



State of Idaho
DEPARTMENT OF WATER RESOURCES

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EASTERN REGION

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August 18, 2000

Lynn Rasmussen
 Watermaster, Water District 13Q
 2200 Lago-Liberty Road
 Grace, ID 83241

Re: Measurement manual, sprinkler nozzle capacity, measurement calculations.

Dear Mr. Rasmussen:

Enclosed is a photocopy of University of Idaho's "Water Measurement Manual," with a chart of sprinkler nozzle capacities added at the back. Also enclosed is a two foot staff gage, and a bill for the gage and shipping.

In response to your questions, I have calculated a couple of Rectangular Contracted Weir discharges, using the U.S. Bureau of Reclamation formulas. These will vary only slightly from the University of Idaho formulas in the manual I sent you.

The formula I used is:

$$\text{Discharge (cfs)} = 3.33 \times (\text{Length in ft} - 0.02 \times \text{head in ft}) \times (\text{head in ft})^{3/2}$$

For the 68 3/4 inch weir with 2" of head, I calculated:

$$\begin{aligned} \text{Length} &= (68.75/12) = 5.73 \text{ ft} \\ \text{Head} &= (2/12) = 0.167 \text{ ft} \end{aligned}$$

$$Q = 3.33 \times (5.73 - 0.02 \times 0.167) \times (0.167)^{3/2} = 1.29 \text{ cfs} = 65 \text{ miners inches}$$

For the 28 1/2 inch weir with 1 3/4" of head, I calculated:

$$\begin{aligned} \text{Length} &= (28.5/12) = 2.375 \text{ ft} \\ \text{Head} &= (1.75/12) = 0.146 \text{ ft} \end{aligned}$$

$$Q = 3.33 \times (2.375 - 0.2 \times 0.146) \times (0.146)^{3/2} = 0.44 \text{ cfs} = 22 \text{ miners inches}$$

Be aware that these heads are too low for the weirs to be fully accurate. It is likely that the actual discharge is slightly higher than indicated. You may wish to clamp a piece of tin onto the weir blade with locking pliers to reduce the length of the weir. A four or five inch depth over the weir would give a much better measurement.

We also talked about sprinkler discharge capacity. The chart value for a 5/32 nozzle at 50 psi is 5.15 gallons per minute. Forty such nozzles would discharge $5.15 \times 40 = 206$ gallons per minute. A miners inch is approximately nine gallons per minute, so $206/9 =$ about 23 miners inches for this sprinkler system.

Please contact me if you have further questions.

Sincerely,

Bryce A. Contor
Senior Water Resource Agent

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