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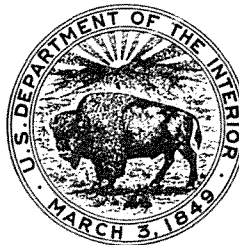
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

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D.L. King

HAYS "MESURFLO" CONTROL VALVE

Hydraulic Report No. R-Hyd-13

DIVISION OF RESEARCH



OFFICE OF CHIEF ENGINEER
DENVER, COLORADO

July 26, 1963

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Office of Chief Engineer
Division of Research
Hydraulics Branch
Denver, Colorado
July 26, 1963

Hydraulics Branch Report No. R-Hyd-13
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Subject: Laboratory studies of the Hays "Mesurflo" control valve

INTRODUCTION AND SUMMARY

These studies were initiated to investigate the possible use of a constant rate of flow control valve for farm sprinkler systems in orchards along the Columbia River. Because of the hilly topography of the area, a pipe system designed to provide a 30-pounds-per-square-inch pressure (for which the sprinkler is designed) at a high point in the system may result in a pressure of over 100 pounds per square inch at a low point. This results in a necessary throttling of valves to maintain the design pressure. A constant discharge valve, placed below each individual sprinkler head, would eliminate this problem by reducing the excess pressure.

The "Mesurflo" control valve, manufactured by the Hays Manufacturing Company of Erie, Pennsylvania, was tested to determine its ability to deliver a constant rate of discharge for pressures up to 150 pounds per square inch. The particular valve tested connects to a 3/4-inch standard pipe on the upstream side and a 1/2-inch standard pipe on the downstream side.

The manufacturer claimed that the valve will deliver a discharge between 2.7 and 3.3 gallons per minute for pressures above 10 pounds per square inch. The laboratory tests indicated that the valve would discharge between 2.67 and 2.81 gallons per minute for pressures between 20 and 150 pounds per square inch; below 20 pounds per square inch the discharge decreased to 2.41 gallons per minute at 5 pounds per square inch. No apparent damaging effects were noted when the valve was inadvertently subjected to a pressure of 250 pounds per square inch.

THE INVESTIGATION

Test Facility

The test facility consisted of a high-head pump, pressure piping system, and weighing tank, Figure 1. Bourdon gages were placed approximately 6 diameters upstream and about 15 diameters downstream from the "Mesurflo" valve to determine the differential pressure across the valve. Tests were made (1) with no back pressure on the valve, and (2) with a back pressure of 30 pounds per square inch maintained on the downstream side of the valve. The upstream pressure was varied from 10 to 150 pounds per square inch for the first test and from 35 to 180 pounds per square inch for the second test. Thus the differential pressure across the valve varied from 5 to 150 pounds per square inch.

RESULTS AND CONCLUSIONS

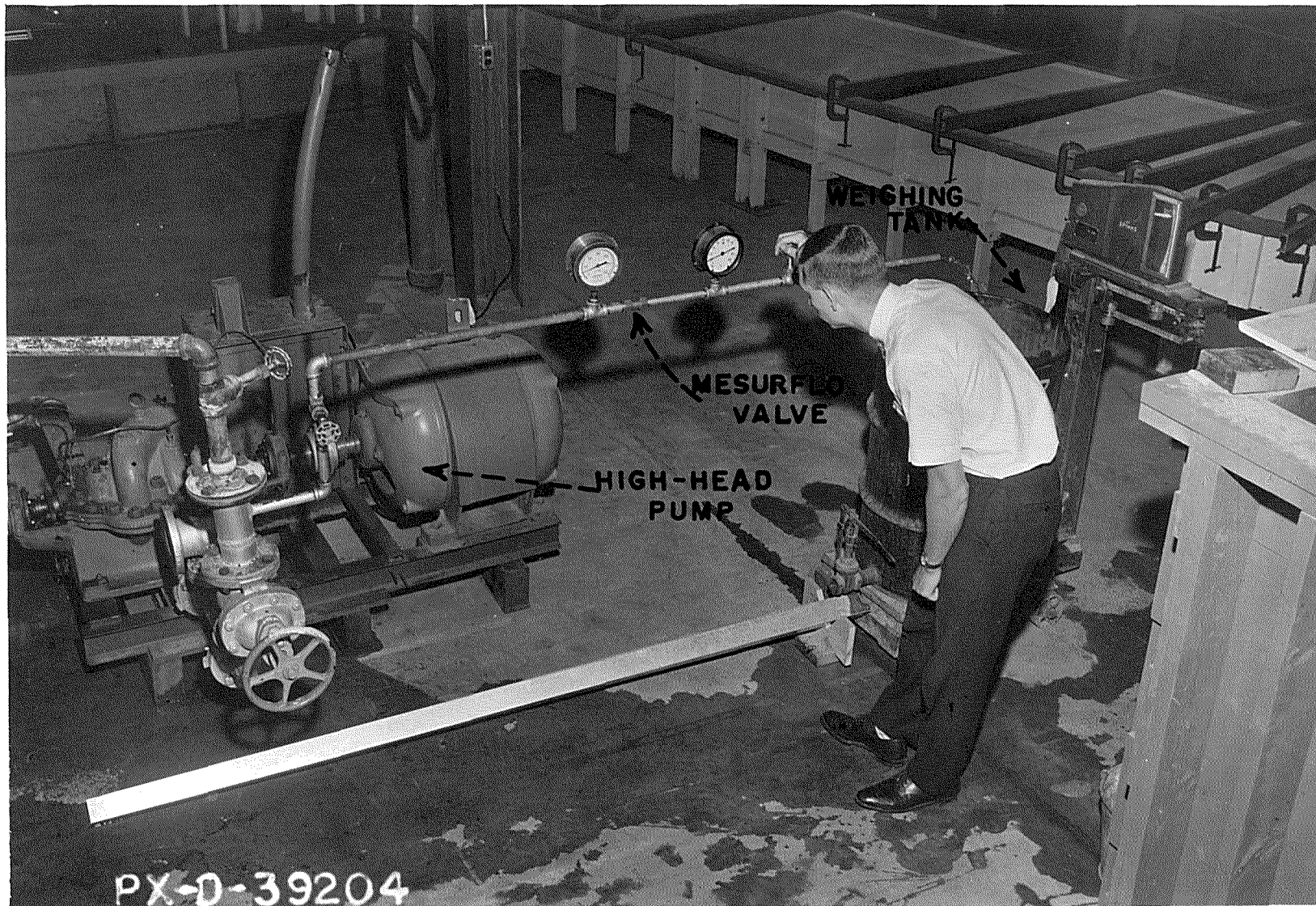
Results of the tests, shown in Table 1 and Figure 2, were as follows: (1) the valve maintained a relatively constant discharge of 2.67 to 2.81 gallons per minute (averaging about 2.73 gallons per minute) above 20 pounds per square inch, with the curves falling very near the manufacturer's claimed lower limit of 2.7 gallons per minute; (2) below 20 pounds per square inch the discharge decreased to 2.41 gallons per minute at 5 pounds per square inch; (3) flow characteristics for the pressure range below 20 pounds per square inch were also determined with a back pressure of 100 pounds per square inch and were found to be nearly identical to those for 30-pounds-per-square-inch back pressure; (4) when inadvertently subjected to a pressure of 250 pounds per square inch, the valve suffered no apparent damaging effects; and (5) the discharges were somewhat more erratic without back pressure on the valve, and appeared to be somewhat larger in magnitude than those with back pressure on the valve.

Table 1

TEST RESULTS

Pressure differential pounds per square inch	Q gallons per minute	
	Zero back pressure	30-pounds-per-square- inch back pressure
5		2.41*
10	2.60	2.60*
15		2.67*
20	2.79	2.71
30	2.81	2.73
40	2.73	2.73
50	2.70	2.69
60	2.73	2.71
70	2.77	2.69
80	2.75	2.67
90	2.73	2.67
100	2.71	2.67
110	2.71	2.69
120	2.72	2.69
130	2.76	2.72
140	2.77	2.74
150	2.79	2.78

*With either 30 or 100 pounds per square inch downstream from control valve.



HAYS "MESURFLO" CONTROL VALVE
Laboratory Test Facility

Figure 2
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