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BUILDING CHARACTER

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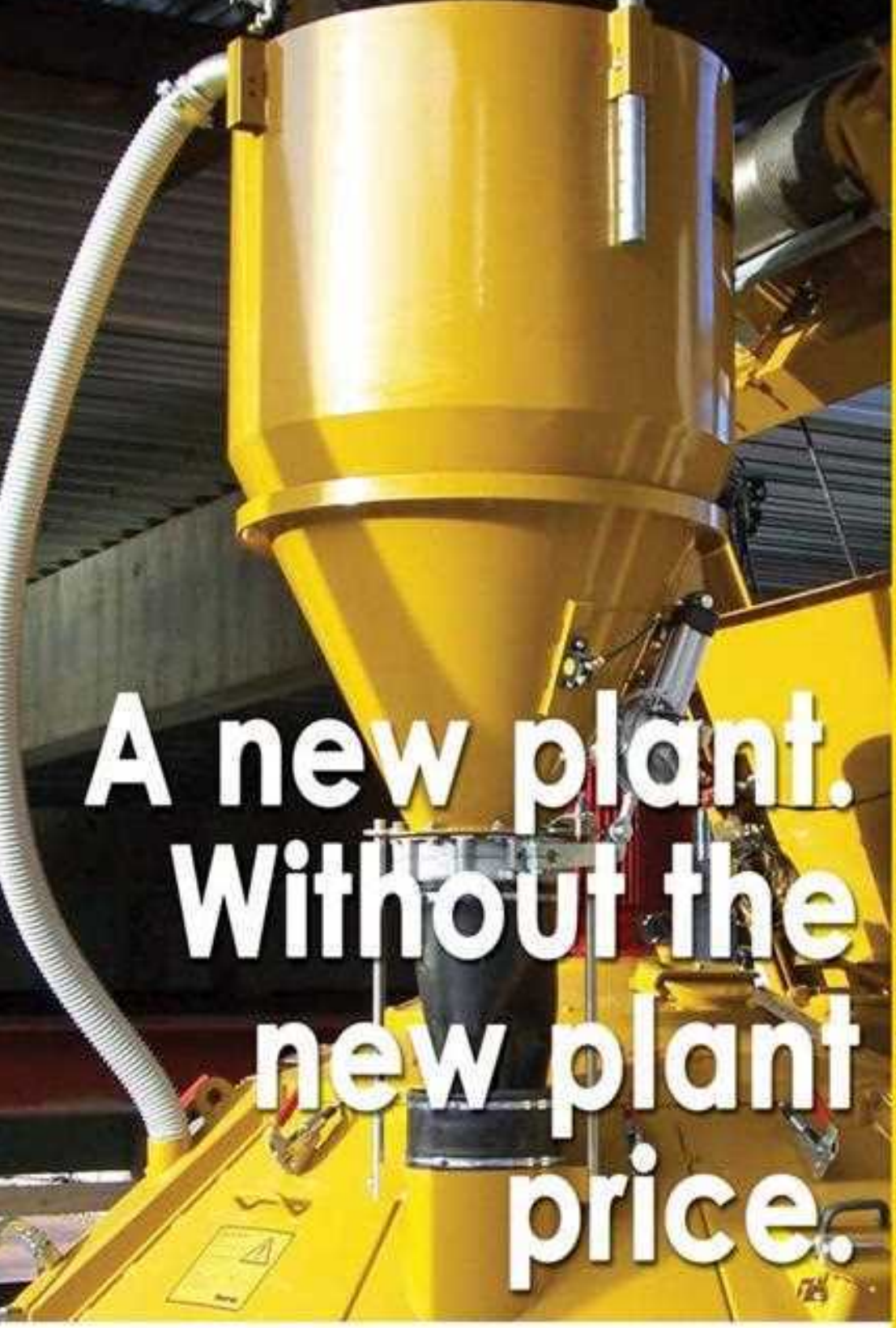

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A SIMPLE SHIFT IN THINKING ON THE ROAD TO SUCCESS

IN AN INSTANT, EARL NICHOLS LEARNS THE VALUE OF INDUSTRY-LEADING RISK CONTROL

Forty perfect stacks of Jersey barriers stood ready for morning delivery when the new forklift operator lost control of the wheel. Lucky for Earl Nichols of Purdie Concrete, CNA's UL-certified Risk Control engineers had just shown him a new technique to make his stacks more stable and his operation more efficient. So instead of calling his independent agent to file a claim, Earl called his client to confirm delivery and arranged three more shipments for the week ahead. Solid work, Earl!

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Running on Fumes

BY BRENT DEZEMBER | *Chairman, National Precast Concrete Association*

At the risk of oversimplifying the issue, less gas consumed means less funding, and on a national scale that means big problems for the Highway Trust Fund.

If you've been following the construction industry news, you are no doubt aware that the Highway Trust Fund is going broke. If you supply products to DOTs, this issue could potentially hit you right in the pocketbook. Originally created to fund the construction of the interstate highway system, the Highway Trust Fund remains the backbone of the nation's surface transportation system. The fund gets its money from a federal fuel tax of 18.3 cents per gallon of gasoline and 24.4 cents per gallon of diesel fuel and related excise taxes.

Those tax rates have been in place since 1993. If you think back 20 years, the vehicles we drove then were gas guzzlers compared to what we're driving now, and that's why the fund is in trouble. At the risk of oversimplifying the issue, less gas consumed means less funding, and on a national scale that means big problems for the Highway Trust Fund.

Congress is now being called upon to provide the fix so that basic highway maintenance, upgrades and expansion can continue. Our economy already suffers immensely from lost time, increased accidents and other inconveniences related to aging transportation infrastructure. Without a fix, the trust fund is projected to run out of money in August, and projects all over the country will grind to a halt. If nothing happens soon, you will likely hear a great deal more about the dire economic consequences as the summer wears on.

The impact is being felt already. In March, the Arkansas Highway and Transportation Department put 10 projects on the shelf due to the uncertainty in funding. Those projects represent $60 million in bid letting, according to the American Association of State Highway and Transportation Officials. The work includes highway rehabilitation and widening, bridge replacements, traffic signal upgrades and highway connections, AASHTO says. Other states will no doubt follow suit.

There are three ways Congress can fix this problem: increase the gas tax, raid the treasury to deposit money into the trust fund account, or pass a long-term transportation bill that addresses the issue. Increasing the tax in an election year is pretty much a non-starter, so that's not likely to happen. Simply transferring money into the trust fund is a Band-Aid approach that has been used before, but it only delays the inevitable insolvency discussion for a short-term period. We need a long-term approach.

So let's fix it. There are hopeful signs that maybe this time we can get it done. Bill Shuster, the new chairman of the House Transportation and Infrastructure Committee, has floated the idea of a vehicle miles tax to pay for the highway bill. Other funding methods are also being discussed. On the Senate side, California's Barbara Boxer, the Democrat chair of the Environment and Public Works Committee, appeared with Louisiana Sen. David Vitter, the top-ranking Republican, to announce a bipartisan agreement "in principle" to work for a long-term renewal of the transportation funding act now known as MAP-21. The Moving Ahead for Progress in the 21st Century Act is a two-year funding piece set to expire Sept. 30. The Senate is talking about a six-year replacement, which would provide enough assurance for long-term projects to continue.

Nothing has been settled, but at least both sides are talking. As an industry directly impacted by roads, bridges and mass transit projects, we will make our voice heard. NPCA will be advocating for decisive action and joining with our partners in the cement and concrete industry to keep the pressure on Congress and the White House. As individual businesses, we need to put the pressure on our own congressional representatives as well. A modern transportation system is critical to the ongoing health of our economy and the safety of our citizens. We're running on fumes now, and it's time for all sides to put partisan differences to rest to figure out a way to fill up the tank.

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PROFILE

Building Character

David Smith of Lee's Precast Concrete Inc. in Aberdeen, Mississippi, inspects an SCC mix before dispensing it for septic tanks. Lee's Precast has built upon its honesty and integrity to become a company known for its character and its quality products.

Story and photo by Ron Hyink

DEPARTMENTS

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What's inside

May/June 2014

FEATURES

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STAFF:

Publisher: Ty Gable

Executive Editor: Bob Whitmore

Editor: Ron Hyink

Associate Editor: Kirk Stelsel

Technical Editor: Sue McCraven

Graphic Design: Molly Flick Tippner

Advertising: Brenda C. Ibitz
bibitz@precast.org (317) 571-9500

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Address your letters and comments to the editor:
Precast Inc./Editor
1320 City Center Drive Suite 200
Carmel, IN 46032
(800) 366-7731 Fax: (317) 571-0041
E-mail: npca@precast.org
precast.org

NPCA is a trade association representing the manufacturers of plant-produced concrete products and the suppliers to the industry around the world.

LIMESTONE, A SEDIMENTARY ROCK, NOT ONLY CAN IMPROVE MANY CHARACTERISTICS OF FRESH CONCRETE, IT IS MORE COST-EFFECTIVE AND ENVIRONMENTALLY BENEFICIAL WHEN USED AS A PARTIAL REPLACEMENT FOR PORTLAND CEMENT.

Dreamstime.com

Portland-Limestone Cement

GOOD FOR THE PLANET AND GOOD FOR YOUR WALLET

BY CLAUDE GOGUEN, P.E., *LEED AP*

When bricklayer Joseph Aspdin burned powdered limestone and clay in his kitchen stove at his home in Leeds, England, during the 1820s, he couldn't possibly have known the impact his experiment would have on the world. It's unlikely that he knew he was in the midst of building the foundation for a massive industry that now produces a billion tons of cement per year worldwide.

Portland cement has evolved to include many other minerals and chemicals to enhance its performance and manufacturing efficiency. However, that evolution has not eliminated the use of Aspdin's two basic constituents: limestone and clay.

Another look at limestone

Limestone is a sedimentary rock composed mostly of the mineral calcite and aragonite, which are crystal forms of calcium carbonate ($CaCO_3$). It can be found in many things from the Great Pyramids of Egypt to your tube of toothpaste.

Crushed limestone is often the main raw ingredient in the manufacture of portland cement clinker that eventually becomes cement. Other raw material sources of calcium carbonate include shells, chalk or marl, which are combined with shale, clay, slate, blast furnace slag, silica sand or iron ore. These raw materials are finely ground, blended in controlled proportions, and then heated in a kiln to temperatures of 2,640 F to form portland cement clinker. This clinker is ground to the fine powder known as portland cement.

In the final grinding step, other ingredients may be included, typically calcium sulfate (gypsum) and uncalcined limestone. ASTM C150 and AASHTO M85 limit the maximum limestone content to 5% by mass. ASTM C595 and AASHTO M240 were revised in 2012 to define portland-limestone cements with between 5% and 15% limestone by mass.

Portland-limestone cement (PLC) has comparable performance properties to ordinary portland cement but improves the environmental performance of concrete.

PLC has been used in the United States on a limited scale in accordance with ASTM C1157 for several years, but it is still considered a relatively new technology. Some forms of PLC have been used in Europe for more than 40 years, however. European Standard EN197-1 includes provisions for cements containing limestone in amounts up to 35%. The national Mexican standard NMX C-414 also allows up to 35% limestone. In New Zealand, PLC is produced with up to 15% limestone, and in Brazil a maximum of 10% limestone is permitted.

PLC has been used increasingly in Canada since its adoption of the CSA A3000 specification in 2008. That specification allows quantities up to 15% with similar provisions to those in ASTM C595.

Softening the standards

In the United States, as the demand for sustainable practices and materials continues to escalate, coupled with more restrictive regulations, the cement industry is working to decrease its environmental footprint. As a result, the provisions within ASTM C595 and AASHTO M240 were revised in 2012 to allow limestone contents of greater than 15% that would produce equivalent or greater performance while lowering the environmental impact.

The cements produced in the United States under ASTM C1157 for several years have a history of satisfactory performance in field applications, yet ASTM C1157 is not widely specified. That is why provisions for portland-limestone cements have been developed under ASTM C595 and AASHTO M240: a more significant impact on sustainability can be achieved as those specifications are more widely referenced.

The 2012 revisions of ASTM C595 and AASHTO M240 both have a new cement type designation: Type IL, which requires between 5% and 15% limestone as an ingredient. Most Type IL cements are around 10% to 12% limestone. Type IL cements can be substituted for ASTM C150 Type I cements, but not for Type II or Type V cements, because at this time there are no provisions for sulfate resistance. Testing is ongoing, and future revisions to ASTM will speak to this issue.

Limestone is a softer material than clinker and therefore takes less energy to grind to the same fineness. In cement finish milling, this results in better particle size distribution in the cement and enhanced particle packing and paste density in concrete. This is from a Canadian study where 12 different types of cement were separated into three groups: without supplementary cementitious materials (SCMs), with 35% slag cement and with 20% fly ash.

Within each group, ordinary portland cement was used, and then three other PLCs. The three PLC blends have different Blaine measurements, which is an indication of how finely they were ground. As you can see in Table 1, the PLC-3 in each group displayed the highest strengths and was the finer blend, with the Blaine values of 560 m^2/kg.

Effects on fresh concrete

Workability. In general, the fineness of the limestone is the main factor that influences workability. Some reviews suggest that the use of limestone may alter the water demand, resulting in a slight increase or decrease compared with concrete made with conventional cements. Therefore, it appears that PLCs can be used following the same approach as conventional portland cement.

Bleeding. Particles will absorb water onto their surfaces; therefore, bleeding is highly dependent on the surface area of the cement particles. As the surface area increases, water absorption increases. Increasing the fineness of the cement or limestone will add more surface area. Water absorption will therefore increase and bleeding will decrease. The use of

Table 1

	No SCM				35% Slag				20% Fly ash			
	PC	PLC-1	PLC-2	PLC-3	PC	PLC-1	PLC-2	PLC-3	PC	PLC-1	PLC-2	PLC-3
Limestone, %	3.43	13.02	15.69	12.59	3.43	13.02	15.69	12.59	3.43	13.02	15.80	12.59
Blaine, m^2/kg	371	462	515	560	371	462	515	560	371	462	515	560
W/CM	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.482	0.453	0.453	0.453	0.453
Air, %	1.3	1.3	1.2	1.3	1.2	1.3	1.2	1.1	1.4	1.4	1.3	1.3
Slump, mm	115	115	105	110	115	120	110	120	125	115	110	110
Slump, in	4.5	4.5	4.1	4.3	4.5	4.7	4.3	4.7	4.9	4.5	4.3	4.3
Set time, min	345	395	355	360	415	435	390	395	405	440	405	385
Bleed water,* mL/kg	3.2	3.6	3.7	2.2	4.4	4.0	2.8	2.9	2.9	3.4	1.6	1.2
Strength, MPa												
1 day	19.0	17.9	18.9	22.7	10.3	10.3	9.8	12.0	16.2	15.7	16.5	20.0
7 days	36.8	36.6	36.4	39.5	34.3	34.4	34.5	36.2	36.7	36.2	36.7	39.0
28 days	47.0	45.7	45.1	49.1	50.2	47.6	48.9	50.8	49.8	47.4	47.8	51.5
56 days	50.7	50.2	49.5	53.1	55.4	53.9	55.3	57.5	55.2	54.3	55.6	57.3
Strength, psi												
1 day	2755	2596	2741	3292	1494	1494	1421	1740	2349	2277	2393	2900
7 days	5336	5307	5278	5726	4974	4988	5003	5104	5322	5249	5322	5655
28 days	6815	6627	6540	7120	7279	6902	7091	7366	7221	6873	6931	7868
56 days	7352	7279	7033	7700	8033	7816	8039	8338	8004	7874	8002	8309

*Bleed water that accumulated during setting

Table from "The Durability of Concrete Produced with Portland-Limestone Cement: Canadian Studies," Thomas and Hooton (2010)

PLC as mentioned in this article refers to interground limestone in the manufacturing of cement and not the blended systems where ground limestone is mixed with ordinary portland cement.

limestone in the cement can slightly decrease bleeding based on its fineness but generally does not have an effect.

Set Time. Based on studies, it appears that cements with limestone may have a slight effect on setting time; however, this should not constitute a concern for the addition rates of 15% or less. In general, it has been reported that the influence of limestone on setting time was strongly related to the fineness of the limestone. As the limestone was ground finer, the setting time decreased.

Hydration. Limestone particles act as nucleation sites for hydration products. This means that small limestone particles are suspended in paste between clinker grains and become intermediate sites for C-S-H (the main binding phase in concrete) growth, improving efficiency. Therefore, the inclusion of limestone can increase the rate of hydration.

During hydration of low water-to-cementitious material ratio concrete mixes, a portion of the cement often remains unhydrated. It just sits in the concrete as filler. That's expensive filler, as cement is usually a major cost factor in concrete. Cost savings could be achieved by replacing that cement with a relatively inert material such as limestone.

Effects on hardened concrete

Strength. The quality and quantity of the limestone used plays a major part in the strength of concrete produced with PLC.

Studies have shown that limestone contents up to 15% may actually increase early-age strength as a combined result of improving particle packing, increasing the rate of cement hydration and production of calcium carboaluminate.

The reactivity of limestone has been debated. While most researchers have previously believed the limestone serves as an inert filler, research shows that limestone does react to a limited extent. As the limestone particles become finer, this reaction is more likely. Studies found that at low concentrations, limestone (calcite) reacts completely to form various carboaluminate phases.

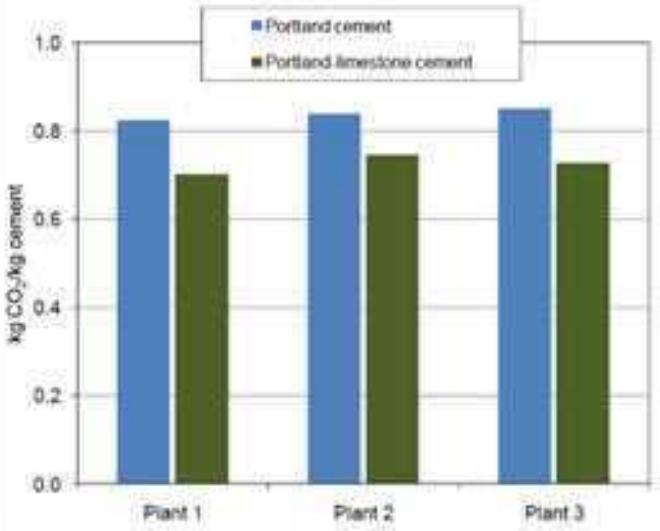
When increasing the amount of limestone in cement to achieve higher strengths, there is a limit. Use of larger quantities of limestone (15% to 25%) can result in the dilution of the paste, and that can reduce the strengths.

Tests show that limestone cements have a special synergy with Class C fly ashes resulting in higher compressive strengths.

Permeability. Many test methods have been developed to measure the resistance of concrete to the penetration of fluids such as water, vapors or gases, and accompanying aggressive species such as chlorides or sulfates. Regardless of the test method applied, it is generally considered that the durability of concrete improves with its ability to resist the movement of fluids and ionic species.

Permeability has been shown to be reduced by the use of limestone due a reduction in the connectivity of the pores.

Table 2



Specific CO_2 emissions from the production of portland cement or portland-limestone cement for three German cement plants (adapted from Schmidt 1992).

This is due to physical mechanisms such as enhanced particle packing and paste density, and the nucleation site phenomenon discussed earlier in this article. It is also due to slight chemical reactions of the limestone. The calcium carbonate also reacts with the aluminate compounds in the cements and SCMs to produce durable carboaluminate crystals. Another side effect includes the stabilization of ettringite and increased total volume of hydration products, thus lowering porosity and increasing strength.

Interaction with SCMs and admixtures

The use of PLC can increase efficiency of SCMs such as fly ash and slag. As mentioned before, limestone cements seem to work particularly well with Class C fly ashes. Limestone in PLC may counter set retardation effects of SCMs.

Studies so far have not revealed any significant effects of PLC on the effectiveness of admixtures. Recent research seems to indicate that a slightly higher amount of air entrainment admixture was needed in mortars made with PLC relative to those with portland cements, but this may be due to the finer cements. The amounts were well within the normal range recommended by the manufacturer and did not seem to extend to concrete mixtures.

Environmental benefit

Carbon dioxide (CO_2) emissions for cement plants come predominantly from two sources: calcination of the limestone, a primary raw ingredient for clinker manufacture; and fossil fuel consumption to heat the raw materials to the temperature required to form clinker.

The primary sustainability effect of using limestone as an ingredient in blended cements at levels of 5% to 15% by mass is that less clinker has to be produced for an equivalent amount

of cement, and therefore less energy is consumed and CO_2 emissions and other greenhouse gases are reduced. This can be seen in Table 2.

Another benefit of PLCs is their lower raw material demand, which reduces the consumption of natural resources. To produce a ton of portland cement, about 1.3 to 1.4 tons of raw materials are needed. PLCs need about 10% less primary raw materials.

Good for you, good for everyone

Precast concrete producers should always be on the lookout for any processes and materials that can reduce the cost of their products and improve sustainability while not negatively affecting performance. PLC may provide a means to that end.

The data shown in Table 1 indicate that the limestone content of cement can be increased from the level typically used in conventional portland cement (about 3.5%) to 15% while maintaining equivalent performance. This can result in reduced environmental impact and, in some cases, reduced cost.

Achieving comparable performance in concrete using PLC to that obtained using conventional portland cement is possible, because finely ground limestone can contribute to development of microstructure, particularly when fineness and chemistry of the finished cement are optimized by the manufacturer. The use of PLC should be a seamless integration in the manufacturing process of precast concrete.

If you are interested in looking into using PLC in your facility, contact your cement manufacturer to learn more. You can also find a lot of good information on the Portland Cement Association's website at cement.org.

For more information on this subject, please feel free to contact Claude Goguen at (317) 571-9500 or at cgoguen@precast.org.

Claude Goguen, P.E., LEED AP, is NPCA's director of Sustainability and Technical Education. Paul D. Tennis, Ph.D., who contributed to this article, is director of Product Standards and Technology, Portland Cement Association.

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Fishing for Changes

NCCCO's certification program for boom truck operators gets some needed changes for precasters, but there is still room for improvement.

BY EVAN GURLEY

All good fishermen need to know what they are doing before they ever dip their lines in the water. There are certain precautions to follow for everyone's safety, there are certain regulations to follow, and the fisherman had better know how to handle his boat and tackle. But trolling around the local lake in your bass boat is quite a bit different from trolling the high seas in your 56-ft trawler. It wouldn't make sense for a bass boat operator to obtain extra skills required to captain a trawler in the ocean.

When we correlate this to hauling concrete, precasters should not be expected to certify boom truck operators who are lifting manholes off trucks with the same certification as operators of huge cranes that lift entire sections of buildings. Certainly precasters should be tested on their capabilities to sling concrete for safety's sake, but the knowledge and skills required to operate a 100-ton crane are far more demanding than those required to operate a boom truck.

Two certifications planned

In response to a request by NPCA and other industry groups, the National Commission for the Certification of Crane Operators (NCCCO) will develop and launch two new certifications created specifically for boom truck operators. NCCCO will develop a more specific certification subtype addressing the unique characteristics of boom trucks, based on recommendations from a working group that included NPCA technical staff, NPCA members and other industry representatives. The new program will cover boom trucks with fixed controls and boom trucks with swing controls. Most boom trucks in the precast concrete industry fall under the Boom

Truck-Swing Controls certification category.

These programs will meet all U.S. Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) requirements and establish the highest standard for certification of boom truck operators. An OSHA rule requiring certification of crane operators has been set to take effect in 2014, but is now delayed until 2017. With the delay, employers can now ensure their employees are certified to meet both federal regulations and any site-specific requirements they may be facing now by taking the certification. Both boom truck certifications are expected to launch in 2014. The certifications will include both written and practical components, but have been designed specifically to address the knowledge and skill required of boom truck operators. Some state agencies may require certification between now and 2017 (see the sidebar "Where OSHA Stands").

BOOM TRUCK WITH FIXED CONTROLS
Photo courtesy of Wes Dees, Helix Steel

NCCCO and issues with certification examinations

NCCCO is a nonprofit organization that develops performance standards for safe crane operation in all U.S. industry sectors. OSHA recognizes NCCCO's certification program as meeting OSHA requirements for crane operator competency. NCCCO's certification program is also recognized by the ANSI.

Prior to forming its Boom Truck Operator Work Group, the NCCCO Mobile Crane Operator certification consisted of a core examination in crane operation and up to four crane specialty examinations. The NCCCO written specialty examinations are:

- Lattice Boom Crawler Cranes (LBC)
- Lattice Boom Truck Cranes (LBT)
- Telescopic Boom Cranes – Swing Cab (TLL)
- Telescopic Boom Cranes – Fixed Cab (TSS)

The majority of operators in the precast concrete industry use boom trucks that fall under the TLL and TSS designations, but some NPCA member operators are having issues passing this certification examination. These issues stem from questions in the current written core exam and the current written specialty exams that go above and beyond what precast industry boom truck operators would actually face. The load chart used in the TLL exam was possibly the biggest snag for precasters, because the specialty exam used a load chart for a Grove crane, which is far and away larger than what they would use for deliveries and installations.

NPCA/NCCCO resolution

In early 2012, the Wisconsin Precast Concrete Association (WPCA) met to address the NCCCO Mobile Crane Operator certification issue, then looked to the National Precast Concrete

WHERE OSHA STANDS

The U.S. Occupational Safety and Health Administration (OSHA) established a new rule on crane safety in 2010, but its new standard on cranes in construction has been in development for a long time. The previous standard was adopted in 1971, and OSHA has been working on a new rule since 1998.

From 2002 to 2004, an OSHA committee of safety and industry professionals reached a consensus on a new rule. In October 2008, OSHA issued a proposed rule based upon the committee's work. After public comments and hearings, OSHA published its final rule Aug. 9, 2010, with its provisions that were to take effect Nov. 8, 2010. A four-year compliance period was added in the provisions for the crane operator certification/qualification requirement, meaning that employers were instructed to be in compliance by Nov. 8, 2014.

OSHA once again proposed a rule Feb. 7, 2014, to extend the compliance date for the crane operator certification requirement by three years to Nov. 10, 2017. The proposal would also extend to the same date the existing phase-in requirement that employers ensure that their operators are qualified to operate the equipment.

Boom truck operators were given a three-year extension when OSHA delayed its certification deadline to 2017, but this doesn't mean all state agencies are waiting until 2017 to require that boom truck operators pass a certification exam. If you're working at a plant in California, for example, you need to be certified by an accredited testing agency right now. Other states have different requirements, setting up a patchwork of regulation between now and 2017.

BOOM TRUCK WITH SWING CONTROLS
NPCA File Photo

Association (NPCA) for direction and action in resolving this issue. By that summer, NPCA formed a Boom Truck Task Group to address the issue, and by fall it asked NCCCO to consider modifying the program to best fit the needs of the precast industry.

The NPCA Boom Truck Task Group, which consisted of NPCA members Jennifer Burkhart of Arrow Concrete Products Inc.; Ben Gray of Pre-Cast Concrete Products of Maine Inc.; Steve Mader of Crest Concrete Products Inc.; Steve Olson of Huffcutt Concrete Inc.; Greg Stratis of Shea Concrete Products; Andy Winkler of Wieser Concrete Products Inc.; and David Watkins of QMC Cranes presented a strong case, and NCCCO agreed to seek a resolution.

NCCCO formed a task group of its own, so the NCCCO Boom Truck Operator Work Group was formed to include NCCCO, NPCA, the National Burial Vault Association, the International Sign Association, and the Outdoor Advertising Association of America.

As a result of the work presented by the NCCCO Boom Truck Work Group, the NCCCO Board of Directors officially approved the development and launch of two new certifications to directly cover the operations related to boom truck operators. The new program will cover boom trucks with either swing controls or fixed controls:

- Boom Truck – Swing Controls (BTS)
- Boom Truck – Fixed Controls (BTF)

Both programs will be restricted subcategories of NCCCO's existing TLL and TSS certifications.

New program requirements

Under the new program, candidates will be required to take the following exams:

- Revised core exam, which eliminates a majority of questions that do not pertain to the precast industry
- Specialty written exam corresponding to each designation (BTS or BTF)
- Practical exam corresponding to each designation (BTS or BTF)

The NCCCO will stick with the existing TSS Manitex load chart for the Boom Truck – Fixed Controls exam, but it will develop a new load chart for the Boom Truck – Swing Controls exam. This is a positive result for the precast industry, as the current Swing Controls written specialty exam includes the Grove crane load chart that many operators in the precast industry do not understand.

Since a great many boom trucks in the precast industry fall under the Boom Truck – Swing Controls designation, a newly developed load chart will vastly improve an operator's chances of passing the written portion of the exam with the appropriate level of training. The existing TSS Manitex load chart hasn't caused the majority of the issues with precast operators, as they are representative of load charts they use on a daily basis, so keeping the load chart in place for the Boom Truck – Fixed Cab exam is not an issue.

Another big change is that NCCCO has agreed to modify its current core exam questions, eliminating the majority of questions that boom truck operators in the precast industry do not work with on a daily basis.

While eliminating the OSHA crane operator certification all together for the precast industry operators would be the ideal scenario, the new certification exams in development by NCCCO will address the needs of operators currently required to have this certification by presenting them with a more representative certification exam. ■

Evan Gurley is a technical services engineer with NPCA.

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Finding and Retaining Quality Workers

With the labor market tightening up, precasters are seeking new ways to find and retain quality employees.

BY BRIDGET McCREA

Good employees are getting harder to come by these days, thanks to a recovering economy and manufacturing firms' seemingly insatiable need for skilled laborers. "The labor market in the Northeast is even tighter than it is elsewhere in the U.S.," points out Paul Heidt, engineering manager at Garden State Precast in Farmingdale, N.J. "There's less competition for jobs and not quite as many candidates out there."

The fact that the economy is in recovery mode is a double-edged sword for precasters. The onslaught of new projects is more than welcome, of course, but staffing up has gotten somewhat more difficult in 2014. No longer compelled to hang onto their jobs for fear of not being able to replace their incomes, employees have more options and are readily exploring them.

That exploration puts pressure on firms like Garden State Precast, which is "struggling to retain employees at a reasonable pay rate," says Heidt, "because there just aren't as many people available to fill the jobs." Much like the law of supply and demand pushes prices up when products are scarce, fewer candidates in the pool translate into higher wages.

Also challenging precasters right now is the fact that no matter how much training and nurturing a company offers, employees could jump ship if presented with a better offer. "You spend a lot of time training and then he or she promptly goes out and gets another job," says Heidt, whose company focuses on creating a corporate culture around employee retention. "You have to make it so that they want to come back, instead of going somewhere else."

In some cases, that means pairing up longtime, veteran

employees with new recruits in a mentoring-type relationship. The new workers get trained not only on their specific jobs and safety measures, but they also get "tuned into" the organization by working directly with a five- or 10-year employee. Garden State also uses cross training (training new employees to be able to handle various jobs versus just one) and provides solid career paths and promotion opportunities to existing employees.

Taking nontraditional routes

To find employees, Garden State Precast has also started using nontraditional recruiting methods. "We're doing more than just our traditional newspaper ads," says Heidt. "We're also recruiting through some of our local churches, labor organizations and other groups." And where some companies may benefit from using sites like Monster or LinkedIn – or other national search methods – to find workers, Heidt says most of the company's workforce hails from the area within 10-12 miles of its facility.

"They don't want to change their locations or move to a new town for a new job, so we typically recruit locally," Heidt explains, "particularly when it comes to our plant labor." A union facility, Garden State Precast also incentivizes its existing workforce for recruiting new workers. Once those new employees have completed the probationary period and entered the union, for example, the precaster rewards the referral source for bringing in the new employee.

> "The idea that employees would stay put simply because they had jobs is going away; the labor market is better, and people are starting to look around for better and/or different options."
>
> – Barry Maher, *author of "Filling the Glass: The Skeptic's Guide to Positive Thinking in Business"*

Heidt says recruiting good employees in today's job market requires a deliberate, honed approach. Put together a plan for recruiting based on your industry, where your plant is located and what your HR needs are. "You can't just shoot from the hip anymore, particularly when it comes to skilled positions like drivers, welders and anyone who has to hold a certification," says Heidt. "They aren't going to come walking in your door anymore; you have to get out there and find them."

Birds of a feather

As the U.S. economy continues to emerge from a period where many employees were afraid of losing their jobs – or, that another would be difficult to find – manufacturers across most sectors are struggling with a shrinking pool of skilled labor. And as Heidt pointed out, the employees swimming in that pool are demanding higher wages, better benefits and a corporate culture that goes beyond just punching a clock every day.

These and other factors have made recruiting, hiring and retaining somewhat challenging for precasters. "You can't have a great business without great people," says Barry Maher, a Corona, California-based business management consultant and author of "Filling the Glass: The Skeptic's Guide to Positive

10 REASONS TO HIRE VETERANS

For its "Employing America's Veterans: Perspectives from Businesses" study, the Center for a New American Security conducted 87 interviews representing 69 companies and uncovered the following 10 reasons why firms hire veterans:

1. **Leadership and teamwork skills.** Veterans typically have led colleagues, accepted direction from others and operated as part of a small team.
2. **Character.** Veterans are perceived as being trustworthy, dependable, drug-free and having a strong work ethic.
3. **Structure and discipline.** Companies, especially those that emphasize safety, appreciate veterans' experience following established procedures.
4. **Expertise.** Companies value veterans' occupational skills, job-specific experiences and understanding of the military community.
5. **Dynamic environment.** Veterans are accustomed to performing and making decisions in dynamic and rapidly changing circumstances.
6. **Effectiveness.** Interviewees report that veterans "get it done."
7. **Proven success.** Some organizations hire veterans largely because previously hired veterans have already been successful. Veterans demonstrate that they share company values and fit the organizational culture.
8. **Resiliency.** Veterans are accustomed to working in difficult environments, and to traveling and relocating.
9. **Loyalty.** Veterans are committed to the organizations they work for, which can translate into longer tenure.
10. **Public relations value.** Some companies have found marketing benefits to hiring veterans.

DON'T OVERLOOK THE MILLENNIALS!

Also referred to as "Gen Y," the millennial generation comprises Americans who were born after 1980 – with the youngest of them now 19 years old. According to Pew Research Center, they are more ethnically and racially diverse than older adults. They're less likely to have served in the military but are on track to become the most educated generation in American history. And while it's no secret that their entry into careers and first jobs has been badly set back by the Great Recession, millennials are more upbeat than their elders about their own economic futures as well as about the overall state of the nation.

Of particular importance to employers is the fact that millennials are history's first "always connected" generation. Steeped in digital technology and social media, they treat their multitasking handheld gadgets almost like a body part – for better and worse. According to Pew, more than eight in 10 millennials say they sleep with a cell phone glowing by the bed, poised to "disgorge texts, phone calls, emails, songs, news, videos, games and wake-up jingles."

Millennials are on course to become the most educated generation in American history. It is a trend driven largely by the demands of a modern knowledge-based economy, most likely accelerated in recent years by the millions of 20-somethings enrolling in graduate school, college or community college in part because they can't find jobs, Pew reports. Among 18- to 24-year-olds, a record share – 39.6 percent – was enrolled in college as of 2008, according to census data.

When looking for millennials to round out your company's workforce, Marian Thier, founder and partner at Listening Impact in Boulder, says "old school activities with a technology twist" tend to be most effective. "Go where they are and communicate how they communicate," says Thier, who sees schools, peers, interest groups, networking meetings and college internships as some of the best ways for companies to connect with potential millennial employees. Tapping into social networking sites like LinkedIn and Facebook can also help companies make those all-important initial introductions with younger recruits.

Thinking in Business." "The idea that employees would stay put simply because they had jobs is going away; the labor market is better, and people are starting to look around for better and/or different options."

Maher says precasters must think beyond money when hiring. "Employees want more; they want a worthwhile place to work in every day," says Maher, who points to management attitudes, corporate culture and advancement opportunities as three good ways for manufacturers to attract and retain new workers. "These things can make up for you not being able to offer as high of a salary as you'd like to."

To find those workers, Maher says the best approach is to motivate your current employees to do it for you. A bonus of some kind or a cash award for every prospect recommended who is then hired and lasts a significant amount of time, say a year or six months, can work wonders. "Your current employees know what it takes to do the job," says Maher. "They have a vested interest in bringing in people who will make the workload lighter, not heavier. And since, as the cliché goes, birds of a feather stick together, they are very likely to know others who are just like them."

Stars and stripes recruiting

Good employees who will see projects through to the finish without complaining or slacking off aren't always easy to find. With the job market loosening up and more companies getting back into the hiring game, now is a good time to start thinking about hiring one or more of the many military veterans currently looking for jobs.

The reasons for hiring veterans are compelling, according to Chris Marvin, managing director for Philadelphia-based Got Your 6, a campaign led by the entertainment industry to create a new conversation in America where veterans and military families are perceived as leaders and civic assets. "The best reason to hire veterans is because it's likely that your competition has already hired some," Marvin says. "If you don't put some of these leaders and assets into your workforce, you'll lose competitive advantage."

Marvin says the fact that veterans have been trained by the federal government to be leaders, team builders and problem solvers makes them particularly good job candidates for myriad positions. "Employers must recognize that veterans bring intangible skills that are invaluable, and that veterans are quick to learn new work skills," says Marvin. "The best approach is to hire for the intangibles and then teach the tangibles."

NPCA is also doing what it can to help put veterans back to work. It recently partnered with the U.S. Army Reserve to promote the Hero 2 Hired (H2H) program. For employers, H2H provides free, direct access to qualified candidates who already have background checks and security clearances, also helping reduce recruiting and hiring costs. You can send customized online marketing materials and invitations-to-apply to the candidates of your choice and "position your organization for future success by connecting your job

opportunities with some of our nation's best-trained talent," according to H2H's website.

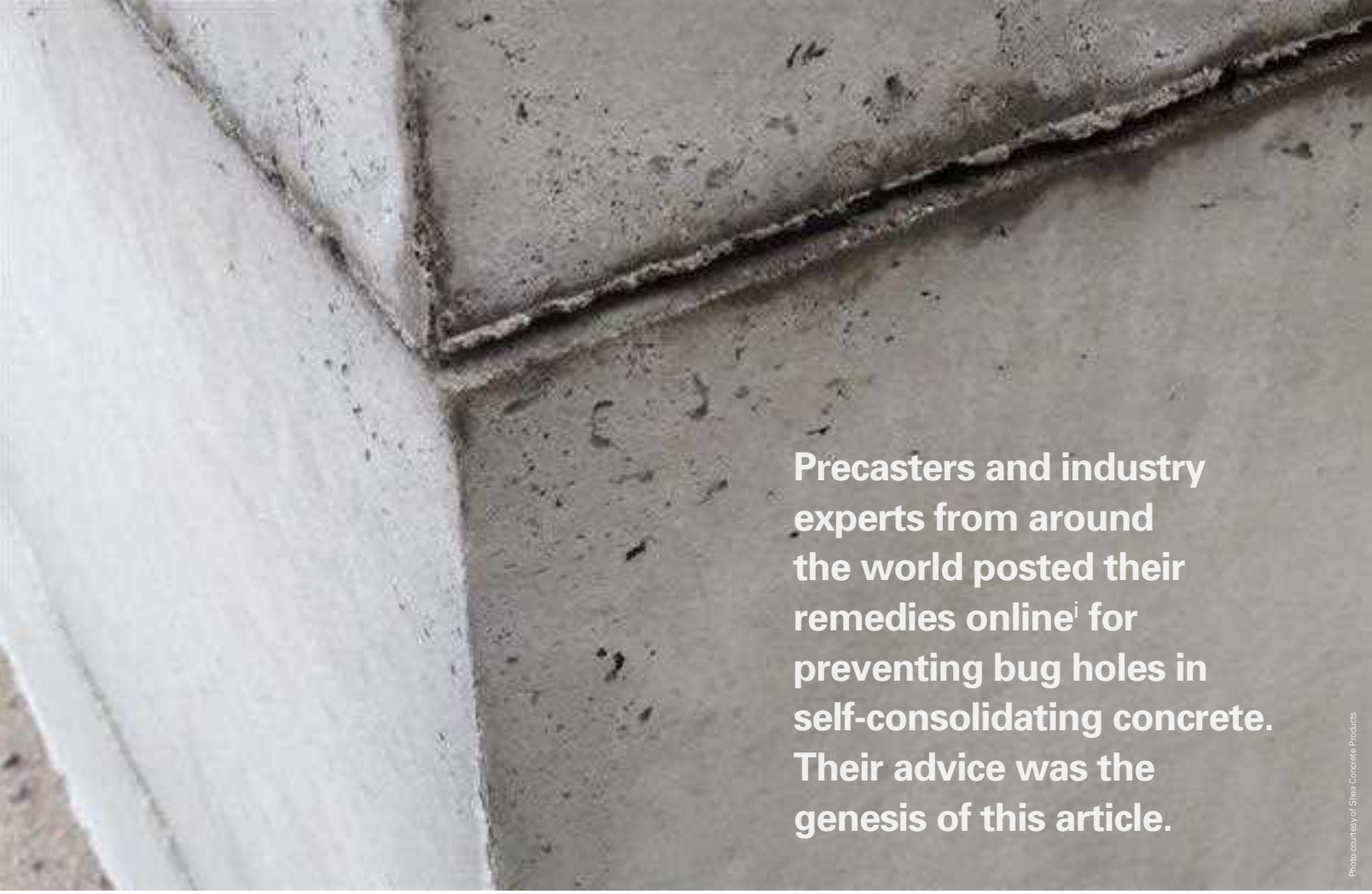
A retired Army Reserve colonel, John Lendrum, president at Norwalk Concrete Industries in Norwalk, Ohio, spearheaded the NPCA-H2H agreement and has used the service on numerous occasions to find job candidates. He says veterans are particularly attractive recruits, because they are more resilient than the average person, have at least basic leadership skills (if not advanced), know the value of safety in and out of the workplace, and tend to be good problem solvers. "They also have a strong work ethic that's unlike what the average employee walking in off the street has," says Lendrum.

Lendrum says programs like H2H can help precasters better manage in this time of tight labor and rising wages. "We've lost some good people this year, because they moved to places where they can get the highest dollar," says Lendrum, who points to road construction and home building as two of several industries that are pulling skilled labor away from the manufacturing sector. "That's definitely presenting some challenges for us right now."

Other ways Norwalk Concrete is offsetting those challenges include visiting and working with area vocational schools and connecting with high school seniors who have specialized in construction, welding or even auto body work. The company also tunes up its compensation plan annually, offers a full suite of benefits, and offers the most competitive wage levels possible. Finally, Lendrum says his company plays up the fact that plant work doesn't require travel or on-the-road living expenses. "In most cases, our employees have a predictable work day in exchange for a good wage and benefits," says Lendrum. "For some people, that's a very attractive proposition."

To precasters who are struggling with employment challenges right now, Heidt says sticking to good hiring practices – even when business is brisk and workers are hard to come by – is extremely important. Don't overlook the need for pre-employment screenings, interviews, drug tests and other practices your company relies on. "You really need to stay the course," says Heidt, "because in the end, you'd rather have four to six good employees than eight to 10 mediocre ones you can't rely on."

Bridget McCrea is a freelance writer who covers manufacturing, industry and technology. She is a winner of the Florida Magazine Association's Gold Award for best trade-technical feature statewide.



Precasters and industry experts from around the world posted their remedies online[i] for preventing bug holes in self-consolidating concrete. Their advice was the genesis of this article.

Photo courtesy of Shea Concrete Products

INTERNATIONAL DISCUSSION:

Causes & Fixes for SCC Bug Holes

BY JOHN PELICONE

Like a persistent mosquito, one question has plagued precast concrete producers for years: "How can I eliminate bug holes?" In the past, this question was much harder to answer, because concrete was placed at a stiffer consistency that required excessive vibration. And excessive vibration sometimes caused more bug holes. After the introduction of self-consolidating concrete (SCC), bug holes[ii] became a less common occurrence. Yet, as a recent online industry discussion revealed, this perturbing problem is still with us.

Let's focus on production's tail end

The first thing we all learn about SCC is that it's a tricky devil to work with. There is no room for error, consistency and control are king, and problems, like bug holes, can have more than one cause.

Most online commentators agree that there are three main causes of bug holes:

1. Improper selection and application of form release agents
2. Problems with SCC mix design (cement, water content, viscosity, admixtures)
3. How SCC is placed in the form

Rather than trying to cover all possible sources of bug holes, I decided, like the online commenters, to focus on form work, placement and form release agents. Attempting to cover complex SCC mix-design issues would be too unwieldy for one article.[iii]

Two types of release agents

1. **Chemically reactive agents:** When a chemically reactive form release agent is used, a nonviolent chemical reaction takes place when fatty acids react with free lime on the surface of fresh concrete.

This reaction results in the formation of a metallic soap, a slippery material that allows air bubbles to rise along the vertical surface. This "soapy" film also prevents the hardened concrete from adhering to the forms during stripping.

2. **Barrier release agents:** Thicker coatings on forms are typical of the older barrier-type materials, like heavyweight used motor oil, vegetable oils, diesel fuel and kerosene. Barrier type release agents are less expensive than chemically reactive agents, but they are not generally recommended for reducing SCC bug holes.

A problem with the heavier, thicker barrier agents is that the flowing SCC may actually push the release agent down the vertical face of the form, thereby enfolding or entrapping air pockets that lead to surface bug holes.

International input on SCC bug holes

The following is advice from industry experts on bug hole causes and remedies.

Juan Manuel Pereira, Concrete Quality Software, Spain (concrete-quality.com)

"Generally, oils will give the worst finish, especially if applied in excess. Use a wax-based mold-release agent in a thin layer (like polishing furniture), which gives excellent results. They are more expensive, but, when you do the math, the cost per square foot is negligible. Maintaining good form condition is also important."

Jeff Bishop, precast division manager, Nox-Crete, Nebraska (noxcrete.com)

"Too often, the form release application equipment is inferior, the sprayer has a faulty tip, or the equipment fails to maintain the minimum pump pressure to adequately apply a thin coat on the form surface. Not many plant workers will make frequent stops to check or correct the pressure after they have started spraying. We spent three years developing quality pumping and spraying equipment that ensures a consistent, fine spray.

"Sometimes with truck deliveries, the discharge chute gets ahead of the initial hydraulic head formed by flowing SCC; this can cause entrapped air. You have to make sure you are adding concrete to concrete in such a way that the head is maintained. As the SCC flows down the form and up the side of the form, entrapped air is pushed forward, up and out."

Cecil Wilson, plant manager, Metromont Corp., South Carolina (metromont.com)

"There are three reasons for SCC bug holes – it's 1/3 form release agent, 1/3 the mix and 1/3 how the concrete was placed. All three potential causes need to be checked systematically, one at a time, so you can pinpoint the problem. It is imperative to pour SCC so that entrapped air has the opportunity to escape."[iv]

FORM RELEASE SHOULD BE APPLIED IN A THIN COATING.

Photo courtesy of John Pelicone

Bob Waterloo, technical sales manager, Hill & Griffith Co., Indiana (hillandgriffith.com)

"Training. I'm a huge proponent of training workers on proper application. 'Thinner is better' is what I advise plant workers during my training sessions.

"Here's an analogy: Think about waxing your car. You put on a thin coat and then buff it out; it's the same with release agents. In fact, the coating should be thinner than a wax finish on a car.

"But do workers always take the time to mop or rub down forms after spraying? Labor is a major expense for all precasters, and the person prepping forms may not follow proper application methods if he knows the forms are needed in production ASAP."

John Stewart, global business development manager, Ecoratio, The Release Agent Co., Great Britain (ecoratio.com)

"The main thing is to use a good release agent. Where possible, revert to a top-class release agent rather than a mold oil. This will help surface air escape quickly rather than being retained by a thick oil."

Alexis Borderon, Reval Stainless Steel & Concrete, Italy (reval-stainless-steel.com)

"We have tried coconut oil, fat, oil-free release agents – all kinds of miracle products from world-class salesmen. I certainly learned that whatever product you use, it must be applied in a thin layer, concrete must be poured close to the form, and never let fresh SCC be poured from a height! We never vibrate."

Sam Strong, president, Strong Products LLC, Michigan (strongproductsllc.com)

"Release agents generally average $7 to $10 per gallon, but specialized applications may call for a more expensive product. A precaster's cost and time concerns can result in a poor choice of release agent. A cheaper price may look good but can lead to more labor cost down the road after you have product staining and bug holes. Truth is, product reps rarely see forms being wiped-down or mopped according to manufacturer's instructions, especially at the smaller precast operations."

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Brian Robinson, continuous improvement manager, Humes Pipeline, New Zealand (humes.co.nz)

"You should try a few different mold release oils – diesel-based, bio oil-based, etc. Suppliers should bust your door down to provide some free samples; stay away from your current so-called 'cheap' option. A good release agent that works will end up a similar price – if applied sparingly (correctly), it will result in better quality products. It's a process of elimination; using different release agents will help you determine if the mix has any issues.

"You've got to place from one point in the mold and let it flow. We noticed the SCC places better in the mold using about a 150 mm-diameter opening – not a wide-mouth opening. Also, if the concrete needs to fall a considerable height, a tremie pipe or sleeve works well. This prevents segregation and removal of release agent by falling concrete (which also affects the finish) and reduces bug holes. We never need to mechanically vibrate (we outlaw this) but large, deep tanks may need a small amount of rodding (12 mm-diameter) reinforcing bar, rodded up and down a dozen times at the opposite side of the mold (from where the concrete is placed) to prevent a discolored seam."

Greg Stratis, manager, Shea Concrete Products, Massachusetts (sheaconcrete.com)

"We don't use external vibration for our SCC products – you can quickly over-vibrate the mix. We use SCC on 95% of our product. A lot of our products are vaults with reinforced 3-in. or 6-in. walls. Our SCC design is 5,000 psi with 26-in. spread.

"We are able to get a smooth finish without vibration. In my opinion, if bug holes are present on our product using this mix, it is usually due to too much form oil or a change in our oil consistency. But generally, I would say that the cleanliness of the form and the quality of the release agent used are critical to preventing finish bug holes in the concrete surface."

Claudio Subacchi, director of R & D, Hawkeye Pedershaab, Iowa (hawkeyepedershaab.com)

"To make sure it is not your release agent, try to make a pour after waxing the surfaces. Sometimes fatty acids (probably the form release agent) generate some bug holes. For wax, we do not use an oil-based one and avoid ones that have beeswax, because they have sugar residues that can potentially cause other kinds of problems. We use a very thin layer of carnauba oil and let it dry, and then cast. If the bug holes go away, then it is your release agent; if not, ask your admixture supplier for a defoaming agent.

"Typically on large architectural surfaces, you do not want to have the SCC travel more than half a meter on a 40 mm-thick pour. If that happens, you may not have bug holes, but you get a shadow from the release agent. See my video for a demonstration."

Todd Leber, chief inspector, Nebco Inc., Lincoln, Nebraska (nebcoinc.com)

"We have had success using two form release agents casting SCC. The key is to apply it as thin as possible. Contact your local distributor to find the right material for your application."

So in conclusion, let's summarize the industry's consensus from for preventing SCC bug holes in three points:

1. Use the thinnest application possible of a quality form-release agent, using superior sprayer equipment (pumpers maintained at proper pressure and sprayer tips/nozzles in good condition);
2. Maintain proper SCC placement from one pour location in the form, remembering that a slower placement rate allows entrapped air to escape; and
3. Maintain forms in clean condition.

John Pelicone is a private consultant for Big River Industries Inc. and has worked in concrete materials, testing and sales in the precast and prestressed industry for more than 40 years. Contact him at pelicone@bellsouth.net or (770) 682-9896.

Endnotes

[i] http://www.linkedin.com/groupItem?view=&gid=1899068&type=member&item=5844098373677760512. Contact Mason Nichols at mnichols@precast.org for more information on this link.

[ii] According to PCA (Portland Cement Association), "The ever-increasing use of structural concrete as an architectural building material has catapulted quality in surface appearance to a prominent position within the concrete construction industry. One of the primary influences affecting the surface aesthetics of concrete is bug holes. Bug holes are surface voids that result from the migration of entrapped air (and to a lesser extent water) to the fresh concrete-form interface. These surface defects manifest themselves mostly in vertical surfaces." http://www.cement.org

[iii] See: SCC Part I (characteristics, aggregates and equipment) and Part II (troubleshooting and test methods) in Precast Inc. magazine, January-February and March-April 2014 for detailed information on mix design and control of free water.

[iv] Best Practices Guidelines for Self-Consolidating Concrete, prepared by the Ready Mixed Concrete Association of Ontario, January 2009, page 10. RMCAO recommends: "For large vertical elements care should be taken not to fill the formwork too rapidly. The placement rate should be slowed to the point that there is sufficient time for the entrapped air to rise to the concrete surface. Since air movement can only take place when the SCC is itself moving into the formwork, slowing the placement rate may assist in removing unwanted air pockets at the formed face of the concrete."

[v] See video at: https://www.youtube.com/watch?v=d8luoYe1Fqg&feature=youtube_gdata Contact Claudio Subacchi of Hawkeye-Pedershaab at: Claudio Subacchi <csubacchi@hawkeye-pipe.com>

Photo by Ron Hvnk

Photo by Ron Hvnk

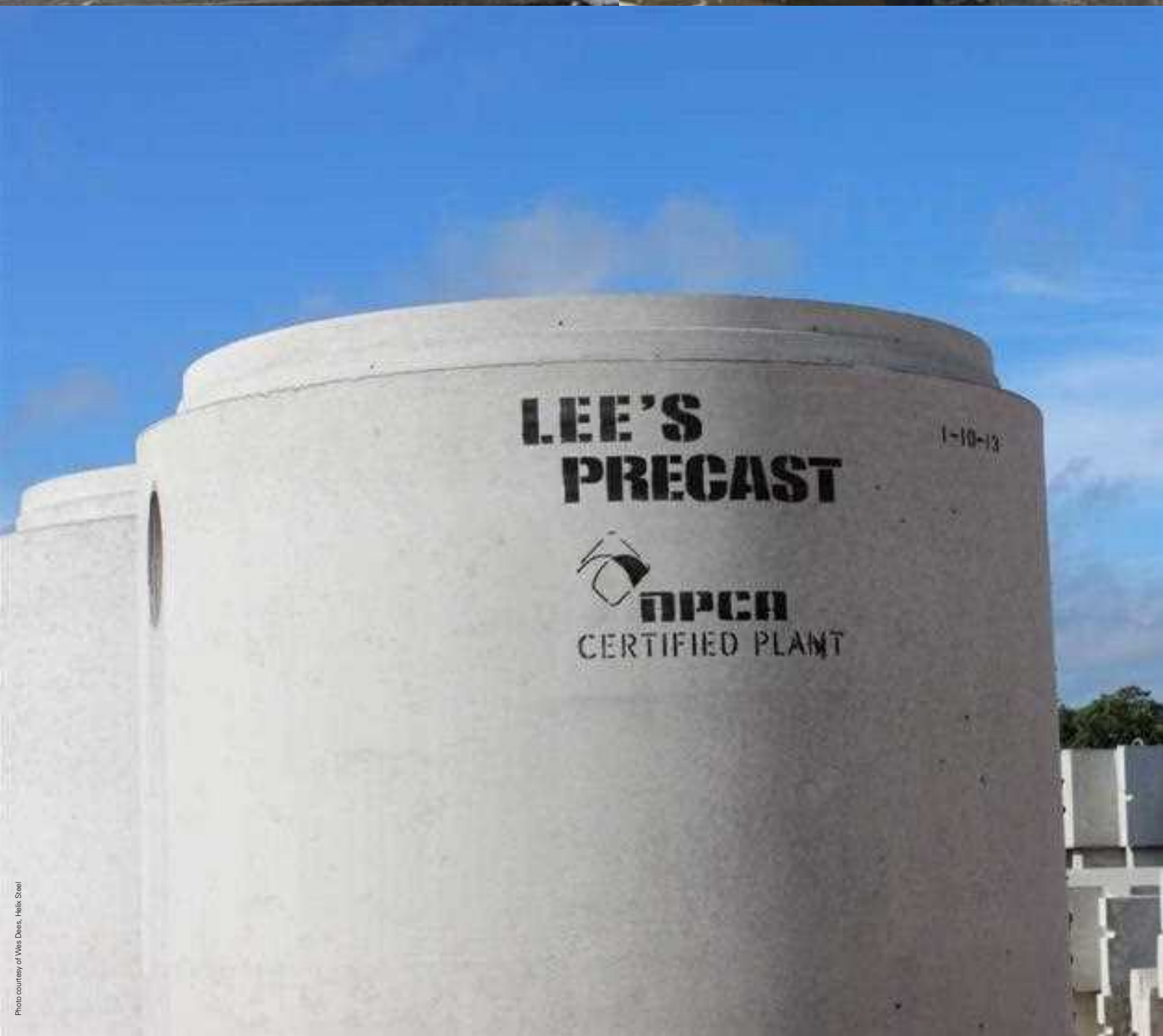


Photo courtesy of Wes Dees, Helix Steel

BUILDING CHARACTER

Lee's Precast Concrete Inc. of Aberdeen, Mississippi, has been built upon honesty and integrity to become a company known for its character and its quality products.

BY RON HYINK

A business deal that went sour for Milton Lee turned out to be a huge blessing. All he wanted to do was acquire his own business so he could work close to home and spend more time with his sizeable family.

A tip from his brother-in-law led him to make an offer on a company going out of business. So he made an agreement with the company's owner and said he would come back that Friday to finish up the deal. "And 30 minutes after I had left, another guy walked in and laid his money down on the counter, and so that put me out," said Milton.

It was a bitter disappointment, but, blessings being what they are, it turned out that two other companies were going out of business at the time. So in November 1978, Milton bought a small, upstart precast concrete septic tank manufacturing business near Aberdeen, Mississippi, that is now known as Lee's Precast Concrete Inc.

With little more than two forms and a truck, Milton went to work to provide for his family as he watched his children and his business grow. He had no batch plant at the time, relying instead on outside help. "We poured with ready-mix for about five or six years, and then we got our own truck that we mixed our own concrete in," he said.

He also had a 1-ton crane that he could use to move forms around, but it couldn't lift the finished product. "We always had to handle the tanks with the trucks," said Milton. "That's where I got started, and it just got bigger and bigger. And now the children are running it."

The product line has since expanded to include grease interceptors, storm shelters and, when proximity and economy make it more practical, pouring products such as MSE wall panels and retaining walls for other precasters.

FAMILY-RUN

With three brothers, two sisters and two brothers-in-law running the business – and with Milton

still involved – Lee's Precast is genuinely a family-run company. Growing up around the family business, the children became acclimated to the intricacies of running a precast plant at an early age, especially the boys as they learned the trade by toiling away on the plant floor.

Allen Lee, who now serves as general manager, along with his brothers, began their mastery of all things precast at around age 10. Working in the shadows of a formidable mixer did not intimidate them. "We used to stand on top of a 5-gallon bucket to get to the levers to operate it," said Allen.

Not even the trucks could deter them as they learned to back them up to the product, hook them up and load them – with just one minor obstacle: "The only way we could reach the clutch and brake was to sit on the front of the seat, lean up and touch the floor," said Allen.

As the boys came of age, so did the business as a new building with a batch plant was erected. "After we built the building, we poured for a while with just a mobile truck, and then we ended up with a drum mixer underneath a stationary, permanent volumetric batching system so we could mix SCC," said Allen, referring to self-consolidating concrete. "It took about 20 minutes to do a batch of 3 yards. It was a small drum, but that's what we used."

As time marched on, some of the family members went to work for other companies temporarily, and Allen himself served as an emergency medical technician for an ambulance service while he worked his way through college. "I still keep up my license," he said. "It's not something I will ever want to have to go back to, but I enjoy helping people. You never know when you can help somebody." And that speaks to the values the Lees adhere to.

Milton is now semi retired, but he still remains very active not only in the company but also in the local community. "He's a key, integral part of the business," said Allen, adding that his father will still weigh in on important business decisions.

A SOLID FOUNDATION

Milton handed down more than just a concrete plant to his children – they also picked up on his strong moral values. He recalled one instance where he was providing a large number of septic tanks to a contractor. Meanwhile, another customer had called wanting a tank delivered at the same time. "He said, 'Tell the other guy that you broke down,'" explained Milton. "I said, 'If I tell him that, you won't ever believe another word I tell you.'"

It's an example of the precedents of honesty and integrity he has set for his children. "We've always built our service on being honest and ethical, and doing the right thing as if we're getting the product ourselves," said Allen. "When you make a mistake, own it! Take care of the customer, and put yourself in their shoes for a moment when something happens."

Such integrity is the foundation upon which Lee's Precast has been built, a foundation that supports a dedicated customer base. That level of integrity is the reason why Lee's Precast has delivered product as far as California. "It was just one of those unique deals. The freight and all that seems crazy, and the logistics of getting it out there," said Allen.

"And we took a storm shelter, a 6 by 12, up to Harrisburg, Virginia," said Milton. "It went to a power company over there, nearly to Richmond, Virginia. W-a-a-a-ay in the backwoods."

The storm shelter was ordered by a contractor who had previously worked with Lee's Precast and decided to stick with what he knew. "He liked our product and just told them if he was going to do the job, he was going to use us," said Allen. "So we've had some situations like that where they could have gotten it cheaper. But overall, we try to find them the closest precaster, because there are a lot of things that can go wrong, and trying to weigh in all the risk in shipping something that far, and then if something's not right. But if they're set on using your product, all you can do is make sure everything is like it's supposed to be before it ships."

Photo courtesy of Wes Deets, Helix Steel


Photo by Ron Hynk

STEEL FIBERS ARE WEIGHED TO THE CORRECT PROPORTIONS THEN ADDED TO THE SCC MIX TO REDUCE THE AMOUNT OF REBAR REQUIRED IN THE FORMS. IN THE CASE OF THEIR STORM SHELTERS, LEE'S PRECAST USES THE STEEL FIBERS WITH NO REBAR AT ALL. *Photos by Ron Hyink*

LEARNING CURVE

Lee's Precast now uses SCC in all its products, and includes Helix steel fibers in most products to lessen the need for traditional steel reinforcement. Rebar can be spaced farther apart in some products, but storm shelters are cast with no rebar at all.

Making improvements doesn't happen overnight, of course, so transitioning to SCC was the culmination of a long learning process. SCC and the National Precast Concrete Association (NPCA) have been two major factors in making Lee's Precast more efficient in its production processes.

"We really fell in love with the SCC concrete," said Allen. Problems like dragging around stinger vibrators, the hazards of standing on the forms to vibrate, and inconsistent batches all went away, he said. "Overall it produces a product that we're happy with, and we feel like our customers are getting the best option out there. It makes a lot better-looking product."

Besides the typical trial-and-error batches to get the SCC mix to behave properly, there was the problem of leaking forms because of SCC's lower viscosity. Adding more fines to the mix helped to minimize the leakage, said Allen, but there were other issues to address. To that end, getting in on the NPCA Plant Certification Program brought production efficiency to a new dimension, including a revitalized forms maintenance program, more precise recordkeeping and so forth.

"We just had to do a little bit of form maintenance on some of them, and that's something NPCA has helped us with and gave us some tolerances to go by," said Allen. "Now we don't have much leakage on our forms.

"We started doing our weights, and we figured out that we were wasting a lot of material," added Allen. "Our cost was just going through the roof. We figured out how much money we were throwing away every month."

Taking NPCA classes and sitting in on NPCA webinars has provided a shot in the arm for the employees as well. "NPCA has been great in providing a lot of these classes that they've taken," said Allen. "Some of the classes have been online and that's helped, and some of them we're getting at The Precast Show. And that's allowed us to have the confidence and the knowledge for taking on new projects."

GROWING OUT

The recession slowed the company down but could not stop it. As with most precasters, Lee's Precast had to downsize, but there was just enough work to help the company hang on. "In 2008, had we not been in commercial stuff, we probably wouldn't be here," said Milton. "But the commercial carried us through the recession."

Things have gone considerably better over the past few years. "We had to buy more forms to do some different products that we weren't doing," said Allen. "But it let us do more jobs, because we just noticed that we were losing some work."

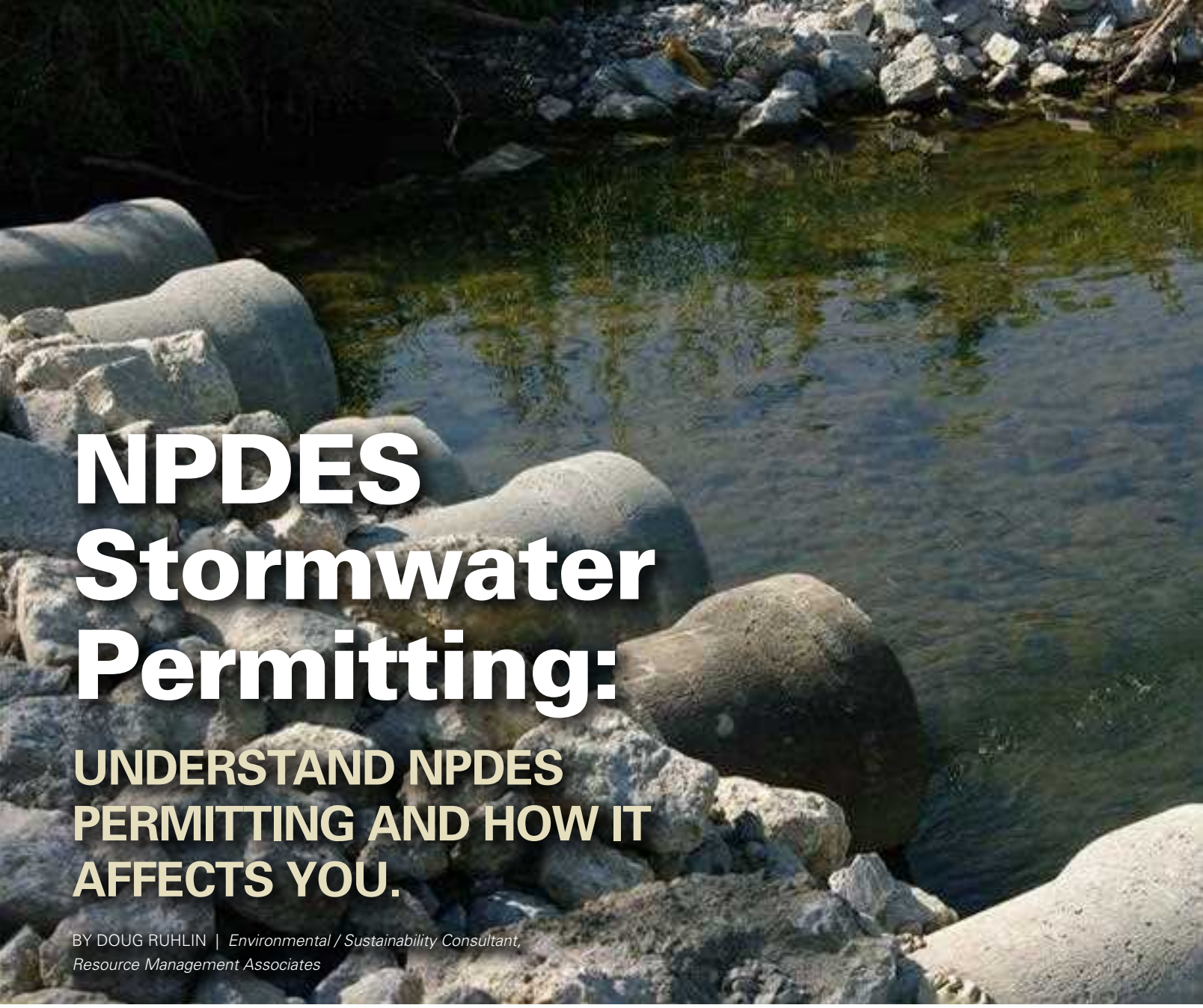
Milton added that in 2011 the company made 600 storm shelters. "They poured them three times a day," he said. "When I started, I was glad to get one pour a day."

Allen countered by saying that technology has changed dramatically since then, and so has the way they do business. "We're doing our own testing in-house, our own breaks, and our plant is MDOT certified from Mississippi so we can produce structures for the state."

And now they are feeling their growing pains more than ever. "We filled up this building where you can barely walk through it," said Allen. "We've got to do something." Even now they are having discussions about what that "something" is, but it will likely include more covered production space and perhaps more cranes.

Whatever it is, you can be sure that customer service and a quality product will be priorities. If attention to customers' needs has been the water that helped Lee's Precast grow, then more efficient production has been the fertilizer. The sunshine has come from within the family itself, and with all the other elements the company is planted in fertile soil for a thriving future.

Ron Hyink is NPCA's managing editor.



NPDES Stormwater Permitting:

UNDERSTAND NPDES PERMITTING AND HOW IT AFFECTS YOU.

BY DOUG RUHLIN | *Environmental / Sustainability Consultant, Resource Management Associates*

Let's face it: Nobody likes to live or work around polluted surface water. Polluted stormwater runoff and process water discharge knows no boundaries, so it is the job of the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) to limit the effects of waterborne industry pollutants to protect surface waters through the use of permits.

Agree with it or not, NPDES views concrete plants as "point sources" for water pollution. Permits require that plants maintain compliance by establishing a stormwater pollution prevention plan that incorporates best available management practices, so it's important to understand the process and its strategies (see a related article at precast.org/permits).

Maintaining compliance is critical, since failure to do so can mean penalties including significant monetary fines – something that no precast producer can (or should have to) face in today's challenging and competitive business market.

While many states allow the discharge of process water (see the sidebar "State Permits"), these discharges are viewed as:

- Generally containing a much higher pollutant load than stormwater;
- Much more capable of causing significant impact to the receiving water bodies; and
- Preventable to a certain extent through recycling and source reduction activities at a concrete plant.

Therefore, these types of discharges are usually regulated much more tightly than other types of discharges, including holding them to very strict water quality standards. To achieve the pollutant levels required to meet these standards (known as effluent limitations) almost always would require elaborate and costly water treatment methods. As such, it is always in a precast concrete producer's best interest to reduce the amount of process water or recycle it whenever possible for production, washing or coring activities.

Stormwater discharges under NPDES permits are usually regulated less stringently than process water

STATE PERMITS

In 45 out of 50 U.S. states, NPDES permits are issued by the state in which the precast concrete plant is located (not a corporate office or any other such location). The exceptions to this are Idaho, Alaska, New Mexico, Massachusetts and New Hampshire, along with Puerto Rico, the U.S. Virgin Islands and all U.S. Trust Territories where these permits are issued by EPA rather than the applicable state regulatory agency. States issuing their own permits under the NPDES program are referred to as "delegated," and those few where EPA issues these permits are known as "non-delegated."

NPDES permits are required for the discharge of any pollutant to any water of the United States or specific state. In the case of most precast producers, this means either stormwater discharges or process wastewater discharges. Most precast producers have stormwater discharges to surface waters either directly (such as to an adjacent waterway or wetland area) or indirectly (such as to a municipal storm sewer system). Many states also regulate discharges to groundwater, which would include retention basins for the capture of stormwater and process water. It is critical to know what your state regulates to ensure that you are in compliance with your applicable NPDES regulations.

discharges, primarily because nearly all industrial facilities discharge stormwater when it rains, which can be difficult to control and often cannot be prevented. Also, stormwater discharges in general are considered to have less impact on receiving water bodies due to lesser pollutant levels (in part due to dilution with stormwater).

Another key difference between stormwater and process water discharges is that exceedance of effluent limitations can lead to an enforceable violation with operational and monetary penalties (which can start at $27,500 per day in most locations), while exceedance of stormwater benchmarks usually requires a self-evaluation, enhancement of best management practices (BMPs) and perhaps reporting to the applicable regulatory agency.

It's also important to note that whenever process water becomes mixed with stormwater, it becomes process water. It is then held to process water standards rather than the more relaxed stormwater standards. That is why it is imperative that every

Table 1 – Common Limitations for Stormwater and Process Water under NPDES Permits

	Stormwater Benchmark Level	Process Water Effluent Limitation Level	Comments
TSS	100 mg/L	25 – 50 mg/L	Process water effluent limitation dependent on receiving water quality.
TDS	500 mg/L	Variable	Process water limitations would be expected to be less than 500 mg/L.
pH	Between 6-9 SU (standard units)	6 -9 SU	
COD	120 mg/L	Variable	Process water limitation would be expected to be less than 120 mg/L.
TPH	10 – 15 mg/L	Variable	Process water limitation would be expected to be less than 10-15 mg/L.
Fe	1.0 mg/L	Variable	

Notes: TSS=total suspended solids, TDS=total dissolved solids, COD=chemical oxygen demand, TPH=total petroleum hydrocarbons, Fe=dissolved iron.

Table 2 – Stormwater monitoring results from precast concrete plants in New Jersey during the period 2005-present. All results shown are in mg/L except for pH which is Standard Units.

	No. Results	Minimum Result	Maximum Result	Mean Result	No. Exceeding Benchmark Level (% Exceeding)	Comments
TSS	136	0	2,710	67.6	15 (11.0%)	
TDS	29	0	2,130	246.7	2 (6.9%)	
pH	168	1.5	9.6	7.9	24 (14.3%)	Most exceedances were >9. Single value of 1.5 is an outlier.
COD	136	0	282	37.3	5 (3.7%)	
TPH	35	0	23.8	1.8	0 (0%)	
Fe	30	0	45.3	6.0	19 (63.3%)	High percentage of exceedances above benchmark – see article text for discussion.

Notes: TSS=total suspended solids, TDS=total dissolved solids, COD=chemical oxygen demand, TPH=total petroleum hydrocarbons, Fe=dissolved iron.

precast concrete producer do whatever possible to separate process water from stormwater discharges. This is usually done by restricting the process water generation and use area, using curbing or berms to deflect stormwater runoff away from process water areas, and covering process water areas such as coring areas.

A general rule of thumb for a precast concrete producer is this: Do not discharge process water – it carries too much unnecessary liability and cost. Of course, modern sustainability practices suggest that practices such as stormwater capture and harvesting (reuse) are excellent practices, and all precast producers should consider them. But from a regulatory perspective, you should still get an appropriate NPDES permit.

Precast concrete producers typically have stormwater discharges containing pollutants due to the presence of fine aggregate, unpaved yard and drive areas, and fine-grained concrete materials. These materials can generate the presence of solids in the stormwater discharge, which is usually indicated by the pollutants' total suspended solids (TSS) and total dissolved solids (TDS). While many acknowledge that these materials may be natural in origin, unwanted or unacceptable levels of solids discharging into streams and other water bodies can cause significant negative impacts on those water bodies and the life within them. The potential presence of cement (although portland cement is rarely stored in a manner at a precast plant where it comes directly into contact with stormwater) and fine-grained concrete material can lead to elevated pH levels in stormwater, making stormwater more alkaline. Many regulators have included other pollutant parameters in the NPDES permits that precast producers may fall under for stormwater discharges, including chemical oxygen demand (COD) from the presence of chemicals such as admixtures and fuels at the precast plant; petroleum hydrocarbons from the presence of fuels, oils and lubricants; and iron from a variety of sources.

These pollutants are also present in process water discharges. Common limit levels are shown in Table 1. As can be seen, there is usually a significant difference between the pollutant levels that stormwater and process water are held to.

A review of the precast concrete producer stormwater data presented in Table 2 shows the following results:

- The typical precast plant pollutants of pH and TSS show reasonably good results from 2005-present.
- The pollutant parameter with the highest exceedances level was Fe (total dissolved iron). Review of a significant volume of stormwater data by the New Jersey Department of Environmental Protection – from many diverse industries – indicated that high exceedances rates were common, and that perhaps a benchmark level of 1.0 mg/L was inappropriately low. This parameter has been dropped.
- Chemical oxygen demand (COD), TDSs and total petroleum hydrocarbon (TPH) levels were almost consistently below applicable benchmark levels, indicating that these pollutants have been successfully addressed by the precast concrete industry. TDSs and TPH were subsequently dropped from the current version of this permit, and it is anticipated that COD will be dropped on the next version of this NPDES permit.

Table 3 shows how the precast industry has met the challenge of implementing successful stormwater

Table 3 – Stormwater monitoring results from precast concrete plants in New Jersey during the period 2005-present as listed by year. All results shown are in mg/L except for pH which is Standard Units. All results shown are the mean of all precast concrete plant monitoring data from the period indicated. Those mean values above applicable benchmark value are shaded.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	Applicable Benchmark Level
TSS	263.5	452.9	165.8	32.5	7.3	13.4	29.3	21.3	22.0	100
pH	8.3	8.1	7.4	8.6	8.1	7.7	7.5	7.7	7.8	6-9
COD	29.4	98.2	27.7	12.8	44.1	33.6	32.7	37.6	13.8	120

Notes: TSS=total suspended solids, TDS=total dissolved solids, COD=chemical oxygen demand, TPH=total petroleum hydrocarbons, Fe=dissolved iron.

9 STEPS TO COMPLIANCE

The following list is critical for all precast concrete producers:

1. **Don't discharge process water.** You don't need to, it's not a sustainable practice, and it carries too much liability under npdes permits.
2. **If needed, determine which permit is right for your precast operation, and get permit coverage.** Without permit coverage, you have nothing. You may be in violation and subject to significant fines.
3. **Read your npdes permit.** Make sure you understand what it covers, what it does not cover, and what your obligations are under the permit.
4. **If you don't think you need a permit for some particular reason, get it confirmed** – preferably by the regulatory agency or an expert in the field. Don't guess or presume.
5. **Do what you need to get into compliance,** starting with the development and implementation of a stormwater pollution prevention plan (swppp).
6. **Determine what pollutants your npdes requires you to monitor,** and evaluate your facility and operation for the potential to discharge those pollutants. Probably it's the pollutants discussed in this article.
7. **Determine and implement a program of bmps** to reduce or eliminate pollutant discharge.
8. **Review your monitoring data, and use it as it was intended** – as a benchmark by which to gauge performance. If you are not getting results below your benchmark levels, review your facility and your bmps and make all necessary modifications.
9. **Finally, talk to other precast producers in your state.** What kind of results are they getting? Can you present your data as a group, evaluating trends with the goal of higher benchmark levels or reduced monitoring requirements? Be proactive in this area!

BMPs from 2005-present. If the mean has improved across this period, one could assume that the precast concrete producers involved have been successful in enhancing their BMPs in order to get better results – and produce cleaner stormwater runoff. Table 3 shows that all data has improved over time, indicating the following:

- The use of stormwater monitoring data as a feedback loop to fine-tune BMPs has been successful over this period. Review of this data, and its use as a benchmark to fine-tune BMPs at precast plants, has resulted in mean TSS values consistently well below the applicable benchmark since 2008.
- In general, the precast concrete producers are generating excellent (and compliant) stormwater results.

Stormwater monitoring, like NPDES permitting itself, may seem complicated and intimidating. It doesn't have to be. If you're not below your monitoring, seek qualified help.

Doug Ruhlin is an environmental/ sustainability consultant with Resource Management Associates, which provides consulting services to the concrete and construction materials industries throughout the United States and internationally. View his website at www.RMAgreen.com or contact him at doug@RMAgreen.com or (609) 693-8301.

Damp Proofing & Waterproofing

Part 2: Preparation, Specifications and Performance

BY TIM FRAZIER

Editor's Note: *This is part two of a three-part series. In the previous issue of* Precast Inc., *we examined the differences in damproofing and waterproofing. In this article, we examine published industry guidelines for concrete surface preparation, guides for effective sub-grade waterproofing and related waterproofing performance specifications.*

Lead photo courtesy of Gainey's Concrete Products Inc. www.gaineysconcrete.com

Inset photo courtesy of Concrete Sealants Inc. www.conseal.com

Various methods of sub-grade waterproofing exist, including: hot melt-applied waterproofing membranes and traditional sheet membranes. Today, cold liquid-applied membranes are growing in popularity, offering advantages over previously traditional systems. The waterproofing specifications reviewed here will focus on these cold liquid-applied membranes.

The unique physical and chemical nature of concrete requires special surface preparation techniques prior to coating not associated with other substrates. There are three basic steps for preparing concrete surfaces that result in a uniform, continuous coating with good adhesion:

- Cleaning to remove loose materials or other contaminants that would inhibit a secure bond to sound concrete
- Profiling to produce the best combination of anchor pattern and surface area for which maximum adhesion of the coating to concrete can be achieved
- Treating surface irregularities to permit application of a smooth, uniform coating film

A bond is only as strong as the weakest link in the chain. Applying a coating to contaminated or dusty concrete will result in poor coating adhesion. Laitance, a layer of weak and nondurable material containing cement and fines from aggregate, occurs when bleed water rises to the surface of formed concrete. Laitance is usually eliminated mechanically by blast abrasion. Contaminates that may need to be removed include form release agents, curing agents and oil. Several good resources related to general surface cleaning methods of concrete are listed in Table 1.

Concrete surface profile is important in that it provides the "grip" that the coating requires to achieve a strong mechanical bond or anchor to the concrete surface. Typically, the thicker the specified coating application the greater the surface profile required. ICRI Guideline 03732 identifies nine distinct concrete profile levels and describes how to achieve each by different profiling techniques. Recommended surface profiles[1] include:

Sealers	0-3 mils thick	0-75 micrometer surface profile
Thin Film	4-10 mils thick	100-250 micrometers
High Build Films	10-40 mils thick	250-1,000 micrometers

Voids and depressions in concrete surfaces (e.g., bug holes, honeycombs and tie-rod holes) should be filled prior to coating so that a continuous coating film can be applied. Successful use of liquid coatings requires that there be no voids in the protective coating film to fully protect the concrete substrate. Similarly, concrete surface protrusions, often called fins, should be removed prior to coating to ensure complete coverage over

the concrete surface. Typically, surface protrusions are removed by grinding.

There are several important waterproofing principles worth consideration. The 90%/1% principle says that 90% of all water intrusion problems occur within 1% of the structure surface area.[ii] Further, the 99% principle states that approximately 99 percent of waterproofing leaks are attributable to causes other than material or system failures.[iii] These principles reinforce the need for acceptable concrete surface preparation and subsequent error-free coatings application for successful waterproofing projects.

ASTM C 898-09, "Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Separate Wearing Course," describes the use of high solids content, cold liquid-applied elastomeric waterproofing membranes in a waterproofing system subject to hydrostatic pressure. Included in this guide are terminology definitions, design considerations and waterproofing membrane requirements among other content. Additional ASTM waterproofing guides are listed in Table 2.

Waterproofing membranes specified in ASTM C898 must meet the requirements of ASTM C836, "Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course." According to this standard, waterproofing membrane materials shall cure, after application by spreading or spraying, to form an elastomeric film capable of maintaining a seal against liquid water in addition to meeting the physical property requirements as listed in Table 3.

It is interesting to note that ASTM C836 does not directly specify the waterproofing membrane's resistance to hydrostatic pressure. Recall that the three main differences between waterproofing and damproofing are elimination of water movement under hydrostatic pressure, thickness of the applied membrane and membrane crack bridging performance. ASTM D7088, "Standard Practice for Resistance to Hydrostatic Pressure for Coatings Used in Below Grade Applications Applied to Masonry," might be a test value that could differentiate or compare similar expected product performance with regard to evaluating stopping water intrusion into treated concrete under hydrostatic pressure. Reviewing Technical Data Sheets (TDSs) from potential membrane suppliers is an important step in selecting the most appropriate waterproofing materials for use in a given construction project.

Besides selecting the waterproofing membrane product based on product performance and physical values, additional criteria will include:

- Product-specific concrete surface preparation requirements
- Concrete moisture tolerance levels
- Environmental considerations (e.g., temperature and relative humidity)
- Material cure rate
- Volatile Organic Compound (VOC) content where VOC environmental restrictions exist
- Unit costing

Additional performance features often touted with waterproofing membranes include the following:

Water Vapor Transmission	ASTM E96
Tensile Strength	ASTM D412, D2370
Elongation	ASTM D412

Table 1. General Surface Cleaning and Preparation Methods

ASTM D4258	Describes practices for removing contaminates by broom, vacuum, air blast, detergent, water and steam cleaning.
ASTM D4259	Describes methods of abrading concrete to remove contaminates including water jetting, mechanical cleaning and abrasive blasting.
NACE Report 6G191	National Association of Corrosion Engineers report highlighting commonly used inspection, testing and surface preparation methods for contaminated concrete.
ICRI Guideline 03732	International Concrete Repair Institute guidelines for selecting the best surface preparation procedures for a particular type of coating.

Table 2. ASTM Waterproofing Guides

ASTM	Subject
C898	Standard Guide for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
C981	Standard Guide for Design of Built-Up Bituminous Membrane Waterproofing Systems for Building Decks
C1127	Standard Guide for Use of High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with an Integral Wearing Surface
D5295	Standard Guide for Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems

Table 3. Waterproofing Membrane Physical Requirements per ASTM C836

Property	Requirement	Test Method
Hardness, min	50	ASTM C863 (5.5)
Weight loss, max %	20	ASTM C863 (5.6)
Non-volatile, min %	80	ASTM C863 (5.6)
Low temperature flexibility	no cracking	ASTM C863 (5.7)
Low temperature crack bridging	no cracking	ASTM C863 (5.7)
Film thickness (vertical surface)	60 +/- 5 mils	ASTM C863 (5.9)
Adhesion-in-peel after water immersion	175 N/m (1 lbf/in)	ASTM C794
Extensibility after heat aging, min	6.4 mm (1/4")	ASTM C863 (5.12)
Stability, min, months	6 months	ASTM C863 (5.13)

Tim Frazier is technical director of Concrete Sealants Inc. He has been involved with coating-related products for 27 years and with concrete coatings for the past 20 years. Frazier holds a bachelor's degree in chemistry from Wilmington College, and a master's degree in chemistry from Wright State University.

Endnotes

[i] Randy Nixon. "The Fundamentals of Cleaning and Coating Concrete." SSPC, The Society for Protective Coatings, 2001, 101.

[ii] Michael Kubal. "Construction Waterproofing Handbook." McGraw Hill, 2nd Edition, 2008, 1.12.

[iii] Ibid., 1.13.

Manage Your Energy!

BY CLAUDE GOGUEN, P.E., LEED AP

Do you wince every time you look at your electricity bill? Do you shudder when you get your fuel bill? You're not alone. Energy costs are one of the major plant expenditures. According to the NPCA 2013 Benchmarking Report, plant operating expenses, which include costs for utilities, run about 7.5% of total production costs. This is an average based on plant size and location.

According to the U.S. Census Bureau, in 2007, the pipe and precast/prestressed industries spent more than $200 million on energy. Of this, 48% was spent on fuel and 52% on electricity. There were variations in the type and the amount of energy used in precast concrete plants across the United States, but the most energy-intensive step is curing, which accounted for nearly 44% of the energy consumed. Light trucks operating on site were responsible for 32% of the overall energy consumed at the plant site. Electricity use throughout the plant was about 17% of overall energy consumption.

It is important now more than ever to make energy management a priority. It can definitely save you money, and it can make you more sustainable by reducing your plant's impact on the environment.

The struggle is to make improvements in energy efficiency without negatively affecting product quality and yield. The best way to do this is by implementing a plant-wide energy management program. Here are some tips on how to get your program off the ground:

1. CREATE AN ENERGY TEAM. A strong and creative energy team can be the core of a successful energy program. Building this team engages and empowers your employees to plan, benchmark, implement, monitor and evaluate your plant's energy management program. The team would also be responsible for training, communicating results and providing recognition.

2. BENCHMARK. When you go on a weight loss program, what do you do first? Weigh yourself, right? That's your benchmark, and hopefully that number will go down. Every successful program starts with a benchmark. Call your utility

SPECIAL CONSULTING SERVICES FOR NPCA MEMBERS

If your company is located in a deregulated energy market, you may be able to save on energy costs through a contracted purchasing arrangement with APPI Energy. NPCA endorses APPI as its exclusive energy consulting firm for members.

APPI's energy experts will analyze your energy consumption and provide consultation services, including negotiating, contracting and monitoring supply. APPI also provides a variety of resources that can be used to train employees. For more information, visit appienergy.com.

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provider and ask for an energy audit. Many energy providers are more than willing to help customers conserve energy and will offer to perform an audit free of charge. They may also provide ideas on possible conservation areas. Florida Power and Light and Wisconsin's Alliant Energy are just two of many large energy providers that provide this service at no cost.

3. IDENTIFY AND FILL THE GAPS. Based on the findings of your energy audit and of your plant energy team, identify the energy management practices that may be missing. Start with the low-hanging fruit to see quick results.

Lighting is usually a great place to begin. Only a small part of the energy used in a lighting fixture results in lighting; the remainder is lost as heat. So, even when lighting is a relatively small part of a plant's energy use, it may be possible to find considerable energy savings from using more efficient lighting systems. Lifetime of a lamp should also be considered, as a long lamp life also reduces maintenance costs.

Repairing leaking ducts and adding some insulation to the building envelope can also bring some immediate and substantial savings.

4. RAISE AWARENESS AND ENGAGE EMPLOYEES. Employees are the heart of your energy program, and not just the ones on your energy team. All employees must be involved, so first, they must be made aware of the value of energy efficiency and how they can participate. Reward those who come up with best ideas.

If you do not currently have an energy management program, there is no reason not to start one now. There are many tools available from your utility providers and from Energy Star at energystar.gov/buildings, including a report that was issued in 2011 that could be helpful.

Also, please feel free to contact Claude Goguen at cgoguen@precast.org or at (317) 571-9500 for information on this or any other sustainability-related topic.

Claude Goguen, P.E., LEED AP, is NPCA's director of Sustainability and Technical Education.

Resources:

"Energy Efficiency Improvement and Cost Saving Opportunities for the Concrete Industry," December 2011, Katherine Kermeli, Ernst Worrell, Eric Masanet, Energy Analysis Department, Environmental Energy Technologies Division, Ernest Orlando Lawrence Berkeley National Laboratory, University of California, Berkeley, CA 94720

www.energystar.gov

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NPCA
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PINNACLE AWARD RETURNS TO WILBERT PRECAST

WILBERT PRECAST INC. OF SPOKANE, WASHINGTON, WON THE 2014 NPCA PINNACLE AWARD WITH ITS LIGHT POLE BASE SAFETY TOWER. *Photo courtesy of Wilbert Precast Inc.*

The NPCA Pinnacle Award, sponsored by Spillman Co., has returned to Wilbert Precast Inc. in Spokane, Washington. Wilbert Precast earned the Pinnacle title for its presentation of the company's Light Pole Base Safety Tower. This innovation keeps light pole base forms safely secured during and after a pour without standing on a ladder, and allows accurate pours on large forms.

The award included a catered lunch by NPCA for all the employees at Wilbert Precast's plant. Wilbert Precast will hold the traveling trophy until The Precast Show 2015 next March in Orlando, Florida, when the next Pinnacle Award competition takes place. Visit precast.org/awards to see the presentation and learn more about the Light Pole Base Safety Tower.

GOVERNMENT AFFAIRS REPORT

Representatives from NPCA and 15 other trade associations spent April 30 on Capitol Hill, urging members of Congress to fix the Highway Trust Fund, pass the Water Resources Development Act, save tax dollars through rebuilding with resilient construction, and maximize the value of infrastructure investment. It was all part of the second annual Cement and Concrete Day on the Hill, sponsored by the Portland Cement Association.

Bruce Hottle, former NPCA chairman of the Board, Ty Gable, NPCA president and Bob Whitmore, vice president of Communication and Public Affairs, attended the event and met with staff from the House Transportation and Infrastructure Committee chaired by Rep. Bill Shuster (R-PA).

The 16 trade associations made between 50 and 60 visits to members of Congress during Cement and Concrete Day on the Hill, carrying a unified message on the key topics of maintaining highways, rebuilding infrastructure, protecting our water resources and rebuilding in a more resilient way after natural disasters.

"Those are issues that are important not only to concrete manufacturers, but to anybody who drives on our roads, drinks water and wants to make the best use of tax dollars through wise investments in infrastructure – in other words, all Americans," Gable said.

The event also included remarks by Rep. Kevin McCarthy (R-CA), the House Majority Whip, and Rep. Cory Gardner (R-CO), a member of the House Energy and Commerce Committee.

Here are summaries of the four key issues communicated to Congress during the event. For detailed information on each issue, please check the NPCA News section of precast.org.

Highway Trust Fund. NPCA supports a bipartisan solution that will provide short-term solvency and long-term viability for the Highway Trust Fund. It is imperative to find a solution before the trust fund runs out of money later this summer.

Water Resources Development Act. NPCA joins the cement and concrete coalition in strongly supporting reauthorization, which has bipartisan support in both the Senate and House. The bill would streamline Corps administration costs and would provide authorization for Corps projects in sea ports, rivers and wetlands.

Resilient Construction. NPCA supports legislation to compel businesses, communities and governments to adopt resilient construction techniques. Whether through tax credits or revision of building codes, NPCA and the industry coalition will be supporting resilient construction techniques in these vulnerable areas.

Maximizing the Value of Infrastructure Dollars. NPCA is encouraging Congress to motivate the state Departments of Transportation to embrace mechanisms that advance the value of our future investment in transportation infrastructure, especially with respect to measuring lifecycle costs of highway construction and maintenance.

CONCRETE SEALANTS EARNS REGIONAL GREEN BUSINESS CERTIFICATION

The National Precast Concrete Association has encouraged sustainable practices among its members as the green movement marches ever onward. NPCA is a member of the U.S. Green Building Council, and has established the NPCA Sustainability Committee to focus on emerging sustainable construction issues and to develop resources that enable NPCA members to build sustainable practices into their manufacturing processes.

Many NPCA members take this message of environmental responsibility to heart, and Concrete Sealants Inc. is leading the charge. ConSeal, based in Tipp City, Ohio, has been recognized by Dayton Regional Green 3 (DRG3) in its Green Business Certification Program as a green business, and is now a certified "blue" business for water stewardship.

DRG3 promotes greener practices on the three fronts of government, business and personal in Montgomery County and the Dayton area to ensure the environmental sustainability of the region and enhance the quality of life for its citizens. The Green Business Certification Program is a voluntary program designed to help businesses take basic green measures to reduce their ecological footprint, reduce their energy and resource use, and save money in the process.

In addition to its local green practices, Concrete Sealants sponsors the NPCA's annual Sustainability Awards competition and is active on the Sustainability Committee. For more information on the committee's activities and the Sustainability Awards, visit precast.org/awards or contact committee chairman Armen Alajian at armen@artobrick.com.

UPCOMING 2014 NPCA WEBINARS

NPCA provides webinars on an ongoing basis throughout the year to provide producers with vital education for all facets of running a precast concrete plant.

Here are the webinars scheduled for the remainder of 2014. All webinars start at noon Eastern time. For course descriptions and registration for any of the webinars, please visit precast.org/2014webinars.

2014 NPCA WEBINAR SCHEDULE

DATE	TOPIC	INSTRUCTOR	PRICE
May 21, 2014	*Understanding How Hot Weather and High Temperatures Impact Your Precast Products*	Claude Goguen	$79 Per Location
June 25, 2014	*Video Surveillance for Precast Plants: Protecting Your People and Your Property*	TBD	$79 Per Location
July 23, 2014	*Cracks Are Whack! A Guide to Proper Precast Concrete Crack Repair*	Claude Goguen	$79 Per Location
Aug. 20, 2014	*Building a Lean Culture*	Paul Akers	$79 Per Location
Sept. 3, 10, 17, 24*	*PQS II Technical***	Claude Goguen	$495 Per Person
Nov. 5, 2014	*Healthcare Reform: How Will Your Business Be Affected in 2014 and Beyond?*	Jamie Hasty	$79 Per Location
Nov. 19, 2014	*Cold Temperature Concreting*	Claude Goguen	$79 Per Location
Dec. 3, 2014	*PQS II Safety (Precast Specific Module)*	Gus Gonzalez	$150 Per Person

** Attendance at all sessions is required for PQS II webinars. ** Due to the advanced math concepts covered in PQS II Technical, students are required to take and pass NPCA's PQS II Technical Math Prep course as a prerequisite for this course. The math prep course will be offered as a free three-day webinar on Wednesday, Aug. 27, 2014, from 1 p.m. to 4 p.m. Eastern time. If you would like to try to test out of the math prep course, please contact Kathy Ritsmon at kritsmon@precast.org.*

Think you know your stuff? Take the challenge and answer the following question. Send your response to Claude Goguen, P.E., at cgoguen@precast.org, and if yours is the correct answer (chosen randomly from among all correct answers), you will receive one free admission to one of our remaining 60-minute webinars presented in 2014. We will accept one answer per person. Good luck!

CHALLENGE QUESTION: A structure in your yard is scheduled to ship within the next month. You find a crack on the structure. After having determined the extent of the repair, what major factor would influence your choice of repair material?

Challenge Question and Answer from the March-April issue

Question: You bring in a sample of aggregates from the stockpile first thing in the morning and it weights 6.8 lbs (3084 grams). You burn off the moisture to get the sample to an oven dry state and it weighs 6.36 lbs (2885 grams). You know that the absorption capacity of this aggregate is 0.02%. If 450 lbs (204.12 kg) of this aggregate is used in the mix design, what adjustment to the mix water will you need to make?

Answer: We need to calculate the moisture content of the aggregate from that morning. The formula is:

$$\textbf{Total Moisture} = \frac{W_{AGG} - W_{OD}}{W_{OD}} \times 100$$

Where
W_{AGG} – Weight of the aggregate sample
W_{OD} – Weight of the oven dried aggregate sample
So

$$\textbf{Total Moisture} = \frac{6.8 - 6.36}{6.36} \times 100$$

Or in metric

$$\textbf{Total Moisture} = \frac{3084 - 2885}{2885} \times 100$$

$$= 6.92\%$$

To obtain the Moisture Content of the aggregates, simply subtract the Absorption Capacity from the Total Moisture
MC = TM – AC = 6.92% - 0.02% = 6.90%

To determine the excess water this aggregate will combine to the mix, we multiply this MC by the aggregate batch weight
Excess Water = 450 lbs x 0.069 = 31.05 lbs
Or in metric
Excess Water = 204.12 lbs x 0.069 = 14.08 kg

So we will have to subtract 31.05 lbs or 14.08 kg of water from our batch water weight.

AND THE WINNER IS...

Congratulations to **Matthew Hoyman** of Cape Fear Precast in Jacksonville, North Carolina. Matthew wins a complimentary webinar registration for any of the six remaining 60-minute webinars scheduled for 2014.

Network of Excellence: Michael Hess

NPCAF scholarship recipient leverages strength and support of family on the road to earning civil engineering degree

BY MASON NICHOLS

No matter what their makeup, families play an integral role in our lives. In times of joy, we turn to family to relay good news. In times of despair, we look to them for support. And, perhaps most importantly, as we progress down the path from youth to adulthood, we rely heavily on our families to guide us in the right direction and help shape who we will ultimately become.

For Michael Hess of Wisconsin Dells, Wis., family played a crucial role in his decision to pursue a civil engineering degree from the University of Wisconsin-Madison. Hess, an NPCA Foundation scholarship recipient, said his father helped him develop a strong work ethic from a very young age.

MICHAEL HESS

"Ever since I was 2 years old, I've been carrying around a hammer and helping my dad out," Hess said. "My dad worked as a carpenter and superintendent and also spent time working as a project manager, which is the type of position I hope to attain."

Hess' connection to another family – the Wiesers – has also contributed to his drive for a career in the construction industry. In 2012, Hess took a summer internship at Wieser Concrete Products Inc. in Portage, Wis., a position he learned about thanks to his longtime friendship with a member of the Wieser family. Though physically taxing, Hess describes his time with the company as crucial to gaining an enhanced understanding of the construction and precast concrete industries.

"I was a concrete form worker, so I was getting down and dirty," Hess said. "It's tough labor, but I was glad I was able to gain that experience so that I know what that section of the industry looks like."

In addition to learning what it takes to properly manufacture culverts, septic tanks and a variety of other precast concrete products, Hess benefitted in another way from his experience: Mark Wieser, executive vice president of Wieser Concrete Products, suggested he apply for a scholarship through the NPCA Foundation. Though Hess had been saving money for his education since he began working at the age of 13, the Foundation's support has been critical in helping to achieve his career goals.

"I'm responsible for putting myself through college," Hess said. "I've been able to save my money and pay for most of college, but now that I'm a junior, most of that money has run out. It's nice to have a little extra boost to keep me going."

Hess' internship with the Wieser family made him quickly realize that gaining experience in real-world settings as a supplement to what can be learned in the classroom is vital. To branch out, last semester he took a position with Construction Geotechnical Consultants (CGC) in Madison, Wis. After focusing on production at the Wieser plant, Hess was able to experience a more technical side of the construction industry.

"I took tests on concrete, including slump tests, air tests, compaction tests and things like that with the soil," Hess said. "I never knew that you have to

"I'm responsible for putting myself through college. I've been able to save my money and pay for most of college, but now that I'm a junior, most of that money has run out. It's nice to have a little extra boost to keep me going."

– Michael Hess

MICHAEL HESS WITH HIS FATHER. "EVER SINCE I WAS 2 YEARS OLD, I'VE BEEN CARRYING AROUND A HAMMER AND HELPING MY DAD OUT," SAID HESS.

check your slump because your water-to-cement ratio might be too high."

As part of his experience with CGC, Hess also had the opportunity to work on the renovation of the Edgewater Hotel in downtown Madison. He noted that working on the project has paid numerous dividends.

"Just being on site was a really great experience, because I was able to not only take tests but also converse with superintendents and project managers to see their viewpoints and what their roles are," he said. "With that, I was able to gain good relationships with them, which could lead to something in the future."

Both extracurricular opportunities have had a major impact on Hess' studies, as he now believes he can more quickly grasp course material. As an added bonus, Hess stated he feels his experiences have helped pave the way for additional opportunities looking ahead.

"My time with Wieser Concrete and CGC has opened doors for me," Hess said. "I've found that it's very valuable to have that hands-on experience, because it helps things more easily fall into place. Thanks to my prior positions, this summer I will be interning at Hensel Phelps."

Through the power of family and with the support of the Foundation, Hess continues to move closer to earning his degree. And though he has grown considerably over the years, he's still just as passionate and energetic as that 2-year-old boy, hammer in hand, willing to do whatever it takes to get the job done.

Mason Nichols is NPCA's communication coordinator.

Precast Concrete Diving Platform

Produced for USC's Transformed Aquatics Center

The University of Southern California's diving team will operate from a firm foundation for many years to come, thanks to a new lightweight concrete platform manufactured by the Oldcastle Precast facility in Perris, California. The diving platform is the centerpiece of the new Uytengsu Aquatics Center at the University of California.

To continue to support the athletic excellence of the USC's teams, the Uytengsu Aquatics Center stadium has been transformed into a state-of-the-art facility. Opened Feb. 21, the Uytengsu Aquatics Center includes a new stadium entry, diving and dry land training areas, men's and women's locker rooms, coaches' offices, meeting rooms, a new scoreboard, permanent seating, and renovation of the diving tower and pool deck.

Title sponsor for the new facility is Fred Uytengsu, class of 1983 and a former captain of the USC Swim Team. Uytengsu, president of the Alaska Milk Corp., and his family donated $8 million to initiate the $16 million project. The gift was the largest ever made to the USC Athletics department by a former student-athlete.

Photo courtesy of Oldcastle Precast

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People & Products is a forum where NPCA members and nonprofit organizations can share information on new products, personnel promotions/acquisitions or service announcements concerning the precast concrete industry. Items are printed on a space-available basis. For possible inclusion, send your press releases and photos to NPCA, Attn: Precast Inc. magazine, 1320 City Center Drive Suite #200, Carmel, IN 46032 or email them to rhyink@precast.org.

Helix awarded ER-279 accreditation as alternative to rebar, wire mesh

Helix Steel, a manufacturer of micro-rebar based in Ann Arbor, Michigan, recently earned IAPMO's Uniform Evaluation Service (UES) Evaluation Report ER-279 on Helix 5-25 Micro-Rebar. This report accredits Helix Micro-Rebar 5-25 and its design method under ISO Guide 65 for use as an alternative to conventional rebar and wire mesh in concrete.

ER-279 opens up more than 99 countries worldwide for the immediate use and design with Helix due to the MLA/MRA agreements in place under IAF (International Accreditation Forum), says the company. The ER-279 documents allow for the specification of Helix 5-25 Micro-Rebar by architects, contractors and designers, and approval of installations by code officials. It also provides code officials with a concise summary of the product's attributes and documentation of code compliance.

UES staff thoroughly examined Helix 5-25 Micro-Rebar product information, test reports, calculations, quality control methods and other factors to ensure the product was code compliant. Helix Steel can now reference its ER-279 on Helix 5-25 Micro-Rebar to ensure that code officials quickly have the information from a trusted third-party source necessary for their quick decision on approval, said UES.

For more information, visit helixsteel.com.

CRESSET'S SOL-ZOL HAND CLEANER

Cresset's SOL-ZOL solves grime, heals skin

Cresset Chemical Co., a manufacturer of release agents based in Weston, Ohio, has advanced its original SOL-ZOL Hand Cleaner for dry, cracked and irritated skin. Uniquely formulated for use against harsh materials, the hand cleaner features a mineral oil-based carrying agent fortified with proprietary lotions that promotes the healing of skin chapped from cement, lime, gypsum and grease.

The highly effective, industrial-strength formulation quickly cleans the heaviest industrial soils while promoting skin comfort by moisturizing dry, cracked, work-sore and irritated skin, says the company. The proprietary formula is also pH balanced – therefore neutral (recommended by OSHA for people working with cement/concrete) and safe for daily use. Most importantly, the proprietary lotion's regenerative properties keep hands consistently moist. This helps combat cement dermatitis and cement burns that may result in blisters, itching, redness, swelling, scaling or dead/hardened skin.

SOL-ZOL is available from Cresset in 1-gallon pump bottles, a six-pack case, 8 oz. bottles with an easy open flip-cap, 5-gallon pails and 55-gallon bulk drums. It stores indefinitely, won't freeze, and offers the ancillary benefit of being used for the removal of grease and ink spots on clothes.

For more information, call (800) 367-2020 or visit cresset.com.

BASF introduces microsphere-based admixture technology for freeze-thaw durability

The Admixture Systems business of BASF's North American Construction Chemicals division based in Cleveland, Ohio, has announced a breakthrough technology for freeze-thaw durability that eliminates the need for air-entrained concrete. This patent-pending, microsphere-based admixture and point-of-use manufacturing system is being developed to help concrete professionals overcome the challenges traditionally associated with the variability and uncertainty of producing air-entrained concrete.

Microspheres are extremely small, hollow spheres that have a highly resilient, tough but flexible polymeric shell. Similar to entrained air, they provide stress relief zones for the expansion of freezing water within concrete, enhancing its long-term durability.

However, unlike traditional air entrainment, microspheres are not susceptible to variations in ambient conditions, concreting materials, construction practices and other factors that often impact the air void system in concrete. In addition, the compressive strength of concrete treated with the microsphere-based admixture technology can be more than 30% higher than an air-entrained concrete because of the difference in air content. This results in opportunities to optimize concrete mixtures for performance and sustainability.

BASF plans to commercialize the microsphere-based admixture technology in 2015. For more information, visit master-builders-solutions.basf.us.

Linde Extended Care 60-month warranty now standard for 2014 Class I, IV and V models

Linde Material Handling-North America Corp. based in Summerville, South Carolina, has announced the inclusion of its Linde Extended Care (LEC) 60-Month Warranty Program at no additional cost for its Class I (electric counterbalanced rider), Class IV (internal combustion engine/cushion tire) and Class V

(internal combustion engine/pneumatic tire) forklift models.

The LEC warranty applies for the remainder of 2014 and demonstrates the confidence Linde has in the performance, reliability and dependability of its trucks and in the after-sale support of the Linde dealer network, says the company. Standard LEC coverage results in an average net savings of $3,000 to $6,000 per unit depending on the specific truck type/model.

For more information, call (843) 875-8319 or email mark.roessler@lmh-na.com).

NMHG strengthens Americas organization to optimize Hyster and Yale brands

NACCO Materials Handling Group (NMHG) based in Greenville, North Carolina, the parent company of Hyster Co. and Yale Materials Handling Corp., has announced a corporate reorganization. The reorganization is being made to strengthen the Hyster and Yale lift truck brands, enabling them to provide greater materials handling solutions and value to customers and dealers.

NMHG will focus on meeting the materials handling needs and challenges of end-users in specific industries and market segments through the creation of three specialized teams: Warehouse, Counterbalance and Big Trucks. These specialized teams will be led by Jonathan Dawley, president, Big Trucks, and Bill Pfleger, vice president, Counterbalance Solutions. The leader of Warehouse Solutions has yet to be named.

The sales effort will be led by David Furman, recently appointed president of NMHG sales. Under Furman's leadership, the Hyster and Yale sales teams are being aligned under three geographic North American regions, as well as Latin America and national accounts.

For more information, contact Ryan Fisher at (864) 272-3023 or ryan.fisher@jacksonmg.com.

JAMES FUOCO

Fuoco joins Hamilton Kent sales team

James Fuoco joined the Hamilton Kent sales team as a territory manager in January. He has more than 10 years of sales experience preceded by 6 years of experience in quality assurance for a major producer of concrete products in Quebec.

Fuoco earned a C.E.T. from Dawson College in Montreal, and is fluent in French and English. He takes over as the territory manager for Ontario, Quebec, the Maritimes and northeastern United States, as Scott Lander and Dan Léger have both been appointed to the position of business development manager, Sustainable Solutions.

Fuoco will be responsible for maintaining Hamilton Kent's existing business as well as growing its business with new products and promoting its message of watertight infrastructure.

Calendar of Events

Meeting	Location	Date
NPCA 49th Annual Convention	Le Centre Sheraton Montreal – *Montreal, Quebec*	Oct. 22-25, 2014
The Precast Show 2015	Orange County Convention Center – *Orlando, Florida*	March 5-7, 2015
The Precast Show 2016	Gaylord Opryland Hotel – *Nashville, Tennessee*	March 3-5, 2016

For the most up-to-date information about NPCA events, visit **precast.org**.

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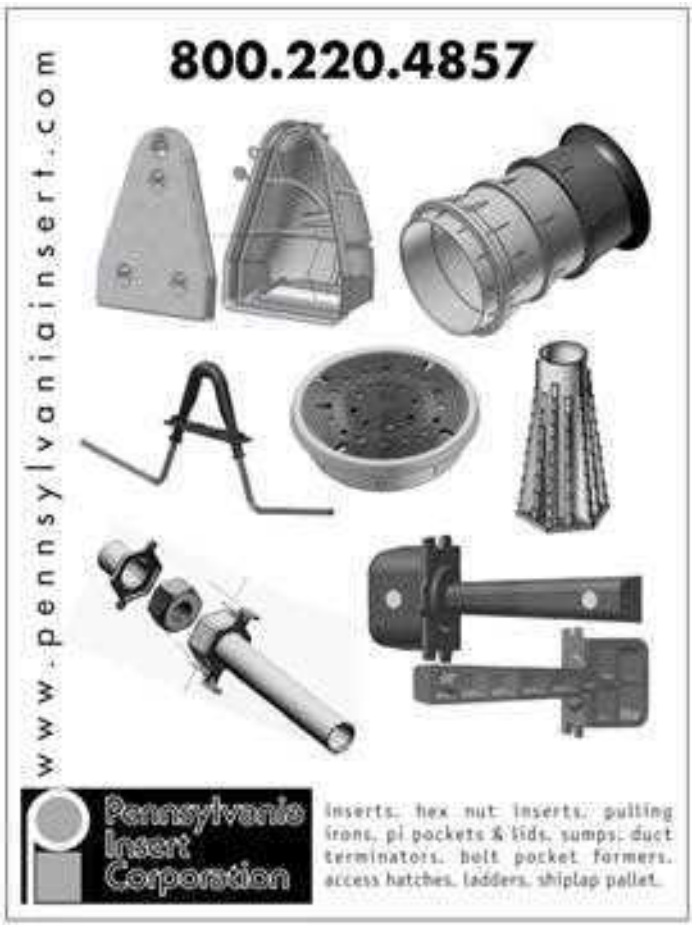

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