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Terracon



WATERS OF THE U.S.: Helping You Navigate the Evolving Clean Water Rule

Let's pretend for a minute that over the past three years you've had time to follow the development of the new Clean Water Rule. Then let's say you've read and interpreted the rule and understand the changes. Congratulations, you need read no further. However, if you are a land owner, developer, or anyone else involved in property transactions who may not have been tracking all the changes to the rule affecting jurisdictional waters, then you need a partner like Terracon.

The Environmental Protection Agency (EPA) has ultimate authority over the jurisdictional status of water bodies and wetlands in the U.S., and the U.S. Army Corps of Engineers (USACE) typically administers and handles the program's day-to-day responsibilities. Contractors, architects, and lenders understand that land disturbances due to construction or development typically require interaction with USACE

when the disturbances result in impacts to waters and wetlands. However, to most, navigating through the intricacies of the Section 404 (of the Clean Water Act) Regulatory Program can seem overwhelming.

Over the years, Terracon has helped thousands of clients step through the regulatory process as part of site expansion projects that potentially impact their surroundings, understanding that USACE district offices often have developed their own processes, tendencies, regional conditions, and interpretations of applicable statutes. This sometimes leads to complicated review procedures, application processes, and differing authorization timelines. The issue can also be further complicated by USACE project managers with different interpretations of the regulatory process.

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Environmental

Facilities

Geotechnical

Materials

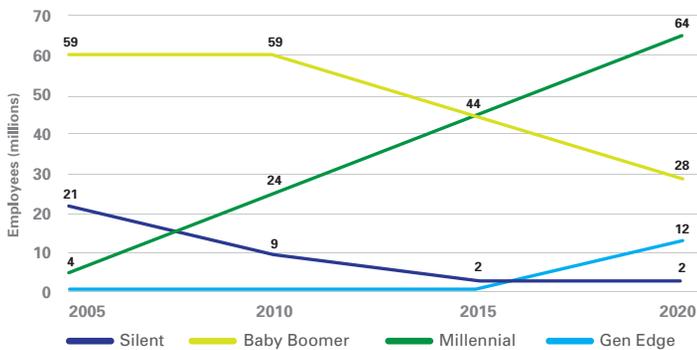


KIDS THESE DAYS: Speaking the New Workplace Language

Every generation wonders about the kids of the next. How often have you heard, What are they going to do with their lives? and, one of today's favorites, How have all those video games prepared them for their careers? Recall when the Baby Boomer generation shocked their parents with their love of freedom and the power they could command based on the size of their population. Though not as big in numbers (and still puzzling to their predecessors), the generation that followed – the GenXers – have proven to be very astute and capable.

As kids, Millennials programmed the VCR and then the DVR so their parents wouldn't miss an episode of *MacGyver* or the *Simpsons*, but now they don't have much need for a TV. Rather, this generation is accustomed to using smartphones to communicate, investigate, and stream. The way Millennials work is different but productive – focused on turning out work and ideas, and challenging 8-5 schedules, but still in constant contact. They just text rather than call.

GENERATIONS IN THE WORKFORCE



Source: Vic Donald, national director of geotechnical services at Terracon, based on research.

The data about Millennials tells us that they have higher population numbers than Boomers creating a new workforce culture. As the Baby Boomers relinquish their domination of the workforce majority to the Millennials, who are joining the Gen Xers in leadership roles, consider: how is your company handling this unprecedented cultural shift? At Terracon, we are embracing it, perhaps even hastening its pace, by innovating our work. This creates a more engaged workforce, a more dynamic attitude, and a firm that is more prepared to serve our clients.

In the geotechnical arena, we are innovating our practice by building a GIS-based data mining method that allows us to predict the subsurface and build intelligent, interactive exploration plans, constantly comparing our findings to those expected. This activates Terracon's vast database of historic information and integrates it with public domain data. As we have migrated to this approach, we have gained tremendous acceptance of the concept



Screenshot of a GeoReport which enables your design and construction team to exchange information and facilitate collaboration so all stakeholders can resolve issues together early in the construction process, preventing future problems on your site.

across the generations because it saves our clients' money by allowing us to perform more efficient geotechnical investigations, develop higher confidence in subsurface conditions, and ultimately design more economical foundation systems.

We also reimagined how we communicate with our clients and design team members. The Report of Geotechnical Investigation is a staple of our profession that has not changed since long before the Baby Boomers were suffering through their first calculus class. But it doesn't work for this generation of tweeters, texters, and coffee-shop collaborators. We needed to change our system to respond to a new client generation more familiar with pulling out a smartphone, making a few rapid-fire keystrokes, and satisfying their informational needs.

The result: Terracon developed GeoReport, which transforms the traditional, paper-based geotechnical report into a web page providing real-time access to all clients and design team members and creating a continual collaboration opportunity. We also got serious about schedule tracking. Recognizing that today's workforce wants to track everything from Amazon.com shipments to pizza delivery, Terracon's GeoReport includes a portal to track geotechnical information, too. This web-based delivery system facilitates the ability to use the resources of the Internet to solve our clients' problems in a collaborative environment. It is Terracon's way of speaking the new workplace language.

As we enter 2016, we know that the rate of change and innovation will continue to accelerate. We plan to enjoy and leverage this change by innovating as we engage with clients and design team members with similar aspirations. So, if you feel excitement more than anxiety when talking about "kids these days," we want to partner with you to innovate together as we improve our profession and create a more engaging workplace for everyone. Especially those kids. 



VIC DONALD, P.E.

Vic Donald is the national director of geotechnical services. He has more than 35 years' experience in geotechnical and geo-environmental engineering working with clients and geotechnical engineers across the country.



AIR BARRIER TESTING: Revealing Cost Reduction Solutions for School Systems

Ever notice a breeze in older buildings even when it is not windy? Many buildings leak air, which means their owners are losing money. The Charlotte Mecklenburg School System (CMSS), the 19th largest in the U.S. with a \$1.3 billion operating budget, recently decided to take action to identify school system buildings that might be exhibiting air leakage.

In early 2014, CMSS approved an architectural/engineering guideline change proposal to incorporate air barrier testing for all new buildings, additions, and major renovations. Using this guideline, CMSS's plan was to decrease the air leakage from 0.25 cubic feet per minute (cfm) per square foot of exterior enclosure for buildings built in 2014 to 0.15 cfm per square foot of building enclosure for buildings built in and after 2018.

To help the school system determine sources of air leakage in one school built in 2015, Terracon performed air barrier testing in general accordance with the U.S. Army Corps of Engineers (USACE) Engineering Research and Development Center (ERDC), Air Leakage Test Protocol for Measuring Air Leakage in Buildings, using a proprietary (Retro-Tec) Blower Door Testing system.

IDENTIFYING CHALLENGES

For effective use of test equipment, the building had to be divided into five areas to be tested separately. Splitting up the building into separate areas proved challenging due to the amount of ducts and air transfers which crossed firewalls and had to be sealed. All doors and mechanical ducts were sealed to prevent extraneous air leakage, which can disproportionately alter the results of the test. The flow through the building enclosure was recorded at 10 different pressure points. These points were placed on a graph which created a straight line that was then used to calculate the flow through the building enclosure at 75 Pascals, a unit of pressure in metric units.

Smoke pens, devices that emit a constant stream of smoke that can be used to show air movement, were used on the interior of the building to focus in on the source of leaks during the pressurization phase of the test. A stream of smoke was moved across different surfaces with potential for air loss, such as front windows, doors, electrical outlets, roof and wall intersections, and other areas. Terracon also used infrared cameras to help detect air leaks. By repeating this process, Terracon was able to identify significant sources of air leakage. For this facility, the exterior doors and the intersections of the exterior walls at the roof deck were the major offenders. In addition, large gaps were exposed at the door locks and at the thresholds.

IDENTIFYING COST SAVINGS

The allowable leakage rate of 0.25 cfm per square foot for an exterior enclosure area meets the target standard. The amount of leakage area this equates to is a single opening of approximately 36.7 square feet.

Other areas were identified, however, which could be easily repaired, providing the client additional savings in energy consumption. For an idea of how much these repairs could save, The National Institute of Standards and Technology issued a report stating that an office building with a total floor area of 24,200 square feet (approximately 30 percent of the floor area of the school building tested by Terracon) in the same climate zone saved more than \$3,000 annually when air infiltration into the building was eliminated by 83 percent from its baseline. Equating this to the floor area of the entire school building, the expected annual savings is approximately \$10,000.

By identifying the most efficient way to conduct air barrier testing for this type of school building, Terracon, in partnership with CMSS, was able to show results and recommend cost saving as well as energy conservation solutions, setting a baseline for future energy performance reviews within the system's buildings. 



JEFF POE, JR., E.I., RRO

Jeff Poe is an engineer in the facilities division in the Charlotte, N.C., office. He has experience in building enclosure testing, roofing design, above-and below-grade waterproofing, and contract administration.



PACIFIC COAST EXPANSION: NORCAL Geophysical Consultants, Inc.

Terracon has enhanced our Pacific Coast resources through the acquisition of NORCAL of Sonoma County, Calif. NORCAL provides services during the planning, design, and construction phases of infrastructure and other facilities, the assessment of environmental conditions, and the evaluation of the earth resources.

YOU. Making the Difference.

This past year we celebrated our 50th anniversary by recognizing those who make our work possible. Because of our clients, the Terracon Foundation is able to provide financial support to organizations that ignite possibilities and make the future better and brighter for us all.

From our 3,500 employees in 150 offices across the country, thank you. We look forward to the next 50 years of working together to make a difference. www.terracon.com/foundation





ASPHALT RECYCLING METHOD: Yielding Benefits for Road Rehabilitation

Rehabilitating asphalt-paved roads has been growing in popularity thanks to the availability of more cost-effective solutions. One industry-leading method is hot mixed-in-place recycling (HMIPR), an on-site method for deteriorated blacktop pavement rehabilitation.

The three most common hot mixed-in-place recycling processes are surface, repaving, and remixing. Surface recycling starts with removing a deep layer of the asphalt, which is then recycled, re-applied, and compacted. Next, a thin overlay of new hot mix asphalt is placed on top of the recycled layer. Repaving recycling involves placement of a new hot mix asphalt layer atop the recycled layer in one pass, followed by compaction. Finally, remixing recycling blends old and new asphalt with additives and additional aggregates. The new mixture is applied, and the roadway is compacted.



The hot-in-place asphalt surface Recycling Single Pass Method is employed here. The system saves clients time and money by completing HMIPR process in one pass. Photo courtesy of Cutler Repaving.

The benefits of HMIPR are numerous: it uses up to 35 percent less energy than conventional paving methods; requires up to 50 percent less asphalt cement than conventional equivalent methods; and minimizes lane closures, sparing motorists the risks of driving on uneven, oily surfaces and the dangers of flying rocks and construction materials.

Despite HMIPR's benefits, only a few state departments of transportation use HMIPR methods regularly due to problems with its durability on certain projects. When these problematic projects were

reviewed, however, the issue frequently was found to be failure to perform a thorough surface evaluation in advance to determine whether HMIPR was the right solution.

EVALUATION AND TESTING: THE KEYS TO HMIPR PERFORMANCE

To ensure that the reconditioned pavement will not deteriorate prematurely, it is essential to first evaluate the existing pavement's constituent materials and properties. Variability within the pavement materials, gradation, or asphalt content can affect the properties of the applied HMIPR pavement. If not accounted for

BENEFITS OF RECYCLING ASPHALT

- Uses less energy and emits fewer greenhouse gases than other rehabilitation methods. Hot mixed-in-place recycling (HMIPR) can help meet sustainability requirements.
- HMIPR can use up to 50 percent less asphalt cement than conventional equivalent methods.
- HMIPR minimizes lane closures, and motorists are spared the risk of driving on uneven, oily surfaces and the dangers of flying rocks and construction materials.
- Lower energy consumption is important for cost saving and resource conservation. In a study conducted by the Federal Highway Administration, HMIPR was found to consume up to 35 percent less energy than conventional paving methods.
- Allows for more overlays before requiring milling or replacement on future rehabilitation. This process typically raises the roadway 1 inch versus 2-3 inches for overlay.

during mix design, this variability may affect the quality of the product and impact performance.

Once HMIPR has been found compatible as a rehabilitation method with the current surface, the existing asphalt pavement is assessed. This process includes heating and removing the asphalt. After its properties are determined, the recycled materials are mixed and laid down to form a leveled pathway. A layer of fresh hot mix asphalt is then applied and the roadway compacted.

Recent advances and innovations to the HMIPR process are increasing its efficiency and value, including the hot-in-place asphalt surface Recycling Single Pass Method, developed by a Terracon strategic partner, which completes the road rehab in one step, saving both time and money. Whichever process is employed, proper evaluation and testing of the existing pavement are the keys to maximizing the performance and value of HMIPR.

For municipalities and civil consultants who may be looking for cost-effective solutions to asphalt road rehabilitation, Terracon can provide an opinion on which roadways may be good candidates for this process and, if so, recommend what type of rejuvenator to use and its application rate. **TI**



MARK WELLS, P.E., PMP

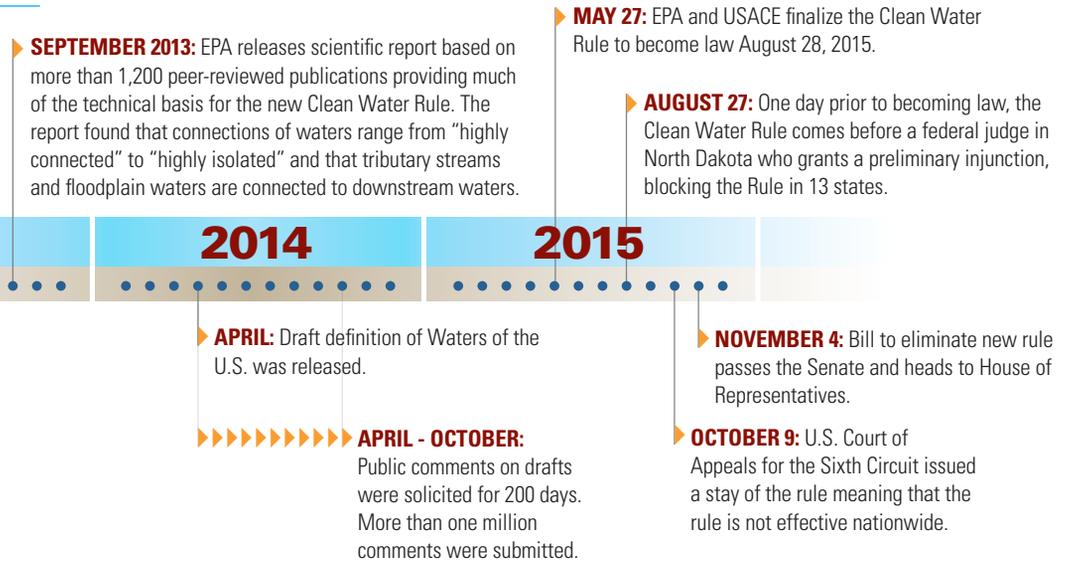
Mark Wells is a senior project materials engineer in the Houston office. He oversees projects including government facilities, educational facilities, convention centers, roads, bridges, commercial buildings, airports, recreational facilities, mid- and high-rise structures, and infrastructure. Mark

has more than 30 years of experience in quality assurance/quality control inspection and testing services with an extensive background in soils and earthwork construction, asphalt recycling, pavement investigations, and road and bridge design.



CLEAN WATER RULE DEVELOPMENT TIMELINE

As seen in the timeline, modifications to the Clean Water Rule, which addresses disturbances to waters and wetlands, have been evolving for more than three years. As new developments continue, Terracon's natural resource specialists are following each step and are prepared to help clients navigate any change to the Regulatory Program.



WHAT ARE WATERS OF THE U.S. UNDER THE NEW STAYED RULE?

According to the new stayed Clean Water Rule there are eight categories of jurisdictional waters, including wetlands, collectively called Waters of the U.S. Four categories have not changed with the development of the new rule. They are:

1. Traditional Navigable Waters
2. All interstate waters, including interstate wetlands
3. Territorial Seas
4. Impoundments of Waters of the U.S.

Categories which have changed in some capacity via the Rule:

5. Tributaries of (1) – (3) above
 6. All waters adjacent to (1) – (5) above
 7. Five types of waters which have been determined to be "similarly situated" through a significant nexus analysis:
Prairie potholes, Delmarva and Carolina Bays, pocosins, Western vernal pools in California, and Texas coastal prairie wetlands
 8. Waters located within the 100-year FEMA floodplain of (1) – (3), above AND waters located within 4,000 feet of the high tide line or ordinary high water mark of (1) – (5) above.
- (7) and (8) require a case-specific significant nexus determination; however, (1) – (6) are jurisdictional by rule and no additional analysis is required.

"Tributaries" have been defined in the new rule as waters that flow directly or through another water to (1) – (3) and the flow must create a bed and bank and an ordinary high water mark. It is important to note that tributaries can be perennial, intermittent, or ephemeral.

"Adjacent" has always been defined as "bordering, contiguous, or neighboring." According to the new rule, a water is considered "neighboring" if it is: located in whole or in part within 100 feet of the ordinary high water mark of (1) – (5); located within the 100-year FEMA floodplain of (1) – (5) and located within 1,500 feet of the ordinary high water mark; located within 1,500 feet of the high tide line of (1) or (3); or is any water located within 1,500 feet of the ordinary high water mark of the Great Lakes.

Due to these challenges, the EPA and the USACE have fielded many requests from stakeholders to add clarity to the process in the form of a rule. That clarification, the new Clean Water Rule, aims to define terms such as: significant nexus, neighboring, tributary, floodplain, and riparian area. Based on some of these definitions, the agencies can make categorical jurisdictional determinations for certain classifications of waters and wetlands. According to the agencies, the rule reduces documentation requirements and time frames to make Approved Jurisdictional Determinations by decreasing how often case-specific significant nexus analysis is required. However, as shown in the timeline above, there have been a number of challenges to the rule being implemented including a Senate proposal to eliminate the rule.

WHAT'S NEXT?

While the exact next steps remain unclear, some form of a rule change is anticipated. Permit applicants and other stakeholders should expect modifications to the process and possibly longer than usual regulatory delays during implementation. Terracon's natural resources specialists have digested the thousands of pages of documentation associated with the proposed Clean Water Rule changes and continue to follow constant activity taking place surrounding its development. Regardless of when a final determination occurs, Terracon is eager to assist clients through the complexities of the Section 404 Regulatory Program and looks forward to partnering with clients to successfully navigate Waters of the U.S. 



CARLAND G. HOLSTEAD, PWS

Carland Holstead is a senior biologist and natural/cultural resources department manager in the Dallas office. He holds the Professional Wetland Scientist (PWS) certification given by the Society of Wetland Scientists. Carland oversees practices including wetland and stream determinations and delineations, USACE permitting, mitigation plan development, threatened and endangered species habitat assessments, NEPA assessments including CEs, EAs, and EISs, cultural resources assessments, and ecological risk assessments.

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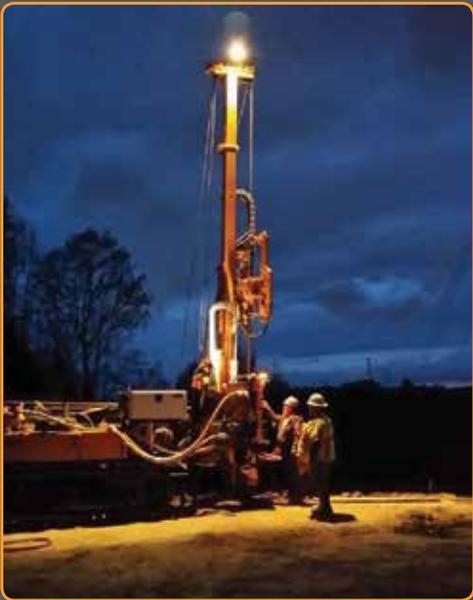
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More Than 150 Offices Nationwide

Photo Contest Tells Your Stories

Employees shared stories of your projects during Terracon's annual photo contest featuring images of people, work, and communities around the country.



First Place in the People and Community Category: Tommy Isaacs, Charleston, W. Va., office. Terracon's drilling team just before it shut down the rig for the evening. It had been drilling in Charleston, W.Va.



First Place in the Project Category: R. Wade Watkins and Jack McCranie, Fort Worth office. Photo was taken above Thurber, Texas, while riding in a helicopter.

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TERRACON COMPANIES

- AQS Environmental
- Argus Pacific
- Dunkelberger Engineering & Testing
- IHI Environmental
- Liesch Associates
- Neil O. Anderson and Associates
- New England EnviroStrategies
- NORCAL Geophysical Consultants, Inc.
- RGA Environmental
- Stafford Consulting Engineers



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