



REPORT

Read All About It

Mapping Ohio
page 1

ASR: The Good News
page 2

Looking Out for Us All
page 3

Subscribe!
page 3

The Shear Results
page 4

Where You'll Find Us

Dayton, OH
P.O. Box 51
Dayton, OH 45401
Phone: 937.236.8805
Fax: 937.233.2016
www.bowser-morner.com

Toledo, OH
P.O. Box 838
Toledo, OH 43697
Phone: 419.691.4800
Fax: 419.691.4805
www.bowser-morner.com

Cincinnati, OH
P.O. Box 15246
Cincinnati, OH 45215
Phone: 513.771.0254
Fax: 513.771.0218
www.bowser-morner.com

Lexington, KY
2416-B Over Drive
Lexington, KY 40511
Phone: 859.233.0250
Fax: 859.233.0183
www.bowser-morner.com

Springfield, IL
226 West Highland
Springfield, IL 62704
Phone: 217.622.8865
Fax: 217.744.7625
www.bowser-morner.com

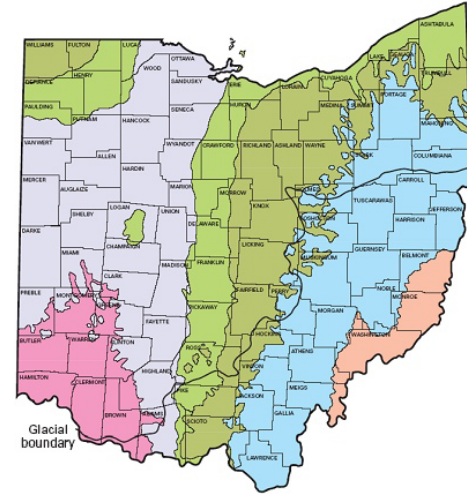
Putting Ohio on the Map, Geologically

At first glance, it looks like a watercolor vision of the state of Ohio, with its bands of pastel colors. The new “Bedrock Geologic Map of Ohio” represents far tougher stuff than oil pastels, however.

As noted by the Ohio Department of Natural Resources (ODNR) on their web site (<http://www.dnr.state.oh.us>), the new “Bedrock Geologic Map of Ohio” shows the distribution of bedrock formations that are at the surface or just under the glacial deposits that often cover the bedrock (<http://ohiodnr.com/news/sep06/0920bedrockmap/tabid/15039/Default.aspx>). This new map replaces the previous version, which dates back to 1920.

While you might not think that the bedrock geology has changed that much in Ohio in the last 88 years, the information available and what it means are as different as the rock formations themselves. For example, the new “Bedrock Geologic Map of Ohio” provides valuable information on minerals and their economic aspects, as well as environmental characteristics and even geological hazards in the state. The new map also shows close to 50 bedrock units or groups of units compared to the 14 from the 1920’s version. As helpful as that information is to the state’s geologists, scientists, engineers, and others interested in the Buckeye State’s bedrock, the statewide geologic cross section that gives a three-dimensional perspective of the geologic framework of Ohio is fascinating even to those of us who can’t tell one formation from another.

Of course, just as the state’s bedrock didn’t develop in a day, creating this new map took time and a great deal of effort by many of the state’s leading geologists, starting with former State Geologist Horace Collins, who began work on the map about 30 years ago, and ending with a final push to the completed version by former state geologist Thomas Berg, as noted by ODNR, assisted by the principal compiler, Ernie Slucher, a senior ODNR geologist. Other groups that helped in this important effort included the U.S. Geological Survey, the U.S. Environmental Protection Agency, and the Ohio Department of Transportation, with as many as 23 geologists at a time working on the map. One of Bowser-Morner’s geologists, Garry Getz, who works in our Construction Materials and Geotechnical Laboratories, was proud to put his decades of hands-on experience in geology to work helping in the creation of the new bedrock map. “It was an honor to be part of such a historic project,” says Mr. Getz. We couldn’t agree more, and are pleased to have had the opportunity to help the state in an endeavor that will benefit scientists, engineers, land surveyors, and others directly as well as everyday citizens indirectly. To learn more about how we can helping you “map out” your projects, just visit us on our web site at www.bowser-morner.com or give us a call.



Graphic: The Ohio Geological Survey



Alkali-Silica Reactivity: The Bad News, and the Good

While few people expect concrete to last forever, its reputation as a durable building material that lasts for years has come under tough scrutiny lately. Departments of Transportation like that in Texas began noticing premature concrete deterioration in some of the structural concrete used in bridges and bridge structures around the state. To the casual observer, the deterioration often looks minor. When the concrete is decorative or on a rarely used parking lot, the effects may indeed be minimal. To those in engineering and construction-related fields who use concrete in critical structures such as bridges, buildings, and roadways, however, the unexpectedly early deterioration of concrete brings up serious safety and financial concerns.

Alkali-Silica Reactivity (ASR)

The most important question: What is causing this premature concrete deterioration? While every case must be evaluated individually, in many instances a phenomenon called “alkali-silica reactivity” (ASR) is the culprit. Alkali-silica reactivity occurs in aggregate particles between the alkaline pore solution of the cement paste and the silica in the aggregate particles.

Hydroxyl ions penetrate the surface regions of the aggregate and break the silicon-oxygen bonds. To maintain electro neutrality, positive sodium, potassium and calcium ions in the pore liquid follow the hydroxyl ions. When water enters the reaction sites, alkali-calcium silica gel is formed.

Since the reaction products take up more space than the original silica, the reaction sites are put under pressure. The surface pressure is balanced by stresses in the aggregate particle and the ambient cement paste. Eventually, however, the tensile stresses may exceed the tensile strength, resulting in cracks. These cracks typically radiate from the interior of the aggregate out into the surrounding paste. While the cracks are empty when they first form, alkali-silica gel may enter the cracks later.

Even when the gel is present, however, cracking does not always occur. Small particles, for example, may undergo complete reaction without cracking.

Commonly Tested Materials

Aggregates like chert, shale, and quartz are more often associated with ASR issues, especially when the materials are used in construction materials that are exposed to moisture. As a result, testing can be performed on these materials and others to determine the likelihood of ASR problems in the future.



A Message from Steve Bowser

As President of Bowser-Morner, I'm proud that we've been serving you, our valued clients, with the same strong commitment to excellence since 1911.



STEVE BOWSER
PRESIDENT, BOWSER-MORNER

If you have any questions, comments, or suggestions about how we can better serve you, please feel free to email me at sbowser@bowser-morner.com or call me at 937.236.8805, Ext. 202. Thank you!

TIM STALEY: LOOKING OUT FOR US ALL

In a company known for the decades of experience we use to help our clients and the care we take for accurate, reliable results, Tim Staley, our Risk Manager and a Bowser-Morner Vice President, helped write the book. In fact, Mr. Staley's work was recently acknowledged for providing "subject-matter expertise and invaluable perspectives" in a risk management handbook for architects and engineers, *The XL Insurance Contract Guide for Design Professionals*.

Our clients and company have long appreciated Tim Staley's knowledge and experience, and it's no wonder. Tim has been a valuable member of the Bowser-Morner team since 1973, and he's seen the different divisions of our company firsthand. From his work as a construction materials field technician for both our Dayton and Toledo offices to his next position as Supervisor of the

Construction Materials Laboratory and Field Operations for our Toledo office, Tim gained up-close knowledge of the practices and procedures involved in this field. That experience helped Tim, who holds a B.S. in Geological Sciences and has taken many additional classes in business and related subjects, in his next position with Bowser-Morner, Project Manager of Analytical Services, in our Toledo office.

With his hands-on background in field and analytical services, Tim was a natural choice for Manager of Remedial Investigations and Site Assessments based in our Dayton location. Later, as Administrative Manager for Engineering Services in our Dayton office, Tim worked with our clients on projects and contracts. In 1993, Tim's excellent work and experience led to his present position as Risk Manager, in which he negotiates contracts and works closely with our attorneys and insurance companies. Tim became a Bowser-Morner Vice President in 1999.

Thanks to Tim's encompassing experience and his acclaimed attention



to detail, Bowser-Morner clients get the information they need when negotiating a contract or project scope. That's security for our clients, and that's good for us all.

If you have a question for Tim or if it's been a few years and you'd just like to say hello, just give him a call at (937) 236-8805, Ext. 295. You can also email Tim at tstaley@bowser-morner.com or send him a fax at (937) 233-2016. You can rely on Tim to help you in any way he can, just as he looks out for us all.



Subscribe!

Signing up is easy.

Go to our web site at www.bowser-morner.com.
Select the "Subscribe" button at the top of the page.
Press "Send."
That's it!

It's our e-newsletter.

It's free.

It's informative

It's designed for you.

www.bowser-morner.com

(Alkali-Silica Reactivity: The Bad News, and the Good, Continued)

Determining the Presence of ASR

How can you tell if cracking in concrete is due to ASR or if the cracks are caused by another, more ordinary reason? The presence of the four characteristics listed below may indicate an issue with ASR:

- Alkali silica reactive aggregates
- The crack pattern
- Alkali silica gel in cracks or voids
- $\text{Ca}(\text{OH})_2$ depleted paste

The Good News: Quality ASR Testing

To determine if concrete has been affected by ASR or to test aggregates before they are used for a project, several laboratory tests can be performed. Bowser-Morner offers five types of ASR testing, depending on a client's needs and a project's requirements. These tests are:

- Six-Month Mortar Bar Method by ASTM C 227
- Chemical Method by ASTM C 289
- 14-Day Mortar Bar Method by ASTM C 1260/C 1567
- 12-Month(+) Prism Method by ASTM C 1293
- 13-Week ICAR Modified by ASTM C 1293

The results of the testing can help a client determine whether what looks like "minor" deterioration in concrete really is insignificant or if the larger problem of possible ASR complications is present. Perhaps more importantly, ASR testing of materials before they are used can prevent problems down the road, literally.

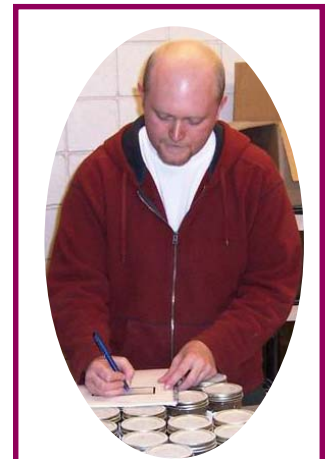
For more information on alkali-silica reactivity (ASR) and the issues it presents for those who depend on concrete for their projects as well as on ASR testing, call [Jim Fletcher](#), Bowser-Morner's Director of Laboratory Services, Construction Services Division, at 937-236-8805, Ext. 235. You can also reach Jim by email at jfletcher@bowser-morner.com. He'll be glad to help you with your questions and projects. You can also visit Bowser-Morner on the web at www.bowser-morner.com.

The (Direct) Shear Results: A Study of Granular Backfill

At Bowser-Morner, we know that helping our clients achieve the most useful, accurate results under their real-world, everyday conditions often requires a great deal of in-depth research under strict, precise laboratory conditions. That's why we're dedicated to helping out with innovative research that will, in turn, help us serve our clients with their many projects.

One of these recent collaborative research projects focused on the evaluation of the shear strength of various compacted, granular backfill materials. These materials were tested in direct shear using AASHTO T-236, as noted in an ASTM International *Geotechnical Testing Journal* article titled "Reproducibility of Direct Shear Tests Conducted on Granular Backfill Materials" by Christopher Bareither, Craig Benson, and Tuncer Edil (2008, 31[1]).

As one of the 10 laboratories across the U.S. that were involved in this inter-laboratory testing, Bowser-Morner performed tests on four granular backfill materials. During this research project, Karl Fletcher, Supervisor of the Geotechnical Section of our Construction Materials Laboratory, performed testing according to the specifications provided to the 10 laboratories in the study. The results of the study, which will be useful in everyday applications, found that the reproducibility of direct shear tests on granular backfill is 8.8°. The complete article can be found at www.astm.org.



Karl Fletcher logs in samples for testing in Bowser-Morner's Construction Materials and Geotechnical Laboratories. Karl assisted with a recent ASTM study on direct shear testing on granular backfill materials.