

As examples, low pump discharge pressure may occur because of pump wear, insufficient pump operating speed, insufficient water supply, a broken pipe downstream, too many open valves downstream, or eroded sprinkler nozzles that discharge excessive flow rates. Conversely, high pump pressures may indicate excessive pump speed, valves that are closed or partially closed downstream, or components that are clogged. Pump discharge rate measurements and visual inspections will help to determine which problem may have occurred. Similar flow rate measurements and visual inspections should be used to determine causes of excessively low or high pressures at other points in the system.

Measuring Sprinkler Application Rates

Sprinkler application rates must be known so that irrigation durations needed to apply specific depths of water can accurately be determined. Measure application rates under field conditions (1) to verify irrigation system designs and (2) to determine whether changes in application rates have occurred with time. Measurements to verify irrigation system design should be made soon after installation. Subsequent measurements should be made at least annually to track changes in system performance and to schedule repairs.

Three techniques can be used to measure application rates:

1. Measure the flow rate and area of each irrigated zone. Measure the flow rate with either a flow meter at the pump or at each zone. Units are normally gallons per minute (gpm). To convert to acre-inches per hour, divide the measured flow rate by 453. The average application rate per zone can then be calculated from:

$$\text{Rate} = Q / \text{Area} \quad (1)$$

where Rate = application rate in inches per hour (iph),

Q = total flow rate per zone in acre-inches per hour, and

Area = total irrigated zone area in acres.

For example, if the measured flow rate to a 10-acre zone is 906 gpm, this is equivalent to $906/453 = 2.0$ acre-inches per hour. Then, the average application rate is $2.0 \text{ acre-inches per hour} / 10 \text{ acres} = 0.20 \text{ iph}$.

2. Measure the average flow rate and area covered by each sprinkler. For regularly spaced sprinklers, the application rate is then calculated from:

$$\text{Rate} = 96.3 q / [(SI) (Sm)] \quad (2)$$

where Rate = application rate in inches per hour (iph),

q = sprinkler discharge rate in gallons per minute (gpm),

SI = sprinkler spacing along the lateral in feet (ft), and

Sm = sprinkler spacing along the manifold between laterals in ft