were removed, the pipe plugs were removed and the spray nozzles were installed. The system was then ready for operation. The spray header piping has no remnants of the temporary test connections used to facilitate preoperational full flow testing.

Re-establishing this full flow test circuit for the purpose of periodic design flow rate testing would require similar modification or replacement of the four-inch recirculation test line with a line of sufficient size to pass ±20 percent of the 2500 gpm design flow rate or a minimum flow rate of 2000 gpm. Such hardware modifications would cause a hardship without a compensating increase in the level of quality and safety.

5.0 PROPOSED ALTERNATIVE AND BASIS FOR USE

PROPOSED ALTERNATIVE

As an alternative to measuring at least five points for the preservice test over a range from the pump minimum flow rate to at least the design flow rate as required by ISTB-3100(a) and ISTB-5110(a), the five points will be obtained over the range of 0 gpm to approximately 1750 gpm. The manufacturer's curve would be used in conjunction with the pump minimum operating point curve and the points obtained would be reconciled to the manufacturer's curve to provide assurance of acceptable pump operation. Refer to Attachment 2 for pump curves. The proposed alternative to ISTB-3100(a) and ISTB-5110(a) provides an acceptable level of quality and safety.

As an alternative to testing within 20 percent of the design flow rate during the comprehensive test, as required by ISTB-3300(e)(1), the reference values will be established at approximately 30 percent of the design flow rate (that is, approximately 1750 gpm). The proposed alternative to the requirements specified in ISTB-3300(e)(1) provides an acceptable level of quality and safety and provides reasonable assurance that the pumps would be able to perform their function as well as providing sufficient indication of any potential degradation occurring to the pumps.

Testing will be conducted as follows:

The test circuits identified in Attachment 1 will be used to satisfy testing requirements.

The quench spray pumps shall be tested by establishing a recirculation flow path back to the RWST via the four-inch recirculation test line. Temporary pressure instrumentation shall be utilized in the pump suction with sufficient calibrated accuracy to satisfy ASME OM Code requirements. Differential pressure will be fixed and flow measured.

Pump vibration will be measured and recorded in accordance with the criteria specified in the Code. In addition, vibration spectral analysis will also be performed which is a more accurate method of detecting mechanical degradation or changes than that of the traditional inservice test vibration requirements.

BASIS FOR USE

To be within 20 percent of pump design flow rate on the low end requires a minimum reference flow rate of 2000 gpm. Presently the inservice test reference flow rates are established with the existing test circuit at approximately 1750 gpm, when setting differential pressure as the fixed reference value.

Reference flow rates are not within the 20 percent of design flow rate required during the comprehensive test. The test flows are lower than the design flow rate as a result of restrictions due to the small four-inch recirculation line. With the recirculation line restrictions, the highest flow rate that can be measured (approximately 1750 gpm) while maintaining stable test conditions is within approximately 30 percent of the pump design flow rate.

At approximately 1750 gpm, the head curve for these pumps is not flat but well sloped (See Attachment 2). Therefore, as performance degrades due to internal recirculation caused by increasing internal pump clearances, the flow rate will measurably decrease for a given reference differential pressure.

Testing at near design flow rate conditions is important for pumps with characteristic head-flow curves that are flat or gently sloping in the low flow region (little change in developed head with increasing flow rate). In the low flow region, increasing internal flows, as a result of internal wear, are difficult to detect. Pumps with the flat portion of the curve at low flow rates should be tested at or near design conditions to determine if increasing internal recirculation flows have degraded pump performance to the point where design performance cannot be achieved. This situation does not apply to the quench spray pumps if they are tested within approximately 30 percent of the design flow rate. Testing at the proposed reference flow rates will detect degradation since the pump head-curve is well sloped at the point of testing.

OTHER CONSIDERATIONS

In addition to the aforementioned tests, the quench spray pumps are included in the Beaver Valley Predictive Maintenance (PdM) Program. All pumps have spectral vibration data obtained each refueling outage and are subject to periodic oil sample analysis. Also, as a preventive maintenance activity, the pumps' mechanical seals are replaced every seventh refueling outage and the pump bearing oil is changed and coupling lubricated every 72 weeks.

If measured parameters are outside the normal operating range or are determined by analysis to be trending towards a degraded state, appropriate actions are taken. These actions may include monitoring additional parameters, review of component specific information to identify cause and removal of the pump from service to perform corrective maintenance.

Historically, the pumps have demonstrated excellent performance during surveillance testing. The only corrective maintenance recorded for the pumps was associated with quench spray pump 1QS-P-1A. Subsequent to the tenth maintenance and refueling outage (in 1995), pump 1QS-P-1A was damaged due to air binding and the rotating element assembly (that is, the impeller) was replaced. The replacement impeller was 10.75 inches in diameter. It was determined that the 10.75-inch impeller was the wrong size since the damaged impeller was 9.85 inches in diameter. The larger impeller resulted in a seven percent increase in the hydraulic data. A successful containment analysis of the DBA conditions with the 10.75-inch pump impeller required that the recirculation spray heat exchanger tube plugging limits be changed from the initial plugging limit of 56 tubes to 20 tubes. In 2001, the recirculation spray heat exchangers had 12 tubes plugged resulting in an eight-tube margin. Therefore, the System Engineering group recommended replacement of the 10.75-inch impeller with a 9.85-inch impeller during fourteenth maintenance and refueling outage (in 2001). Impeller replacement was completed on October 1, 2001 and pump operation has been satisfactory.

CONCLUSION

Compliance with the specific ISTB Code requirements identified in this relief request would require hardware changes and cause a hardship without a compensating increase in the level of quality and safety as previously described. It is requested that the NRC evaluate this determination pursuant to 10 CFR 50.55a(f)(6)(i) and grant relief from the identified ISTB Code requirements.

6.0 DURATION OF THE PROPOSED ALTERNATIVE

The proposed alternatives identified in this relief request shall be utilized during the fourth ten-year inservice test interval at Beaver Valley Power Station Unit No. 1.

7.0 PRECEDENT

The precedents cited below are cases where other plants have submitted relief requests that were granted. The FirstEnergy Nuclear Operating Company relief request is similar to these precedents, and the precedents support the position that the proposed alternative is acceptable.

1. North Anna Power Station, Unit Nos. 1 and 2, Docket Nos. 50-338 and 50-339, Inservice Testing for Pumps and Valves, Third Ten Year Interval Update (TAC Nos. MB2221 and MB2222), dated January 28, 2002.

2. Seabrook Station, Unit No. 1, Docket No. 50-443, Relief from ASME Code Operations and Maintenance Code ISTB 4.3(e)(1) Ten-Year Interval Inservice Test for Containment Spray Pumps CBS-P9A and CBS-P9B (TAC No. MB6676), dated May 30, 2003.

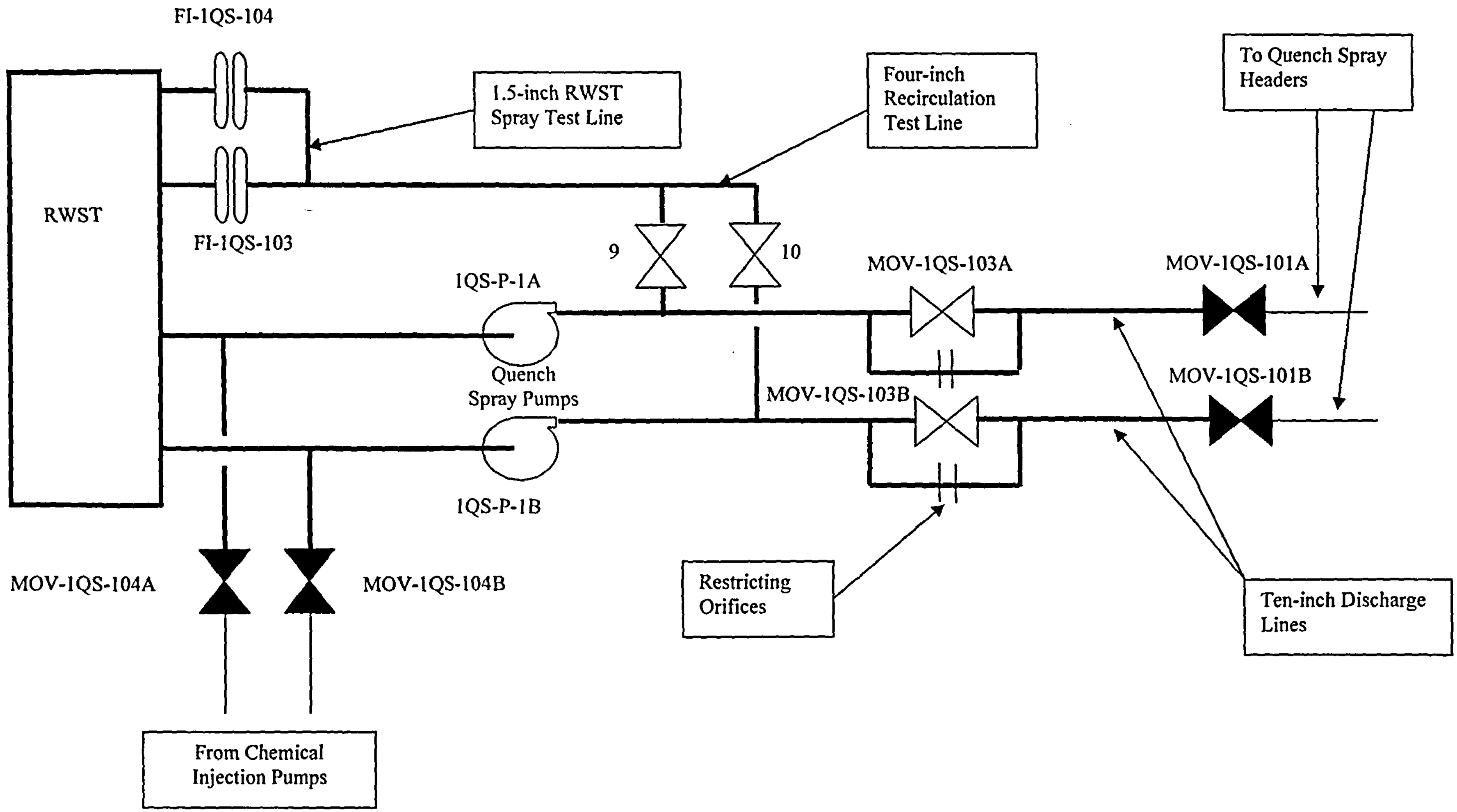
8.0 REFERENCE

NUREG-1482, Revision 1, Section 5.10, "Alternative to ASME OM Code Comprehensive Pump Testing Requirements."

ATTACHMENT 1

QUENCH SPRAY PUMP TEST CIRCUIT

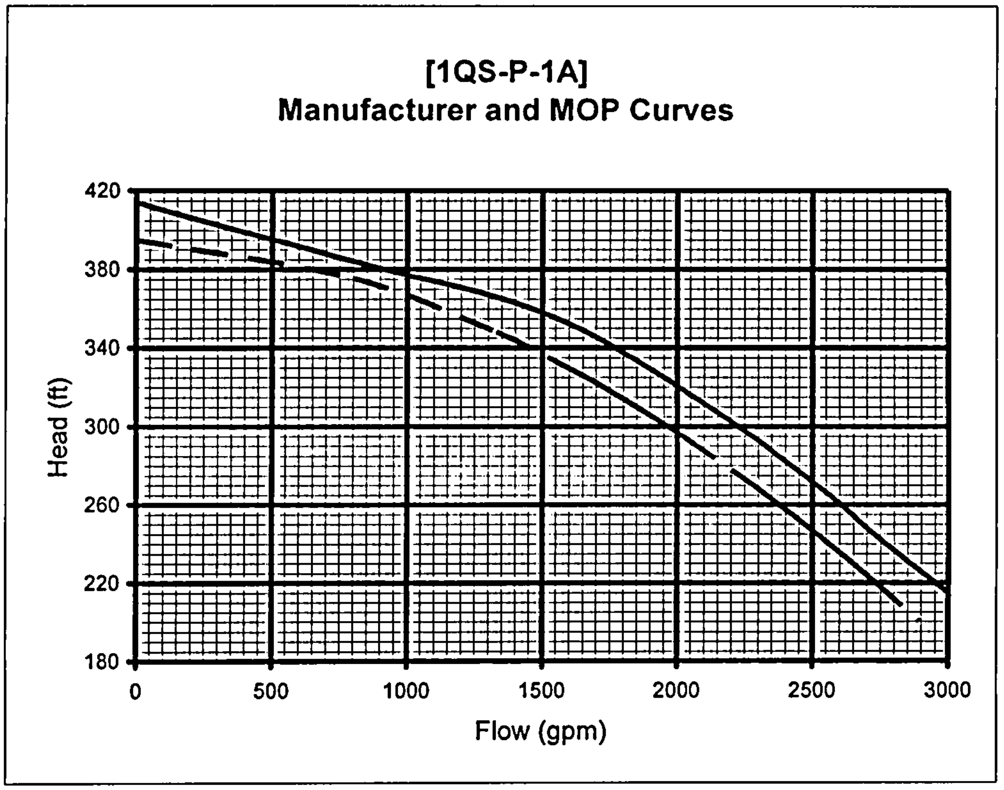
Quench Spray Pump [1QS-P-1A, 1B] Test Circuit



ATTACHMENT 2

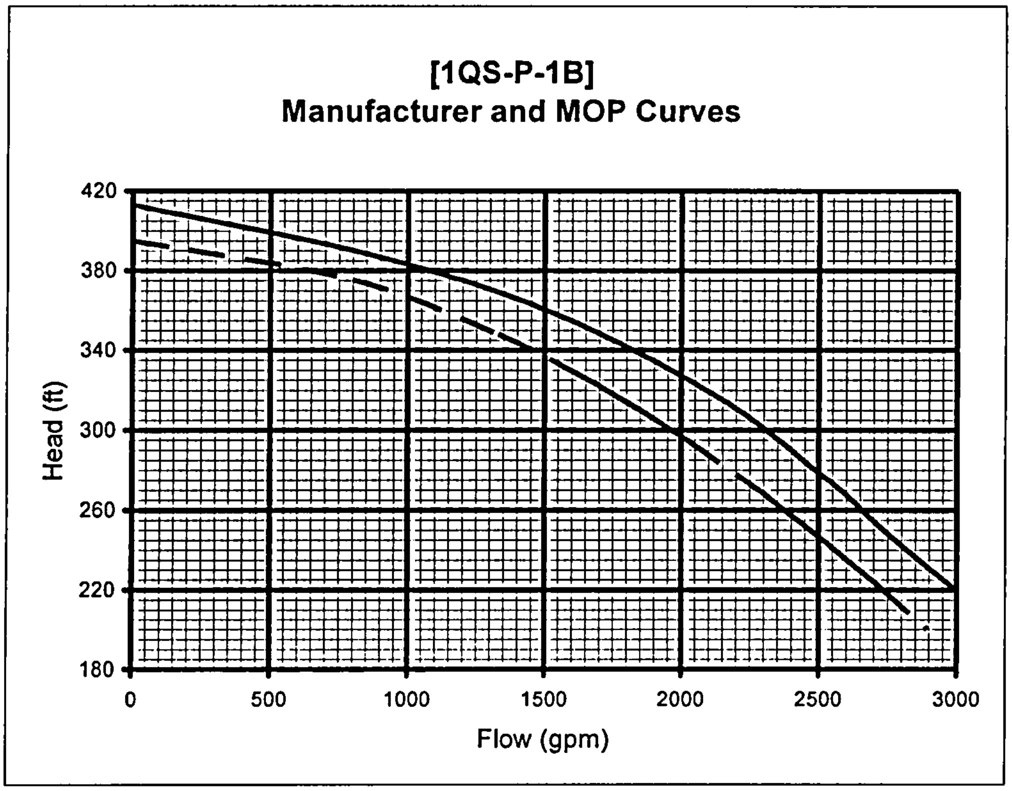
MANUFACTURER'S AND PUMP MINIMUM OPERATING POINT (MOP) CURVES

Pump Name: 1A Quench Spray Pump   Pump Number: 1QS-P-1A



Manufacturer's Curve		MOP Curve	
Flow	Head	Flow	Head
0	414	0	395
803	384	800	375
1522	357	1330	348
2119	310	1630	327
2516	270	1712	321
2597	261	1730	320
2769	240	1830	312
3222	191	1930	303
		2030	294
		2230	275
		2330	265
		2430	254
		2530	243
		2630	232
		2730	220
		2893	200

Pump Name: 1B Quench Spray Pump   Pump Number: 1QS-P-1B



Manufacturer's Curve		MOP Curve	
Flow	Head	Flow	Head
0	413	0	395
866	388	800	375
1527	359	1330	348
2141	316	1630	327
2496	279	1700	322
2597	268	1730	320
2769	246	1830	312
3181	199	1930	303
		2030	294
		2230	275
		2330	265
		2430	254
		2530	243
		2630	232
		2730	220
		2893	200