The Low-Down on Pool Startup Chemistry

onBalance

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Four years ago, the National Pool Industry Research Center (NPIRC) at Cal Poly reported that they had studied the effects of three different chemical startup procedures on pool plaster. (Phase 2, October 2005). The three chemical startup procedures were;

- the ñAcidò startup ï where enough acid was added to lower the pH to 4.5 and alkalinity to zero for three days
- the ñpH-Neutralò startup ï where one gallon of acid was added to an 8000 gallon pool
- and the ñTraditionalò startup where the water was maintained in a slightly alkaline (basic) water condition

In published results the NPIRC claimed (using just visual observations after eight months) that the Acid and the pH Neutral startups proved superior and provided plaster with better protection against etching deterioration when compared to the Traditional startup, which was reported as resulting in significant etching deterioration. This begs the question: How does a balanced startup technique such as the Traditional startup result in etching deterioration? And yet the acid startup had no etching?

Is the NPIRC study accurate regarding the effects of the three different startup procedures? What really is the best way to chemically start up a new plaster pool? These questions are the heart of a recent study conducted by onBalance, and funded with a $2500 donation by IPSSA.

All three of these startup techniques were recently studied (2008) by onBalance, which also included a study on the technique known as the Bicarb startup (which involves water pre-treatment with sodium bicarbonate).

Two different methods were used to analyze and determine what chemical startup provided the best protection for a new plaster surface. One method was microscopy (40X magnification) to visually examine the plaster surface. The other analysis was performed by determining the calcium increase of the water that the plaster coupons were submerged in.

Well made, high quality plaster coupons were formed and placed in water after 24 hours of drying in moderate temperatures. Several coupons were each (separately) placed in water where conditions duplicated the ñBicarbò startup. The second set of coupons were placed in typical balanced water (simulating a ñTraditionalò startup), the third set were placed in moderately aggressive water (an SI of ï 0.8, similar to the so-called ñpH Neutralò startup), and the fourth set were placed in water that simulated an ñAcidò startup (which equals a very aggressive ï 4.0 SI). After three days, the coupons were removed and the calcium level in each water tank was tested. The Bicarb startup water had a zero to 2 ppm increase in calcium, the Traditional start water had an average calcium increase

of 7 to 10 ppm, the pH Neutral (moderately aggressive) startup water had a 15 to 20 ppm calcium average increase, and the Acid (or zero alkalinity) startup process had an average calcium increase of 60 to 80 ppm. An increase in calcium (in the water) indicates a loss of calcium from the plaster, and a resultant increased porosity of the surface. This produces a weaker surface which can lead to eventual staining. As can be seen from these results, the bicarb startup program had the least amount of calcium loss, preserving the high surface density which provides the best protection for the plaster surface.

While all coupon samples were white and smooth to the touch, when 40X magnification was used to examine the plaster surface, we found that the Acid startup coupons were slightly etched, with the thin layer of cream (cement) missing, the aggregate exposed. On the other hand, the Bicarb startup coupons were very smooth, with the cement cream layer still intact and the aggregate not unduly exposed. The other two methods fell in between the Acid and Bicarb results, with the Traditional startup coupons showing just a slight effect of exposed aggregate, and the pH Neutral startup coupons just a little more exposed than the Traditional. This microscopic examination was consistent with, and confirmed the results found by using the ñcalcium increaseò analysis method. But understand, this observation is with a microscope; the unaided human eye cannot see the difference, and the hand cannot feel the difference.

As one could conclude, the results obtained by the onBalance study differ greatly from the results obtained by the NPIRC, and in fact, are completely opposite. It would appear that the NPIRC did not consider differences in workmanship as possible causes of deterioration or discoloration. It is evident that the Acid startup is the most detrimental method and causes irreparable harm to a new plaster surface. While the Acid startup may dissolve plaster dust and help the surface look good for a few months, it is obvious that this more coarse and porous plaster surface will deteriorate and stain earlier and easier. The Bicarb method, on the other hand, is an improvement on the industry standard Traditional method.