On the Waterfront

by Jim Reed

Since I turned in my last article in June, I can report good and bad news on the rainfall front. The good news is that many areas of northern Illinois and Indiana received measurable amounts of rain. The bad news is that much of it did not soak into the ground since most amounts came down in 5 to 20 minutes. Also, the accompanying 50 to 80 mph. winds did some major damage to local courses. The first storm of June 17 knocked down 51 large oaks and specimen trees at Lakeshore CC in Glencoe and destroyed probably that many at Skokie CC and Northmoor CC. The second storm on July 2nd knocked down tents at the Western Open at Cog Hill and took down 16 trees at River Forest GC. Meanwhile, every superintendent in the area is finding out how well their course's irrigation system was designed.

This month's topic is "PVC Strength Characteristics and Typical PVC Fitting Failures", from an article written by Ron D. Bliesner in February, 1987. This section of his report states "To better understand the performance of PVC fittings in piping systems, it is helpful to examine the strength characteristics of PVC and the types of fitting failure that can occur. The types of failure fall into four main categories: 1) Burst failure; 2) Long term pressure failure; 3) Cyclic surge failure or fatigue; 4) Mechanical failure due to external forces. Each of these types of failures will be discussed separately, although failure may be caused by a combination of situations.

PVC Strength Characteristics

Most PVC pipe and fittings used in the irrigation industry are manufactured from Type I, Grade I PVC compounds ... The tensile strength of PVC under stress for an extended period of time is often described by a stress regression plot ... for example, if a pipe is continuously stressed at 5,000 psi it would be subject to failing (bursting) after approximately 1,000 hours ... the time required to bring PVC pipe specimens to failure varies according to the pressure (stress) being applied: e.g., individual specimens should withstand 6,000 psi for 10 hours; or 5,000 psi for 1440 hours (60 days); or 4,000 psi for 306,600 hours (35 years) ...

These values are for static pressure conditions. Tests have shown that PVC pipe under continuous static pressure for a long period of time can be subjected to a quick burst pressure (less than 70 seconds in duration), and will perform essentially the same as pipe which has not been subjected to static pressure testing. It appears that, even after years of service, PVC pipe maintains its ability to withstand occasional high pressure surges.

However, if this pipe is subject to frequent pressure variations of a cyclic nature it can fail, even though the peak pressure never exceeds the design pressure of the pipe. ... It appears that the ability of PVC pipe to withstand cyclic pressure conditions is independent of its ability to withstand constant static pressure. PVC pipe seems to have two "funds" upon which to draw, one labeled "static pressure life", and the other "cyclic pressure life".

It should be noted that the above conclusions are based on limited long term testing of PVC pipe ... From examination

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(On the Waterfront cont'd.)

of PVC fittings removed from installations and tested, it appears that the ... observations may not hold true for fittings. At least the number of cycles to failure may be considerably less, due to stress concentrations at points of direction change in the fittings.''

NEXT MONTH: BURST FAILURE AND LONG TERM PRESSURE FAILURE

This month's article is pretty vague. Next month's will be more understandable. I'll bet most of you didn't think I could write something this exciting. Hope this doesn't take as long to type as ''War and Peace''.

Management of Fungicide Resistance

by Patricia L. Sanders
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Fungicides can be divided into two groups according to where they act to protect plants. CONTACT or PROTECTANT FUNGICIDES are those that stay on plant surfaces and provide a barrier against the fungi that cause disease. ERADICANT or SYSTEMIC FUNGICIDES are absorbed by plants, and thus can work to protect plants from within, in the same way that antibiotics act to eradicate ''germs'' inside human bodies. Most systemic fungicides also have protectant properties in that they can provide barriers to fungi on plant surfaces. Systemics have the advantage of long residual action, protection of plant crowns and roots, movement within plants to protect newly-formed tissues, eradication of fungi already inside plants, and protection from washoff and weathering.

The chief disadvantage of systemic fungicides has been the problem of resistance to these fungicides in many important turf pathogens. Resistance in fungi to systemic fungicides occurs because these fungicides generally poison fungi at only a single location in their growth and development cycles. It is, therefore, relatively likely that some individuals will be present in populations of disease-causing fungi that are able to circumvent or short-circuit the poisoned site. These individuals will be able to grow and increase in the presence of the fungicide. With repeated, continuous application of the same systemic fungicide, the naturally-resistant individuals in a fungal population will multiply until the population is composed primarily of fungicide-resistant individuals, and disease control fails. This has happened in countries all over the world where systemic fungicides have been used. In the U.S.A., most of the disease control failures from resistance to systemic fungicides have occurred on turfgrass. There are published reports of resistance control failures of Tersan 1991 on dollar spot, Subdue on Pythium blight, and Chipso 26019 on dollar spot and pink snow mold.

Identification and development of new fungicides is costly and time-consuming. Therefore, we must learn to use systemics in ways that will prolong their useful lives. In order to prevent or delay fungicide resistance in populations of disease-causing

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