

Research Results Suppressed by the Pool Plastering Industry

onBalance – Que Hales, Doug Latta and Kim Skinner

It should concern pool industry members that at poolside inspections, service techs and/or pool owners are being incorrectly told by plaster consultants that the light spots and streaking and/or grey mottling discoloration on their new pool plaster were caused by aggressive water. The consultants add that the NPIRC/Cal Poly studies have proven this and that there are no other relevant studies on these types of problems. Of course, this is false on both counts.

It is unfortunate that some pool owners and service techs become either misled or intimidated into accepting these false claims and end up paying for a replaster for problems they did not cause. The fact is that there are other relevant and informative research studies demonstrating that improper workmanship practices are the likely cause of such discoloration type problems. The following are studies (some even conducted by the National Plaster Council), which contain information and results that pool plasterers do not like, and which they have suppressed or not shared because they do not want the rest of the industry to know about the results.

ARIZONA POOL STUDY – organized by Greg Garrett – current NPC Technical Advisor

In 1991, a pool was plastered by Arizona NPC members using different manufacturer's cements and aggregate mixes in eight separate sections. It was reported that all mixes had calcium chloride added, although the amount was not disclosed. The pool water was first maintained in balance for a few months and then maintained in slightly aggressive conditions. After one year, the pool was drained and inspected. Mr. Garrett wrote a report (which Pool & Spa News reported on) claiming that all sections "spot etched" (soft spots, streaking, and lightening discoloration), and that this was caused by aggressive water. Doug Latta was present the day this test pool was drained, along with the service company representative who maintained the swimming pool.

A year later, the entire onBalance team and an editor from Pool & Spa News visited that pool and noted some interesting details that Mr. Garrett hadn't reported on. While it was noted that six of the eight sections had spotting covering over 80 percent of the area of each section, two other sections had less than 25 percent coverage in spotting. Indeed, one section had only a few spots with less than 20 percent of the section affected with spotting and streaking discoloration, and with a large area completely unaffected. No sections were identical and even the spotting and discoloration was different from section to section. This difference indicates that perhaps

something other than aggressive water caused the spotting. It was also noted that the white plaster had more mottling (graying) than most typical plaster jobs.

At the time, onBalance already had reason to believe that workmanship issues may be involved in the development of light (white) spotting and grey discoloration. A request was made to Mr. Garrett and to NPC members asking how much calcium chloride was added to each section, how much hard troweling and water troweling was performed on each section, and we requested the video on the troweling process, and a response to the fact that two sections had very little spotting in comparison to the other sections. This was met with a refusal from NPC members to provide any further information or answers.

PASADENA POOL STUDY - 1992-1996:

This pool was plastered by California NPC members and the setup was similar to the Arizona test pool. After one year, an inspection determined that only two sections out of the eight developed some light spot discoloration, which clearly indicated that this phenomenon was not caused by aggressive water chemistry, which invalidated the supposed results of the Arizona Test Pool. Five years later, onBalance and Stan Zielinski (an IPSSA member who serviced this pool and was also the liaison to the NPC) inspected this pool and determined that no other sections had spotted. It was also noted that one other section had developed a few calcium nodules (an indication of delamination and bond failure). The original video of the installation of the Pasadena test pool showed that this nodule section did not adhere and fell off the wall several times during the plastering!

A request was made by onBalance to the NPC asking them to report and publicize the results of this test pool and respond to the evidence that this additional NPC test pool study indicated that spotting and streaking discoloration is not caused by aggressive water, and more likely caused by improper plaster practices. The NPC did not publish results from this test pool.

NPC and onBalance joint “Alkalinity” research project - 1999

Sixteen large (double sets) plaster coupons were formed (with various materials) and made by NPC members in 1999 and given to Que Hales and Kim Skinner (onBalance members), sixteen to each. Each coupon was then cut and quartered and placed in four different alkalinity maintained waters, 40 ppm, 80 ppm, 120 ppm, and 160 ppm. One year later, only one coupon developed any soft spot discoloration, and the spotting occurred in all alkalinities of 40, 80, 120 and 160 ppm. And interestingly, the spots only developed on the troweled side of the coupon, and not on the back (molded) side which was also exposed to the same water. This experiment also illustrated that water chemistry could not have been the primary factor in the spotting problem.

At the 2000 NPC conference, onBalance reported on the result of the “Alkalinity” experiment to the NPC membership. NPC leaders claimed that the joint “Alkalinity” experiment was tainted by

possible tampering (during formation of coupons) with ONE of the sixteen coupons (not the one that spotted), and they disavowed the results without providing details or publishing results to the industry.

RJ Lee Group and Construction Technology Laboratory studies (CTL) 1999-2003

These two professional cement analysis firms were retained by onBalance to independently study pool plaster spotting, discoloration, and failures from actual pools. Core samples were sent to them and after petrographic analysis (using scattered electron microscopy, stereo optical microscopy, electron dispersive spectroscopy and X-ray diffraction) they both concluded that improper additives and practices led to the spotting problem. These studies and reports were given to the NPC, but onBalance never received any direct response, even though it was promised. Over 12 separate plaster failures were analyzed as part of this research. A review of these “spot etching” case histories is available at the following link. www.poolhelp.com/onbalance.aspx

Portland Cement Association (PCA) research studies and literature.

The PCA has published literature stating that calcium chloride additions will lead to an overall darkening and mottling effect on cement products. Additionally, a PCA study (RX203) has reported that late hard troweling along with the use of calcium chloride in cement mixes will cause light spots to develop against a darkened background.

Click below for a simplified and condensed version (by Kosmatka) of that study, and then go to page 3. <http://www.cement.org/bookstore/download.asp?mediatypeid=1&id=454&itemid=PL861>

The NPC has not officially responded to this particular study, but there are some reports that some NPC board members are claiming that this PCA study has no relevance to pool plastering. So-called plaster experts claim that there are virtually no ferrite compounds in white cement, but that claim is false. Ferrite compounds in grey cement are small, about 2.5 percent, and there is about 1 percent in white cement. Ferrite will react with calcium chloride to darken the cement color (especially noticeable on a white cement background), and late hard troweling causes it to be even darker and can create spotting. Further, the materials, tools and finishing practices are the same with grey or white cement, as well as the integrally colored cement chemistry. There is no honest reason to claim that the PCA’s studies do not apply to swimming pool plaster.

Summary

As can be easily seen, past research has pointed to improper workmanship practices and material additives as more likely causing the white spotting and grey discoloration problem. Of course, this implicates the pool plastering industry as being responsible for these problems.

A course of action by the NPC

In 2003, the executive director of the NPC, Mitch Brooks, declared that all past studies on spotting discoloration problems (including NPC's own test pools) were either conflicting, flawed, or irrelevant, and nothing could be learned from them. He also announced plans to fund and have Cal Poly (NPIRC) begin studying plaster spotting problems. Mr. Brooks did not explain why and how these other studies were flawed or useless.

Mr. Brooks also stated that there had not been any independent studies conducted by PhD's (which wasn't true – see references to PCA and RJ Lee above), and therefore Mr. Brooks contended that an independent study by Cal Poly was needed and that the NPC would stand by the results obtained by them. Unfortunately, the observations and results from the Cal Poly research are tainted by poor research procedure, and many claims contradict established cement and concrete science. (See our email update (1/28/10) "Problems with NPIRC studies").

Recent reports that have not been publicized by the NPC.

The Rothstein report "Plaster Durability in Pool Environments" - 2005

Dr. David Rothstein, along with Cal Poly professors Dr. Kachlakev and Dr. Pal, presented a paper, "Plaster Durability in Pool Environments" to the International Cement Microscopy Association (ICMA) in 2005. In that paper, they concluded that Phase 1 of the Cal Poly Research did not link Spot Alteration (white spotting) to a specific set of construction practices or water chemistry conditions. This completely contradicts the Cal Poly professor's statements to the pool industry that "water chemistry is the primary cause of "etching deterioration" (spot alteration or discoloration). Although Drs. Kachlakev and Pal's statements were released to the pool industry, the Rothstein material was not. This contradictory information was brought to the attention of NPC board members. The NPC has remained silent on this conflicting issue and has not made this known to the pool industry.

The Jana report "Swimming Pool Plaster Deterioration" - 2008

In his report to the ICMA, petrographer Dipayan Jana provides multiple reasons to implicate plastering workmanship in many common plaster problems; he acknowledges that "spot alternation or deterioration" can be caused by workmanship, and also water chemistry - but bases that theory of water chemistry causation on the Cal Poly Research and the Rothstein report – neither of which could prove water chemistry causation! The NPC and NPC personnel are listed as contributing to the Jana Report. To date, the NPC has not disclosed this report to the pool industry. Why not?