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On the Waterfront

by Jim Reed

I know that the season is almost over when I can sit down at my word processor ten days before Fred Oppermans article due date and take my time in copying this article. There is enough information left to be written on from the Keller-Bleisner Engineering study on "Designing, Operating, and Maintaining Piping Systems Using PVC Fittings" that you can continue to be entertained by this report until spring. By the time you are ready to start up your systems in April, the last section on "Precautions in Winterizing the System" will be in the **Bullshead** and you can figure out if you screwed up when you blew out the irrigation in the fall. This month's article is on "The Effects of Management on Pressure Surges".

As discussed earlier, given the flexibility of operation available with today's sophisticated irrigation controllers, all possible conditions cannot be foreseen at the design stage. Therefore, considerable care in management of the system is required. The magnitude of flow variations, and thereby velocity variations and potential pressure surges, of a typical golf course is depicted (on a chart — not included), showing the frequent and dramatic changes in flow demand at the pump ... With the shorter set times and repeated irrigations per set, the number of potential surges during the course of an operating season can exceed 40,000 mentioned earlier. The stress placed on irrigation systems by such fluctuations can reduce significantly the life of the system components, especially if the magnitude of the fluctuations is great and the pressure limit of the components is approached ... It is not uncommon to have flow velocities in given pipe segments vary from zero to over 8 feet per second at 2 to 4 minute intervals unless the operating stations are carefully configured to balance flows.

To limit the magnitude and frequency of pressure surges, system operators should use the following guidelines:

1. Operate the system to maintain pump flowrate as uniformly as possible. This will not only reduce hydraulic transient problems but will increase the life of the pumping unit.

2. Attempt to balance system flows so the sprinkler set changes are systematic within system subunits. Avoid changing from one main area of the system and back again in the operating program. Maintain subunit flows uniformly, if possible.

3. Run fewer sets for longer times. Hydraulically, it is easier on the system to run a given set as long as possible, provided runoff does not occur, or the moisture holding capacity of the soil is not exceeded. This will allow for fewer sets and, therefore, fewer opportunities for surges to occur.

4. Avoid operating too many sprinklers in one area of the system and elevating the operating velocities. Use the design guidelines to govern the number of sprinklers that may operate simultaneously on a given pipe segment or loop.

(Though not part of this report, design guidelines of 5 feet per second would show that 2" pipe can carry flows of 50-60 gpm, 2½" pipe — 80-90 gpm, 3" pipe — 120-130 gpm, and 4" pipe — 200-220 gpm.)

Next month: "The Dangers of Entrapped Air"