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Water quality assessed 9

The quality of the state's surface waters, ground-water and estuaries is generally good, based on criteria that DEP and other regulatory agencies monitor. Water quality data for 2012 through 2014 were recently summarized in a sprawling document produced by the department.

Crop conversion 10

St. Johns County and the St. Johns River Water Management District have partnered on an innovative program to improve county water quality by converting intensively-irrigated row crops to a minimally-irrigated timber crop.

Solar's cloudy future 11

Voters recently approved an extension to a tax break for solar power generation by residential and industrial property owners. However, the future of solar in the Sunshine State remains uncertain until two more measures are considered.

Gypstack sinkhole 12

Another sinkhole opened under a gypsum stack at Mosaic Co.'s New Wales fertilizer plant in southwestern Polk County, releasing an estimated 215 million gallons of process water and sludge underground through a 45-foot-diameter hole.

Seismic search 13

Cholla Petroleum began seismic testing in Calhoun and Gulf counties, triggering public fears the firm will soon embark on more aggressive oil and gas drilling.

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Got a story lead?

Got an idea for a story? Like to submit a column for consideration? Fire when ready. And don't forget to fill us in on your organization's new people and programs, projects and technologies—anything of interest to environmental professionals in Florida. Send to P.O. Box 2175, Goldenrod, FL 32733. Call us at (407) 671-7777; fax us at (407) 671-7757, or email mreast@enviro-net.com.

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Monitoring, site inspections assure health of JEA's Blacks Ford wastewater treatment wetland

By **BLANCHE HARDY, PG**

On Feb. 8, 2015, JEA received bids to execute Phase 2 of the Blacks Ford Water Reclamation Facility Phase 4 expansion.

The approximately \$55 million project executed this summer will double the three million gallons a day average daily treatment capacity to six mgd.

Construction is expected to be complete by the spring of 2018.

JEA reclaims and distributes treated wastewater from the Blacks Ford facility for reuse as irrigation on publicly accessible spaces as their primary method of effluent disposal.

The utility is on track to produce about 400 million gallons of reuse water for its customers this year.

Treated wastewater that is not distributed for irrigation is discharged into the forested wetlands of Blacks Ford Swamp in northern St. Johns County where JEA owns and maintains 500 acres of wetlands for that purpose.

"The Blacks Ford total discharge is approximately 2.1 mgd annual average daily flow," said Edward Cordova, PE, a JEA environmental engineer. "Ap-

proximately half of that flow, or 1.1 mgd annual average daily flow, is currently being discharged to the wetlands.

"With the rapid growth of Blacks Ford's service area, JEA expects the Blacks Ford plant to evolve primarily

into a wet weather discharge facility over the coming years, with probably less than 30 percent of the effluent being discharged to the wetlands."

RECLAMATION
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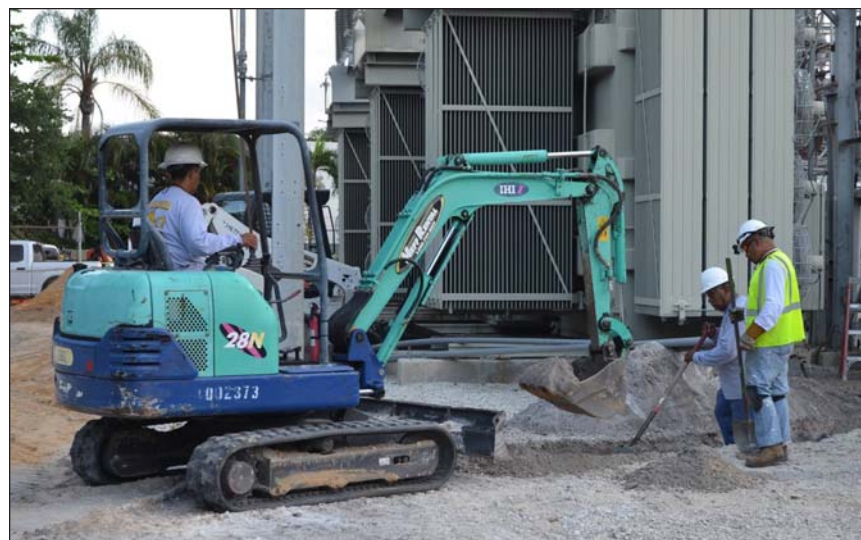


Photo by John Lucarelli

A construction crew from Alpha-Omega Training and Compliance, headquartered in Cocoa, works on upgrades at a power substation in Juno Beach. The project included electrical conduit installation, trench work and the cleanup of oil-impacted soils.

Seminole Tribe of Florida's challenge to revised DEP water quality rule dismissed

By **ROY LAUGHLIN**

On Aug. 8, the Seminole Tribe of Florida filed suit with the Florida Division of Administrative Hearings challenging recent state Environmental Regulation Commission approval of a proposed water quality rule.

The rule revised existing standards for 43 chemicals and created new standards for 39 chemicals in the Human Health Toxics Criteria Rule, 62-302.530, FAC.

The Seminole Tribe asked for a determination of invalidity of the proposed rule revisions.

The tribe's petition said that the new risk-based calculation used to establish standards "does not take into account the subsistence rates of fish consumption for tribal populations."

The tribal members' subsistence consumption rate is over 140 grams of fish per week—five times greater than the consumption rate used for the proposed rule.

The petition also claimed that procedural violations of "delegated legislative authority" invalidated the rule because the proposed rulemaking, referring specifically to the ERC meeting where it was approved, did not have a full 28-day notice period.

The proposed rule was published in the Florida Administrative Register on June 30, 2016. The ERC met and voted approval on July 26, 2016.

On that basis, the petition characterized the proposed rule as "arbitrary and capricious."

Secondarily, the petition criticized the proposed rule because it failed to establish adequate standards for agency decisions.

Administrative Judge Bram D.E. Canter heard the case on Sept. 6-7 and dismissed it on procedural grounds on Sept. 13.

DEP counsel pointed out that the tribe's counsel filed the petition at 5:02 pm, Aug 5. Filing rules establish a 5:00

pm deadline on the final eligible day of filing.

Judge Canter also determined that the petition was late because it was sub-

SUIT
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**Conference preview:
2016 Florida Remediation Conference features broad content, format diversity**

By **ROY LAUGHLIN**

As the Florida Remediation Conference advances into its third decade, prior attendees will notice some changes to the technical session format and leadership at the top of the card this year.

FRC 2016 welcomes a new chair, Jim Langenbach, PE, BCE, senior principal with Geosyntec Consultants in Titusville, who succeeds long-time Conference Chair Nick Albergo, PE, DEE, former CEO of HSA Engineers & Scientists in Tampa and its two successor companies, Conestoga-Rovers & Associates and GHD Services Inc.

Since its outset, FRC has kicked off its two-day format with an always unpredictable and provocative opening address from Albergo.

But this year, after a few parting comments from Albergo, that duty will fall to Langenbach.

His address, Developments in Remediation: A Look at How the Tools, Technologies and our Understanding of the Remediation Problem Continue to Evolve, will set the tone for the balance of the event.

Following Langenbach, Michael

Goldstein, Esq., managing partner of The Goldstein Environmental Law Firm in Miami, will discuss legal issues of significance to remediation consultants.

Goldstein's presentation is entitled Notes From the (Brown)Field: Limiting Consultant Exposure to Malpractice Risk at Contaminated Redevelopment Sites.

This year's conference has a strong agenda that provides input on advanced techniques that every remediation professional should be aware of, according to Langenbach.

Technological innovation and discussions of effective strategies for challenging remediation projects have always been the primary focus of FRC talks, even though topic areas may shift every year.

This year, the schedule includes ten sessions, with three pairs of concurrent sessions on Thursday afternoon and Friday morning and the annual regulatory panel discussion on Friday after lunch.

The sessions are grouped into sub-topics over two days including, among others, sustained-release technology ap-

FRC
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USGS to study nutrient contribution to harmful algae blooms nationwide

Staff report

While massive cyanobacteria blooms in Lake Okeechobee and its drainage waterways in Florida received nationwide attention between February and August this year, news headlines began to report that other large lakes in the country experienced similar cyanobacteria blooms as summer temperatures occurred in higher latitudes.

An outbreak in Utah Lake was one of the most prominent summer blooms outside Florida. An estimated 150 people became ill with headaches, vomiting and skin rashes, and farmers were left without water for their livestock during the heat of the summer.

The U.S. Geological Survey responded by initiating a study of nutrients in Utah Lake and Great Salt Lake for several weeks in July and August.

The study was characterized as a “proof of concept” project to characterize how nutrients foster cyanobacteria blooms and other toxic microalgae that cause harmful algal blooms.

The ultimate goal is to develop some capability to predict when and where algal blooms will occur.

In the Utah study, USGS researchers specifically examined the contribution of

wastewater treatment plants and agricultural operations.

Numerous environmental factors including higher temperatures, increased precipitation and runoff influence algal blooms. But the USGS scientists noted that nutrient inputs by human activities is one of the primary factors contributing to blooms that humans can control.

The study involves the use of automated water quality monitors that make frequent simultaneous measurements of multiple environmental conditions including nitrogen and phosphorus concentrations, along with physical factors such as temperature, sunlight and chlorophyll concentration.

The study’s results, still being analyzed by researchers, will be made public when available.

SE ecosystems vulnerable to climate change. The Southeast U.S. is an area with multiple distinctive regional ecosystems. Six of them are vulnerable to present and future climate change, according to two new USGS reports conducted by the U.S.

Department of the Interior’s Southeast Climate Science Center.

Of the six, two are part of Florida’s landscape: the Caribbean coastal mangrove ecosystem and karst-depression wetlands.

The Caribbean coastal mangrove ecosystem is vulnerable to sea level rise, precipitation changes and more frequent storm events. Karst-depression wetlands, which are abundant throughout the southeastern states from Virginia to Florida but are iconic to the sunshine state, are vulnerable to changes in precipitation and resulting changes in groundwater levels.

The four other southern ecosystems identified at risk include the Edwards Plateau limestone shrubland in Central Texas; the Nashville Basin limestone glade and woodland, predominantly in central Tennessee; southern Appalachian balds at high elevations of these mountains; and the southern loess bluff forest on the eastern bluffs of the Mississippi River in Mississippi and Louisiana.

Collectively, these ecosystems face

stress from adjacent urbanization, warmer temperatures and increasing dryness from changes in precipitation and drought patterns.

Invasive species are also a problem in many of these regional ecosystems.

The ecosystems are important because they occur within the boundaries of the North American Coastal Plain, an area of approximately 1,100,000-square kilometers that is ranked 30th on the list of global biodiversity hotspots.

These ecosystems are pockets of land that are “especially biologically rich compared with their surroundings,” according to the USGS.

They typically support multiple rare and geographically restricted plants and animals, many of which are endangered or threatened species.

These species, with restricted ranges and highly specific habitat requirements, are likely to be unsuccessful adapting to climate change or escaping isolated habitats to find more suitable ones.

The report assessing vulnerability to climate change is a first step, according to the authors, in planning and prioritizing effective regional conservation efforts.

Clean energy development grants.

Florida, along with Montana and West Virginia, will share a \$225,000 grant to fund “Technical Assistance to Advance Clean Energy Activities.”

The grant from the U.S. Department of Energy’s State Energy Program is intended to expand high priority ongoing state and local programs in these three states.

DOE’s State Energy Program awards projects in three categories: state energy planning; innovative opportunities for energy efficiency and renewable energy practices; and technical assistance to advance clean energy activities.

Florida’s grant came from the third category.

Three other states—Hawaii, Minnesota and New Mexico—will share \$745,000 for state energy planning.

The second category was by far the largest in terms of funding and participation. Ten states will share \$4 million for projects in that category.

DOE funds state-led projects intended to develop “replicable actions other states and local governments can adopt to overcome barriers to new energy initiatives and enable them to achieve greater public and private investment in energy efficiency and renewable energy.”

Fracking chemicals reduce human fertility.

A research team led by faculty at Duke University and the University of Missouri recently published results of an experimental research study that showed a link between prenatal exposure to a mix of chemicals used in fracking, and oil and gas development, and adverse reproductive and development impacts in female mice.

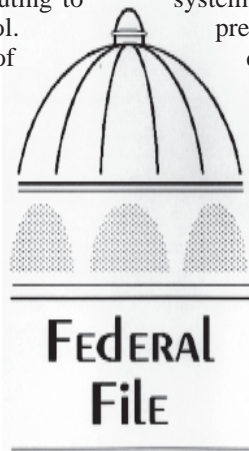
The 23-chemical mixture included chemicals that occur in fracking fluids and well produce water, including benzene and xylenes.

According to the researchers, mice were exposed to contaminant doses consistent with what humans drinking water near wastewater spill sites would experience. The effects included heart developmental defects, altered pituitary hormone levels, reproductive organ and body weight changes, and altered heart and ovarian egg development.

A second paper included a scientific literature review of 45 research articles discussing the relationship between exposure to oil and gas development and extraction chemicals, and human reproduction.

The exposure included both environmental and occupational factors.

The studies provide evidence of increased risk of negative human reproductive effects following exposure to chemicals used in fracking.



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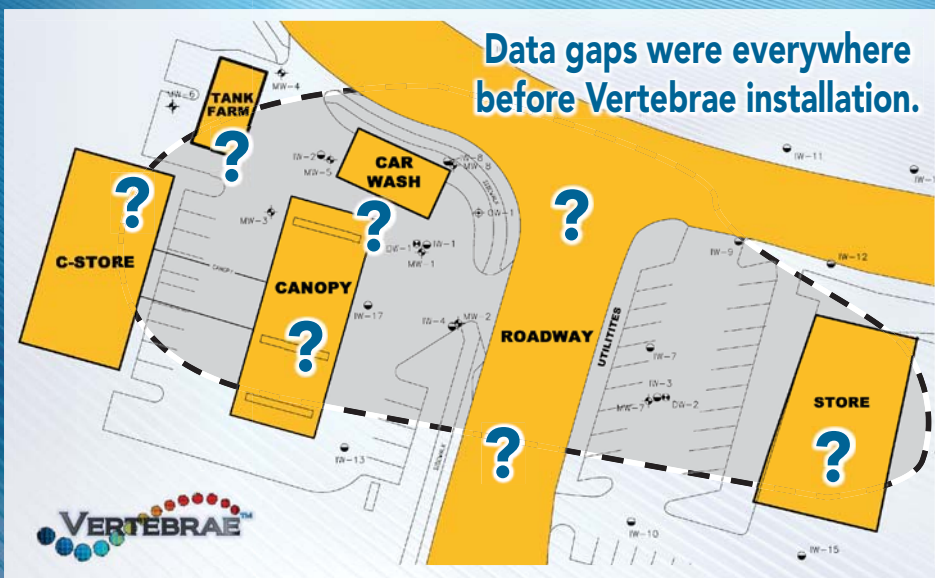
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Contributing writers and columnists

PRAKASH GANDHI
Senior Environmental Correspondent
Orlando, FL

BLANCHE HARDY, PG
Environmental Correspondent
Sanford, FL

ROY LAUGHLIN
Environmental Correspondent
Rockledge, FL

Ruling reversed on permit for Fort Pierce development

Staff report

Florida's Fourth District Court of Appeal reversed a lower court ruling that the Florida Department of Environmental Protection committed a regulatory taking of a property that the plaintiff, Beach Group Investment LLC, hoped to develop into 17 luxury townhouse units.

The court ruled that the would-be developer did not seek a variance following the permit denial, agreeing with DEP's argument that the claim was not "ripe" because there might be alternative uses allowed for the Fort Pierce property.

The district court said ripeness is the threshold question for an as-applied regulatory taking claim.

Beach Group acknowledged that it did not apply for a variance.

The company could have used the application process to argue that DEP should have based its permit decision on a 1997 erosion control line that it had been using.

The district court found that the trial court made a mistake in finding that the DEP could not have issued a variance because the coastal construction control line permit was a statutory requirement.

By not applying for a variance when given the chance, Beach Group deprived DEP from possibly granting one, the court added.

The district court also determined the case was not ripe because it found that Beach Group could have considered alternative plans for the 2.2 acre tract.

All aboard! A major environmental permit has been issued by South Florida water managers for sections of All Aboard Florida's Brightline Rail project.

But the approval omits dozens of rail crossings through parts of Palm Beach, Martin and St. Lucie counties.

The South Florida Water Management District issued a permit approving how Brightline plans to handle stormwater runoff around its rail line. But water managers said the approval does not include 77 intersections where the rail line crosses roadways.

All Aboard Florida claims the intersections are exempt from permit review. But water managers dispute that claim.

The approval addresses only stormwater management systems in Palm Beach, Martin and St. Lucie counties and not the construction or operation of the railway line.

Martin County officials, who have been fighting to block the rail line, criticized the approval. County officials said they are disappointed with the decision and strongly believe the district should not issue the permit.

The permit application "fails to provide reasonable assurances that harmful and negative environmental impacts would not occur," the county said in a press release.

A judge had earlier ruled that a lawsuit will continue challenging federal transportation officials' decision to allow AAF to sell \$1.75 billion in tax-exempt bonds to help pay for the rail line.

The first phase of the project—the segment between Miami and West Palm Beach—is already under construction.

The second phase of the rail line will run between West Palm Beach and Orlando on existing Florida East Coast Railway tracks.

Martin and Indian River counties filed federal lawsuits last year against the U.S. Department of Transportation challenging All Aboard Florida's eligibility for private activity bonds.

AAF has received two extensions to sell the bonds. The company has until Jan. 1, 2016, to complete the sale.

Sabal Trail. The U.S. Army Corps of Engineers approved permits for the controversial Sabal Trail natural gas pipeline in Florida.

In addition, the Federal Energy Regulatory Commission approved a request to start construction on a connector pipeline that will carry natural gas from the station

in Osceola County where Sabal Trail will terminate to a Florida Power & Light natural gas plant in Martin County.

The corps finalized permits that allow the companies partnering on the pipeline project to discharge dredge and fill materials into waterbodies, such as wetlands, during construction.

The permit requires Sabal Trail to buy credits from several federal- and state-approved wetland mitigation banks.

In northern Central Florida, the pipeline's route will cross under the Suwannee and Lower Santa Fe rivers and traverse dozens of springsheds.

The Sabal Trail pipeline project is a \$3.2 billion, 516-mile, three-foot wide pipeline that will carry up to one billion cubic feet of natural gas a day from Alabama through South Georgia and Florida to the connector pipeline in Osceola County.

In Florida, the pipeline will run through rural areas of Hamilton, Suwannee, Gilchrist, Levy and Marion counties and a small portion of Alachua County.

It will continue through Sumter, Lake

and Orange counties to hook up to the connector pipeline that will run to the FPL natural gas power plant in Martin County.

In February, FERC approved the pipeline project. The agency is now looking at whether the companies behind Sabal Trail have met all the conditions of the approval before it supports the start of construction.

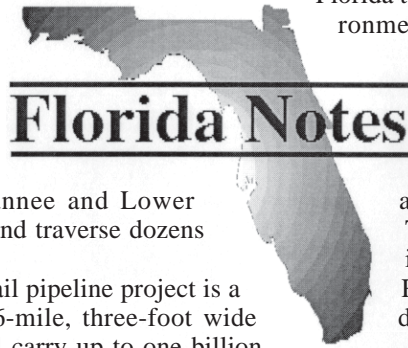
The corps turned down a request from the Madison County Commission in North Florida to further review potential environmental impacts of Sabal Trail's main line.


County officials are concerned about potential pollution to the Withlacoochee River, Madison Blue Spring and local drinking water wells. They are also concerned about impacts to the headspring of Rainbow Springs and possible damage to wetlands.

Patrick fined. Patrick Air Force Base was fined \$40,000 to resolve hazardous waste violations at the base. The penalty was part of an agreement the base has entered into with the EPA.


Inspectors found several violations, in-

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Volusia officials unimpressed with Webster Creek Mitigation Bank plan

Staff report

The Volusia County Board of County Commissioners is seeking additional information regarding the proposed Webster Creek Mitigation Bank in Florida's Mosquito Lagoon Aquatic Preserve.

The plan proposed a 315-acre mitigation bank on land that county administrators said is state sovereign lands.

Former MLB baseball player and manager Davey Johnson believes that he owns the land and has applied for permits from the St. Johns River Water Management District and the U.S. Army Corps of Engineers.

The details of the plan are complex, especially the ownership issue.

At a Volusia County Commission meeting in August, a deputy county attorney said that a substantial portion of the proposed mitigation bank land, consisting primarily of swamps and intertidal land, was mapped in the 1970s and declared to be sovereign lands.

He also noted that the proposed mitigation bank includes areas that the county and state agencies have worked to restore.

Johnson hired Bio-Tech Consulting Inc.—owned by John A. Miklos, the current chairman of the SJRWMD's governing board—to prepare permit applications

to the corps and district.

To many observers, Miklos' involvement as project consultant and chairman of the board of an involved permitting agency represents a clear conflict of interest, particularly with respect to the contested ownership of sovereign lands.

Developing the land as a mitigation bank requires that the Webster Creek Mitigation Bank owners restore at least parts of the habitat. They are proposing to lower the elevation of spoil piles and fill in mosquito control ditches, some of which date back to the 1950s.

Further, they plan to use pressurized water—hydroblasting—to do it.

Volusia officials believe that hydroblasting is not an ecologically appropriate method because it could mobilize insecticides and other contaminants from the spoil piles being blasted.

Johnson and his consultants claim that none of the land proposed for the mitigation bank is state-owned. They also defend the use of hydroblasting.

Mitigation banking is a business. Owners of mitigation banks earn credits for re-

storing habitat and enhancing its ecological condition.

Those credits can be used by the bank owners or sold to other developers to offset undesirable or unacceptable real estate development practices in other locations.

Mitigation bankers get one credit for each acre restored. According to a Volusia County newspaper article, one credit here

is worth more than \$135,000. At that rate, the mitigation bank could gross Johnson more than \$42 million.

At its August meeting, the Volusia County board unanimously approved a letter to Gov. Rick Scott asking him to suspend Webster Creek Mitigation Bank application reviews until the land ownership question is suitably settled.

Shelley Szafraniec, APR, assistant community information director for the county, said the governor's office acknowledged the letter with an email.

The county received a letter from the Office of Florida's Internal Improvement Trust Fund acknowledging that it will examine the mitigation land ownership issues that the county raised in its letter to the governor.

Volusia County sent similar letters to the St. Johns River Water Management District and Florida Department of Environmental Protection raising the ownership issue.

Letters from those agencies said that they have asked for clarification of ownership, and are also concerned about the use of hydroblasting on the site.

The mitigation bank will face delays lasting perhaps months, and likely much additional public scrutiny and protest until the issue can be sorted out.

Another contentious mitigation bank. A couple of developers, some Manatee County residents and permitting agency officials are involved in a skirmish over a proposed development on Sarasota Bay that includes an unusual mitigation bank proposal.

Developers Carlos Beruff and Larry Lieberman, are seeking permits to develop Aqua by the Bay and an adjoining Long Bar Mitigation Bank.

Local residents oppose the development but DEP said it intends to permit it in spite of objections from its own permitting staff.

Making matters muddier, some contend that the developers may be withholding information about a possible marina and chan-

nel in the mixed-use development.

Aqua by the Bay is a proposed mixed-use development that ultimately may include 3,197 homes and 78,000 square feet of commercial space.

On a 69-acre southeast parcel between Aqua by the Bay and the proposed mitigation bank, the developers are proposing a 200-lot development site. The development plan for this parcel has become controversial.

Developers have permit applications in to the Southwest Florida Water Management District for an amended stormwater management plan to allow dredging of an eight-foot-deep basin described as "a lagoon estuary and enhancement area" and sea wall construction.

Opponents of the proposed lagoon construction plan said that it does not meet minimum or average buffer requirements, will create stagnant water in the deeper parts of the lagoon and includes unjustified depths.

Between the proposed Aqua on the Bay development and the Long Bar Pointe Mitigation Bank is a 120-foot gap between the two parcels. Opponents of the plan worry that at some point that gap will be converted into a marina channel whose construction would involve dredging and that, perhaps, the stormwater basin would be developed as a marina.

Assumptions about a canal and marina appear to be hypothetical. The developers have not publicly disclosed any plans for the area between the mitigation bank and the development.

The developers are also proposing to establish the Long Bar Pointe Mitigation Bank on a 263-acre portion of the site that's mostly submerged lands and mangroves.

The mitigation bank is controversial for several reasons. First, the developer requested to trim the mangroves, a practice that Manatee County regulations restrict.

In addition, the mitigation bank will be the first in the state to operate alongside an active development, according to local critics. They claim that the project as a whole will degrade and destroy habitat rather than enhance it.

Nevertheless, developers initially applied for 18.62 mitigation bank credits.

A DEP permit reviewer reduced that to 14 credits but later, after DEP officials met with Beruff, they reversed the reviewer's decision and agreed to restore the original 18.62 credits.

In that area, credits could be worth approximately \$1.8 million if sold.

Even though Beruff and Lieberman could pocket close to \$2 million, land in the mitigation bank would not be subject to ad valorem taxes paid to local governments.

DEP has reviewed a permit for the development, and has issued its intent to permit. SWFWMD is now reviewing the amended stormwater management permit.

The U.S. Army Corps of Engineers is also reviewing a permit application. More than 100 residents have requested the corps to hold a public hearing.

"We are currently reviewing the comments to determine if the project has potential to become a mitigation bank," said Nakeir Nobles, a corps spokesperson, in response to a query about the prospects for a public hearing.

"If there is no potential, a hearing is not needed," she said. "If we determine there is potential, we will evaluate the need (for a hearing) based on information we have already received, and if additional information could be gained through a public hearing."

She noted that the corps had until late September to make a decision and inform the applicant, and then determine whether or not to hold a public hearing.

St. Johns County expands reuse distribution. The Anastasia Island Water Treatment Facility in St. Johns County—



WATCH
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WATCH
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including a one-million-gallon reservoir to store reclaimed water—is nearing completion.

When it goes into service, it will conserve an estimated 9,100 gallons per day of potable water by providing reuse water for landscape irrigation. It will also reduce nutrient discharges into the Matanzas River by about 1,898 pounds annually.

As the local population grows, the discharges to the Matanzas River redirected to reuse could increase to two million gallons a day.

Local officials said that existing homes on Anastasia Island, a location characterized as “built out,” will likely not receive reuse water.

Instead, the county plans to require new developments to install distribution pipes for reuse water from the new facility.

The reuse water also will go to the Marsh Creek Golf Course, and to 130 new homes in the Ocean Cay Development.

Construction costs for the new tank at the treatment facility were \$1,675,000. The St. Johns River Water Management District contributed a third of the total construction costs, not to exceed \$552,750.

St. Johns Utilities is also constructing a second one-million-gallon reuse water storage tank at its State Road 16 Water Treatment Facility.

The water management district is contributing up to \$412,500 towards the expected \$1,250,000 construction costs for that facility.

It will eliminate discharges to Cowan Swamp, a tributary of Moultrie Creek. That will reduce nitrogen loading by about 5,000 pounds annually, conserve approximately 60,000 gallons of potable water per day, and provide reclaimed water for landscape irrigation at 850 homes.

Additional expansion of St. Johns County’s reuse water system is expected in the future.

Upper Suwannee Springs project completed. The Suwannee River Water Management District announced completion of the Eagle Lake/Upper Suwannee River Springs Project.

The project is a public-private partnership with PotashCorp. The company owns Eagle Lake, a reclaimed mining pit that receives a majority of the surface water runoff from the company’s mining operations. Water from the mining pit is eventually discharged to Swift Creek and then into the Suwannee River.

For the restoration project, PotashCorp installed pumps to recirculate Eagle Lake water to two of its mining operations to reduce withdrawals from the Floridan Aquifer.

It will also reduce nutrient loadings in the Upper Suwannee River basin by 140,000 and 110,000 pounds per year of total nitrogen and total phosphorus, respectively.

The project’s total cost was \$3,600,000. DEP contributed \$3,070,000. SRWMD contributed \$300,000. PotashCorp contributed \$230,000, and was responsible for the installation and operation, and will cover the long-term maintenance costs of the project.

Construction began in 2016 and the completion ceremony was held on Aug. 25, 2016.

Apopka water conservation. The city of Apopka and the St. Johns River Water Management District are partnering on a water conservation effort.

The program will identify high water use customers based on city water utility customer account information including residential, commercial and city accounts.

The city will provide high consumption customers with advice and recommendations to help them reduce potable water consumption.

Recommendations may include identifying irrigation runtimes, appropriate controller settings and water wise landscaping choices. It will also provide rebates for irrigation system upgrades.

The city and water management district hope the effort will lead to decreased

groundwater withdrawals by reducing the use of potable water for irrigation.

Reduced groundwater withdrawals will benefit both Rock Springs and Wekiwa Springs.

SJRWMD contributed \$70,088 in cost-share funds to the city of Apopka’s water conservation incentive program.

NWFWMD’s mobile lab to continue. For the past 13 years, the Northwest Florida Water Management District has operated a mobile irrigation lab.

The lab’s purpose is to reduce farmers’ operating costs through increasing irrigation efficiency. At the same time, increased irrigation efficiency conserves water resources and reduces nutrient loading.

The mobile lab program provides assistance to any farmer within the 16 counties of the district, but priority is given to irrigation systems within the delineated spring recharge basins in Jackson County and within the water resource caution area in Gadsden County.

The district’s governing board recently approved \$71,125 in funding for the program in the upcoming fiscal year.

The Florida Department of Agriculture and Consumer Services provided \$82,364 and the National Resources Conservation Service provided an additional \$61,450 in in-kind expenses to support the total \$215,214 annual cost of the mobile irrigation lab program.

Since 2004, the first the lab operated, the program has conducted 777 evaluations covering an irrigated area of over 57,000 acres. The evals are free and voluntary.

Venice replaces potable well. In late August, the city of Venice began construction on a new drinking water well on a 200-square-foot plot of land near the east spur of the Venetian Waterway Trail.

The well construction site is on the eastern side of the intracoastal waterway, across from Venice High School. The new well is about 25 feet from an existing, but damaged, drinking water well.

About a year ago, the well pump casing on the old well was damaged during efforts to maintain it. The well was capped to give officials time to consider options to repair or replace it.

Now that the decision to build a new well has been made, the old well will be appropriately abandoned according to Southwest Florida Water Management District procedures.

Applied Drilling Engineering Inc. of Tampa will drill the new well at a cost of \$474,350. Venice will finance the construction with a loan from the state revolving fund program at a rate of 0.86 percent.

The new well will provide about 19,000 gallons a day and will join 12 other wells throughout Venice that provide water to the

city’s reverse-osmosis potable water treatment plant.

UCF to study attitudes regarding IRL. The National Science Foundation is funding a study by the University of Central Florida to determine if 20 years of Indian River Lagoon restoration efforts in Volusia and Brevard counties have influenced public behavior and citizens’ perceptions about the lagoon, and if so, how.

One of the study’s goals will be “a comprehensive assessment of stakeholder perceptions, attitudes and sense of place” that bear on the success of restoration efforts beyond the traditional success metrics.

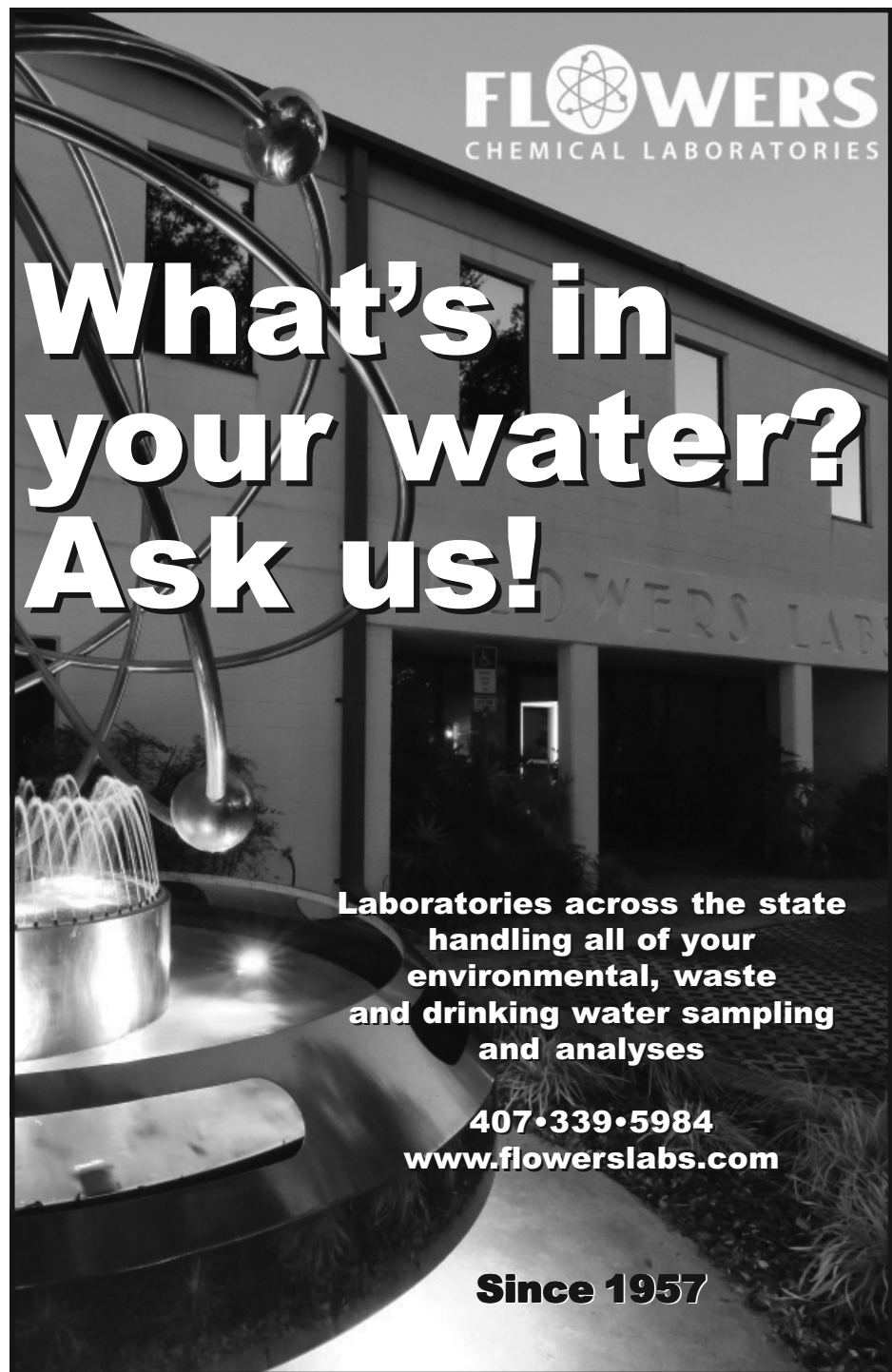
In other words, did the large public involvement with restoration projects influ-

ence public perceptions that they were effective and worthwhile?

The sociological perceptions will be compared with the success of the projects in terms of monitoring data, changes in erosion patterns, persistence of the oyster reefs and living shorelines, habitat enhancement for other species such as wading birds and other “scientific metrics.”

The investigation will focus on up to 20 years of post-enhancement project monitoring information for selected habitat improvement projects that have been completed.

Sociological opinions and data will be gathered by developing an Internet portal where stakeholders can share their stories and perceptions of restoring the IRL.



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applications; risk analysis applications and petroleum cleanup; plume management using carbon injectables, modern iron applications; and management of groundwater to surface water discharges.

Day One highlights

Session 3, Combined Remedies for Enhanced Outcomes, consists of six presentations discussing effective combinations of techniques that typically have been used as stand-alone remediation approaches.

They include combining physical removal with specific electron donors, combining absorption with bioremediation, combining slow release electron donors with bioaugmentation and using electrical resistance heating to raise ambient temperatures below ground, at least doubling reaction rates over those that occur under much lower temperature regimes.

Comments from two of the speakers provide some insight into how combined techniques are both very new as well as very traditional in bioremediation projects.

Jesse Brown, PE, an associate and senior engineer with Golder Associates in Jacksonville, will discuss a project to restore a contaminated former dry cleaning

site.

Noting that it's not always easy to locate DNAPL's main mass at some of these sites, this site was different, said Brown.

"We saw DNAPL coming out of the ground," he said. "It involved a lot of (physical) removal."

In his talk, Brown will describe the combined use of large diameter auger excavation followed by CHITOREM®-based bioremediation.

Steven Sittler, senior project geologist with Patriot Engineering in Indianapolis, will discuss perchloroethylene- and trichloroethylene-contaminated site treatment with data drawn from many sites that show that simultaneous or nearly simultaneous electron donor and microorganism injection is a viable and effective time- and effort-saving strategy.

"We've had no issues with bacteria not being viable within three days of (electron) donor injection, or three days of bacteria injection," he said. "There's no need to wait any period of time for conditions to become acceptable."

Sittler will present data showing characteristic rates of daughter product formation relative to parent product reduction. These, he proposes, can be used as bench-

marks to assess whether bioremediation progress is occurring appropriately.

Deviation from his benchmark rates and attainment of daughter product peak concentrations, he said, can indicate a need to identify a problem and apply corrective measures to push bioremediation to its desired end points.

Dan Socci, chief executive officer of EthicalChem in South Windsor, CT, will focus on project results, surfactant selection and treatment design during his talk, Successfully Integrating Surfactants into ChemOx Technologies.

"Surfactants have been used in remediation primarily to flush contaminants from the subsurface," he said. "We have developed proprietary surfactants and processes to enable simultaneous injection of surfactants and oxidants to achieve in-situ contaminant liberation for immediate destruction."

This results in clean soil without rebound while containing contaminant mobilization, he said.

In the past when one remediation technology fell short on results, another followed in succession, mostly on a trial-and-error basis. Those early projects were precursors, in some cases, to the combined

remediation technologies being used successfully today.

Session 4A, one of two concurrent sessions late Thursday afternoon, features a new, fast-paced format. This session includes eight presentations of five minutes in length on new products and new product delivery technologies.

Langenbach, who brought the "speed talk" format back to FRC this year and who will chair the session, said attendees can expect a brief talk with a strong "hook."

"The talks are intended to provide what essentially represents a movie trailer regarding a company's product or delivery approach," he said.

The session will be followed immediately by the FRC Reception to facilitate post-session discussions.

Day Two highlights

One of two early morning sessions on Day Two, Enhancing your Foundation for Remedial Success, focuses on combining information technology, mobile computing and real-time data analysis to shorten project time frames and inform decisions in the field.

First, Kara Wimble, project manager with EnSafe in Jacksonville, will discuss using Microsoft Office 365, SharePoint and additional software and technology to conduct long-term monitoring at Cecil Field in Jacksonville.

During the next talk, Timothy Jellett, senior scientist with HydroGeoLogic at Cape Canaveral Air Force Station, will discuss combining membrane interface probes and hydraulic profile tool technologies to develop a three-dimensional characterization of a DNAPL source area at the Air Force station.

There, use of the two technologies in tandem reduced an expected 18-24 month-long field investigation to less than four months.

Rounding out the session, Doug Davis, technical services manager with Regenesys in San Clemente, CA, will discuss using design verification programs to assist remediation planning after risk assessment has determined the need for cleanup.

Davis noted that assessments sometimes do not fully characterize how much contamination is on site, its location or distribution. That can create a gap between site assessment and remediation planning.

"Our design verification program is specific to the injection of remedial fluid into a remediation area," he said. "About two-thirds of the time, we revise our remedial design based on these design verification testing programs."

The session entitled Emerging Contaminants: Remediation of Perfluorinated Compounds brings a novel topic to FRC this year. Three speakers will describe and discuss remediation methods of a class of compounds with paradoxical physical properties that challenge traditional remediation techniques.

Perfluorinated compounds, widely used in consumer products and as flame retardants, are globally distributed and resistant to oxidation.

The U.S. Environmental Protection Agency recently established 70 parts per trillion drinking water advisories for two of the most commonly used perfluorinated compounds—perfluorooctanoic acid, PFOA, and perfluorooctane sulfonate, PFOS.

The U.S. Department of Defense has been a major user of perfluorinated fire retardants at military bases throughout the country.

The DoD is now conducting a nationwide assessment of perfluorinated compounds in water and soil around its bases, assessing military personnel exposure and identifying sites requiring remediation to meet the new health advisory.

Attendees wanting to know more about dealing with these emerging contaminants of concern will underline this session in red.

FRC's program has included a regulatory panel discussion for many years that has historically been the most well attended session of the two-day conference.

Joe Applegate, PG, senior principal

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Technical Session Agenda

Day One, Thursday, Oct. 6, 2016

Opening Session

9:00: **A Word from our Founder**
Nick Albergo, PE, DEE, Senior Engineer, GHD, Tampa

Keynote Address from the Conference Chair

Jim Langenbach, PE, BCEE, Sr. Principal, Geosyntec Consultants, Titusville

9:30: **Notes from the (Brown)Field: Limiting Consultant Exposure to Malpractice Risk at Contaminated Redevelopment Sites**
Michael Goldstein, Esq., Managing Partner
The Goldstein Environmental Law Firm PA, Miami

The dramatic expansion of the brownfields redevelopment marketplace is being driven by large, traditional developers who, even though historically risk averse, are increasingly forced to acquire contaminated sites as a result of a rapidly diminishing inventory of clean land in infill locations. While this creates more financial opportunity for environmental consultants, especially in Florida—one of the top brownfield markets in the country—it also carries significant malpractice risk for environmental professionals that are not familiar with the many ways in which development and construction activities at contaminated redevelopment sites can influence and alter traditional means and methods of conducting site investigations and cleanups. Michael Goldstein, one of the leading brownfield practitioners in the state and an environmental attorney for over 24 years, will analyze where specifically these malpractice risks exist, provide the legal basis for why they exist, present recommendations for minimizing such risk, and suggest strategies for converting such risk into a platform for creating new business opportunity. This presentation will specifically cover those assessment and remediation aspects of Chapter 62-780, Florida Administrative Code; Chapter 24, Miami-Dade County Code; and Chapter 27, Broward County Code, that most commonly impact and influence redevelopment activities at brownfield sites.

10:00 Break

Session 2: Sustained Release Technology Applications

10:30 **CSIA Evaluation of Slow Release Permanganant Cylinders**

Yi Wang, PhD, Director

Pace CSIA Center of Excellence, Pittsburgh, PA

A dual isotope technology based on compound-specific stable isotope analysis of carbon and hydrogen, 2D-CSIA, was recently developed to help identify sources and monitor in-situ degradation of the contaminant 1,4-dioxane in groundwater. Site investigation and optimized remediation have been the focus of thousands of CSIA applications completed for volatile organic contaminants worldwide. CSIA for the water miscible 1,4-D, however, has been technically challenging. The most commercially available sample preparation settings "purge and trap" for VOC, could not efficiently extract 1,4-D out of water for a reliable CSIA measurement, especially when the concentration is below 100 µg/L. Such a high reporting limit has prevented CSIA from being used for effective site investigation and remediation monitoring at most 1,4-D contaminated sites, where 1,4-D is often present at very low ppb levels. This presentation outlines the recent breakthrough in 2D-CSIA technology for 1,4-D in water, reported down to ~1 µg/L for carbon, and ~10-20 µg/L for hydrogen using solid-phase extraction based on EPA Method 522, and its benefit is highlighted through a case study at a 1,4-D contaminated site.

11:00 **Controlled Release Environmental Reactants – A Green and Sustainable Approach to In-Situ Remediation**

Lindsay Swearingen, PhD, Managing Partner, Specialty Earth Sciences, New Albany, IN

The environmental science community has an interest in identifying viable and sustainable remedial solutions for groundwater contaminant plumes that reduce carbon footprint, minimize waste generation, and limit energy inputs required for remediation implementation, operations and ongoing maintenance. DOE and DOD sites in particular could benefit from greener cleanup technologies, especially in light of future requirements to remediate vast dissolved phase plumes of emerging contaminants of concern such as 1,4-dioxane.

Sustained and controlled release reactant technology involves coating or encapsulating environmental reactant materials to facilitate more efficient and user-friendly in-situ remediation implementation. The result is a passive approach to ground water remediation that addresses the common challenges encountered with traditional liquid injection applications, such as contaminant rebound, plume migration and the need for multiple mobilizations. Rather than pressurized liquid injection, the energy of concentration gradient-driven diffusion as well as natural groundwater movement is used to deliver oxidants in the subsurface over long periods of time.

Sustained and controlled release reactant materials can be applied to the subsurface in a number of forms and methods. Multiple remediation practitioners have applied sustained and controlled-release reactants at sites across the U.S. and Canada. ESTCP Project ER-201324 is currently underway which is a slow-release chemical oxidant field demonstration for the remediation of 1,4-dioxane plumes. Site examples will be presented including site selection, implementation design, cost and monitoring data.

11:30 **Highly Successful ERD Pilot via Simple Additive Delivery System Lead to Full-Scale Biostimulation Strategy for Destruction of Residual cVOCs**

Kent Armstrong, President, TerraStryke Products LLC, Andover, NH

A former dry cleaner site experienced chlorinated volatile organic compound impacts to soil and groundwater. Contaminants-of-concern included tetrachloroethylene (PCE) and associated daughter products at concentrations above Ministry of Environmental & Climate Change Table 3 Site Condition Standards.

In October 2011, the consultant of record completed a pilot study evaluating the efficacy of TerraStryke® biostimulant ERDenhanced™ to enhance reductive dechlorination by native microbials under actual biogeochemical conditions.

The amendment was applied via passive release sock deployment units suspended vertically in saturated screened interval of existing two-inch groundwater monitoring well.

Day

1

This just in...

PRP Training...DEP Petroleum Restoration Program managers will present a program update and training event prior to FRC on Wednesday, Oct. 5, 2016, from 1:00 pm to 5:00 pm at the Rosen Centre Hotel, Orlando, in cooperation with the 22nd Annual Florida Remediation Conference. **There is no charge to attend.**

This training will provide information to site owners, cleanup contractors and subcontractors on PRP nuts and bolts including funding and legislative changes; site assessment work flow and tasking; remediation and site closure Issues; and invoicing tips and reminders. All interested parties are invited to attend.

62.780 Discussion Group...We have scheduled an informal discussion regarding site assessment and remediation under Florida's new risk-based corrective action rule. Join DEP's Brian Dougherty Friday morning at 8:00 pm to gain a better understanding of how the rule will affect future cleanups. **FRC registration is required.**

Four replacement events were performed during evaluation, the last at week 20 of a 26-week evaluation. Baseline monitoring and sampling/analytical testing was performed prior to additive deployment. Four post-deployment performance monitoring/testing events were completed, the final event in week 26.

Pilot results confirmed rapid electron acceptor scavenging, expedited residual mass solubilization, and enhanced cVOC reductive dechlorination by native dehalorespiring bacteria. Specifically, PCE decreased 46.9% by week 8, increased 233.3% in week 14 (additive enhanced co-solvent effect), then decreased 89.6% in week-26. Total cVOCs decreased 49.6%, increased 282.6%, then decreased 77.4%. Parent/parent-daughter molar ratio decreased from 100% to 29.1%, a 70.9% reduction.

Monitoring/geochemical data provided a secondary line of evidence for enhanced reductive dechlorination.

In July 2013, MOECC approved a full-scale strategy combining source and ERDenhanced™ biostimulation. An injection gallery was installed in the excavation footprint. March and July 2014, 990kg and 840kg ERDenhanced™ was gravity fed into gallery using 1,100 liters make-up water. Five rounds of groundwater monitoring/sampling were completed between March 2014 and October 2015. 19-months post deployment, additive influence was observed at MW-2, MW-3, MW-6—15-20 meters downgradient of gallery. PCE decreased 99.9% at MW-2, 95.0% at MW-3, and 97.9% at MW-6. Total cVOC decreased 89.7% at MW-2, 75.8% at MW-3, and 88.1% at MW-6. Molar parent fractions realized were 99.0% at MW-2, 87.7% at MW-3, and 90.0% at MW-6.

12:00 Day One Luncheon

Robert Knight, PhD, Director

Howard T. Odum Florida Springs Institute, High Springs

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Session 3: Combined Remedies for Enhanced Outcomes

1:30 **Large Diameter Auger Excavation and Enhanced Bioremediation using CHITOREM® at the former Dixie Cleaners in Jacksonville**

Jesse Brown, PE, Associate

Golder Associates Inc., Jacksonville, FL

The former Dixie Cleaners site is located at the north end of Lakeshore Plaza Shopping Center, northeast of the intersection of San Juan Avenue and Blanding Boulevard in Jacksonville, FL. The cleaners occupied the site from 1956 to 1995. Chlorinated solvents were released to the surficial groundwater underneath the dry cleaning building and through the sanitary sewer lift station. A groundwater plume consisting of high tetrachloroethene (PCE) and trichloroethene (TCE) concentrations extended over an area of approximately one acre. The most significant PCE impacts in soils and dense non-aqueous phase liquid were identified at a depth of approximately 18 feet below ground surface, following the contour of the stormwater drain along the northeast corner of the building. It appears that, historically, waste may have been disposed of outside the back door, where it then drained onto the asphalt and into a concrete culvert. The site lithology consists of silty fine grained sand from the surface to a depth of approximately 18 feet bgs, clayey fine grained sand from approximately 18 to 30 feet bgs, limestone from approximately 30 to 32 feet, and a stiff clay unit below 32 feet.

Previous remedial activities conducted at the site included the injection of Hydrogen Release Compound, HRC-X®, and Bio-Dechlor Inoculum. The initial HRC® and HRC-X® treatments were successful in achieving greater than 99 percent mass reduction in the shallow and the deep intervals. However, elevated PCE and TCE concentrations persisted in the intermediate interval located close to the sewer lift station. Golder used an edible oil carbon source, EOS®, below the building along with a shallow source removal to address this area. Golder also injected ammonium bicarbonate in 2006 to raise the pH of the intermediate aquifer. To address the increasing groundwater contaminant concentrations in the shallow and intermediate intervals, an additional injection of EOS® and AquaBupH™ was conducted in 2009. During the injection process an area of DNAPL was identified and further delineated in 2010 along the onsite storm drain at the back of the property. In 2011, Golder developed an interim source removal work plan to address the area of identified DNAPL upon available state funding.

To address the DNAPL source area present along the contour of the stormwater drain, Golder conducted a large diameter auger excavation in January 2016. A total of 18 LDA boreholes were drilled to depths ranging from 17 to 30 bgs. Each borehole was backfilled with flowable fill. Field screening using an organic vapor analyzer was used to assist in segregating excavated soils into roll-off containers for temporary storage. Composite soil samples were collected from each container and submitted to a laboratory for waste characterization purposes. Based on the lab results, a total of 345.19 tons of high level hazardous waste and 61.05 tons of low level hazardous waste was transported to U.S. Ecology's facility in Belleville, MI. A total of 125.15 tons of nonhazardous waste was transported to the Omni Waste facility in St. Cloud, FL.

Injection wells were constructed downgradient of the perimeter LDA boreholes. During their construction, a mixture of gravel and approximately 330 pounds of CHITOREM® was placed around the screened section of each well. CHITOREM® utilizes crushed crustacean shells as a carbon substrate that promotes anaerobic degradation. Following the LDA source removal, the storm drain was replaced and the site was restored to match pre-construction conditions.

Continued on Page 8

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1:50 A Combined Remedy Approach to Address a Trichloroethene Source Zone at a Legacy Hydraulic Containment Site

Joseph Bartlett, EI, Env. Engineer, Geosyntec Consultants, Titusville

Historic releases of trichloroethene, TCE, resulted in the contamination of the surficial aquifer at the Precision Fabricating & Cleaning Co. site in Cocoa, FL. Detailed investigations revealed the presence of onsite source areas and an associated downgradient dissolved plume. Remedial measures implemented at the site in 2002 included a hydraulic containment system to provide flux control at the PFC property line with downgradient dissolved plume monitoring.

After successfully operating and optimizing the system for over a decade, a combined remedies approach, which included an enhanced in-situ bioremediation strategy used in conjunction with the existing hydraulic containment system, was prepared with the goal of reducing the onsite TCE source zone and facilitating the accelerated shutdown of the hydraulic containment system.

The bioremediation design was implemented in October 2015 and included injection of Terra System's SRS-FRL® slow release electron donor and SiREM Laboratories KB-1® dechlorinating bacteria in the vicinity of a known release area which had been historically investigated by University of Guelph researchers. Immediately prior to injection activities the hydraulic containment system was shut down. Following an initial five-day shut-down period, the extraction system was restarted and operated for a three-day period with an objective of enhancing electron donor and microbial culture transport and distribution within the treatment area and toward the downgradient recovery wells. Following the transport period, the system was shut down for three months to promote biological degradation processes. The system was then restarted following this period in order to maintain hydraulic containment capabilities.

The combined remedy approach, utilizing the existing hydraulic containment system in conjunction with the focused bioremediation source zone reduction, has proven to be successful in documenting significant ongoing mass reductions. The presentation will provide up-to-date performance monitoring results associated with remedy implementation in addition to strategies and considerations for optimizing existing treatment trains using combined remedy approaches.

2:10 Combining Adsorption and Bioremediation Technologies for In-Situ Groundwater Remediation

David Alden, PE, Technical Associate, Tersus Environmental, Wake Forest, NC

Laboratory studies have shown the potential to treat groundwater in situ by using a mixture of activated carbon, aluminum hydroxide and kaolin clay. This combination of materials can immobilize a range of amphoteric metals and organics, including petroleum hydrocarbon constituents. Combining this formulation with an appropriate mixture of amendments should minimize interventions by incorporating both adsorption and biostimulation techniques to manage groundwater plumes and destroy constituents of concern. Current activities include assessing pilot scale effects and implementation effectiveness.

The presentation will include results and lessons learned from laboratory work and the latest field implementation experiences. This dual function approach, which immediately binds contaminants and provides electron acceptors and micronutrients for biodegradation of organics, may provide both short term risk management and a remediation method for contaminated groundwater.

2:30 Successfully Integrating Surfactants into ChemOx Technologies

Dan Socci, CEO, EthicalChem, South Windsor, CT

Use of surfactants in remediation can significantly improve chemical oxidation results when optimally selected and applied based on site conditions. The idea of surfactant use in remediation however is often met with questions, uncertainty, and reluctance due to concerns of contaminant liberation and offsite contaminant mobilization. Drawing from experience optimizing and implementing surfactant enhanced in-situ technologies, Surfactant-enhanced In-Situ Chemical Oxidation® and Surfactant Enhanced Product Recovery™, with data points from a successful coal tar clean up in the New York City area and a petroleum LNAPL site in Texas as well as laboratory data, this presentation provides guidance on surfactant application, and addresses the most common concerns regarding this remedial option while also presenting its advantages. Information will be presented based on site experience as well as laboratory data that addresses many frequently asked questions about surfactant use with oxidants in remediation. Case studies will be presented, demonstrating S-ISCO remedies can achieve complete or near complete contamination removal, eliminating rebound and the need for follow-up treatments.

2:50 A Multi-Site Performance Review of Slow Release Electron Donor and Bioaugmentation Co-Application Strategy

Steven Sittler, PG, Senior Project Mgr., KERAMIDA Inc, Indianapolis, IN

This presentation will include performance data and cost analysis from multiple commercial sites throughout Indiana in which an electron donor and bioaugmentation co-application strategy was successfully implemented. As part of the multi-site review, a discussion on the consistent strategy for success which was implemented at these sites will be shared with the audience. Site challenges, conceptual site model development, baseline analysis and design and implementation of this electron donor/bioaugmentation co-application strategy will be discussed in detail. Site specific comparisons between the co-application strategy and separate injections will be presented. In a few examples, a combined remedies approach involving in-situ chemical oxidation followed by the electron donor/bioaugmentation strategy will be highlighted as well.

In recent years, technological advancements have allowed for a transition towards a co-application of controlled-release electron donors and bioaugmentation cultures of dehalococoides, DHC. These advancements, such as pH neutral electron donors and a better understanding of the viability of DHC in this environment have allowed many to move away from the old way of thinking of waiting to bioaugment. The result is a more aggressive approach with a significant increase in enhanced reductive dechlorination rates. Data suggests that this co-application approach can rapidly reduce PCE/TCE concentrations in groundwater followed by short-term increases in daughter products—cis-1, 2-dichloroethene, trans-1, 2-dichloroethene, and vinyl chloride. Sustained reductive dechlorination as a result of the slow release electron donor along with the increased degradation rates afforded by direct injection of a microbial culture are leading to complete degradation of the target constituents, thereby facilitating closure following the post-injection monitoring period.

The rapid success of this strategy will be highlighted in multiple data sets showing complete PCE/TCE reduction within three to 12 months with daughter products persisting for three to six months in most cases. Long term performance data showing sustained reduction of daughter products will also be presented. A lessons learned section will also be presented in which the need for small focused, supplemental injections was implemented quickly to minimize the time to cleanup goal attainment and avoid unnecessary monitoring. In conclusion, a comprehensive cost analysis with comparison to other traditional remediation technologies will be presented.

3:10 Combining Technologies to Reach Site Closure

Emily Crownover, PhD, R&D Engineer, TRS Group Inc., Longview, WA

Electrical resistance heating is a well-established, robust and rapid remediation technology. Primarily due to cost considerations, remediation practitioners generally apply ERH in the source zone to volatilize and treat volatile organic compounds. As ERH can maintain fairly uniform temperatures in the subsurface and as elevated temperatures increase reaction rates, there has been significant interest in applying ERH at a reduced cost to provide a plume-wide solution.

Moderately increasing temperature, 20-30 degrees Celsius, the subsurface matrix will increase biotic and abiotic reaction rates and will increase the dissolution rates of sorbed contaminants and non-aqueous phase liquids, making them bio-available. Field results, as

well as published research, elucidate the production of short-chain, volatile fatty acids from the naturally occurring organic, non-soluble carbon already distributed throughout the treatment volume. The newly formed, dissolved organic carbon provides electron donors, supporting the biodegradation of chlorinated volatile organic compounds. Further, elevated temperatures help create redox conditions appropriate for anaerobic biodegradation. Keeping temperatures below those that produce steam eliminates the need for vapor capture and treatment, substantially reducing costs.

This strategy is currently being applied at an EPA Superfund site and data will be presented along with the principals of heat enhanced plume attenuation.

3:30 Break

Concurrent Sessions

Session 4A: New for 2016 - "Speed Talks" New Products and New Approaches to Product Delivery

- 4:00 1) **Electrokinetic Enhanced Bioremediation to Effectively Deliver Amendments to Low Permeability Materials at a Florida DNAPL Site**
Sandra Dworatzek, Senior Manager, SiREM, Guelph, ON, Canada
- 2) **Replaceable Treatment Cartridges for Groundwater Remediation**
W. Joseph Alexander, PG, Principal, Ai-Remedial Systems LLC, Chapel Hill, NC
- 3) **Materials and Methods to Address Contaminated Ground Water to Surface Water Interaction: Case studies of sites with petroleum, PCBs, DNAPLs and LNAPLs, chlorinated solvents, arsenic and other contaminants.**
John Collins, COO and General Manager, AquaBlok, Toledo, OH
- 4) **Overburden and Bedrock Remediation Using BOS 200® at Former Retail Petroleum Sites**
Mike Mazzaresse, Senior Engineer, AST Environmental Inc., Golden, CO
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Florida's water quality good, but key criteria heading in wrong direction

By ROY LAUGHLIN

The quality of Florida's surface waters, groundwater and estuaries is generally good—but not overwhelmingly so—based on criteria that the Florida Department of Environmental Protection and other agencies routinely monitor.

In surface waters and springs, there is a clear trend toward eutrophication. And groundwater, particularly in deep aquifers, is showing a trend toward increasing dissolved solids and salinity.

The data for 2012 through 2014 were recently summarized in a sprawling document entitled Final Integrated Water Quality Assessment for Florida: 2016 Sections 303(d), 305(b), and 314 Report and Listings Update.

The data in the report are presented in different categories based on Clean Water Act programs that require the reported monitoring summary, referenced by the numbers in the report's subtitle.

The assessment first summarizes water quality data in a "status and trends" category. Status and trends measurements began in the 1970s with the Clean Water Act's passage. Another component was added in 1994.

Status and trends measurements focus on surface freshwater including streams, rivers and lakes as well as groundwater. Sediment analysis and lakes is also part of the category.

Eutrophication is the most significant and widespread water quality issue affecting Florida's surface waters.

Eutrophication is a process that begins with increasing levels of nitrogen and phosphorus.

These spur algae growth, most notably microalgae, in the water column.

Streams and rivers are likely to display total nitrogen levels above acceptable thresholds, while lakes are likely to exceed total phosphorus thresholds. The result: an increasing proportion of Florida's moving and standing waters are exhibiting some degree of eutrophication as reflected by increases in chlorophyll *a* content.

The report uses "threshold" to characterize the difference between acceptable analyte content and higher concentrations that cause unacceptable conditions for designated uses.

Excess nutrients are evident across all of Florida's freshwater habitat types characterized in the report: 29.4 percent of sampling sites in Florida's rivers and 32.7 percent of sites in its streams do not meet total nitrogen thresholds.

But rivers and streams don't exhibit high eutrophication, as characterized by chlorophyll *a* levels. Just 8.3 percent of river sampling sites and 4.6 percent of stream sampling sites exceed the chlorophyll *a* threshold.

Just 9.7 percent of Florida's large lake sampling sites do not meet total nitrogen thresholds and a larger proportion, 22.4 percent, do not meet total phosphorus thresholds.

Of the small lakes, 8.6 percent do not meet nitrogen thresholds and 10.4 percent do not meet total phosphorus thresholds.

Both nitrogen and phosphorus fuel algae growth that results in eutrophication and, in Florida's lakes, phosphorus is in excess. 52.2 percent of large lakes and 45.2 percent of small lakes did not meet chlorophyll *a* thresholds during 2012 - 2014.

Eutrophication, in the absence of harmful algal blooms, is not a direct peril to aquatic organisms. Eutrophication harms by promoting very low oxygen levels produced by community respiratory metabolism.

The lowest persistent oxygen levels occur during darkness and may directly cause fish and invertebrate kills, sometimes widespread.

The report's dissolved oxygen data do not reflect eutrophication influences: 4.5 percent, 22.9 percent, 1.5 percent and 13.8 percent of rivers, streams, large lakes and small lakes, respectively, do not meet the

dissolved oxygen threshold.

But protocols do not require monitoring during darkness to assess the lowest oxygen levels occurring during absence of photosynthesis.

Perhaps future robotic monitoring, increasingly used in waterbodies across the state, will fill in details of low oxygen tension at night to more fully characterize the complete eutrophication cycle's ecological risks.

Fecal coliform is also reported as one of the primary contaminants of interest. Streams showed the highest percentage of sampling sites, 21.6 percent, that did not meet fecal coliform thresholds.

In none of Florida's rivers, large lakes and small lakes did fecal coliform values above thresholds exceed five percent.

The report's authors noted that wastewater treatment plants in Florida have effectively reduced point source fecal coliform loadings to surface waters across the state.

Fecal coliform exceedance, particularly notable in small streams, reflects the origin of fecal coliform contamination from nonpoint sources including septage, leaking sewers and animal wastes.

The report also included a brief characterization of canals and constructed water conveyances. Values reported for exceedances are within the range of those reported for natural waterbodies, except for fecal coliform.

There, 9.7 percent of canal sampling sites did not meet the fecal coliform threshold, probably for similar reasons that small streams led the list for fecal coliform exceedances.

Designated contaminants in lake sediments are also characterized.

In presenting the results for metals, the report characterized a threshold effects criterion, or TEC, one that has a low probability of harm to fauna and flora, and a probable effects criterion, or PEC, that refers to a concentration with a high probability of causing biological harm.

TEC and PEC levels are unique for each metal and are characterized further in the report. Analysts measured nine metals including arsenic and, of those nine, copper, lead and silver exhibited sediment concentrations at or above PEC levels.

The proportions of sites were in the low percent range with 3.0 percent for copper, 0.4 percent for silver and 1.1 percent for lead.

The generalizations about TEC and PEC break down a bit differently in large lakes and small lakes when a metal's natural background levels are factored into the interpretation.

The report gives more information on using biological activity models based on sediment type to account for attenuating influences of sediment-bound metals.

Sediment-bound metals, much less biologically available, are typically a large proportion of the total sediment metal content.

Groundwater was the third water resource category discussed in the status and trends section and characterized using threshold criteria.

Confined aquifers, such as the Upper and Lower Floridan aquifers, generally meet criteria but samples from 3.6 percent

of the monitoring wells do not meet the threshold for sodium, and 9.8 percent do not meet the threshold for total coliform.

Unconfined aquifers show a greater number of wells that do not meet criteria. 2.6 percent do not meet criteria for arsenic; 3.1 percent do not meet criteria for lead; 1.7 percent do not meet criteria for nitrate and 3.7 percent do not meet criteria for fecal coliform.

With respect to aquifers used as drinking water sources, the presence of radio-

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St. Johns County launches crop alternative plan aimed at reducing nutrients, diversifying production

By PRAKASH GANDHI

St. Johns County officials are hoping to improve water quality and better control pollutants such as nitrogen and phosphorous with their innovative new Crop Alternative Program.

The program will provide cash to help landowners convert intensively-irrigated row crops to a minimally-irrigated timber crop.

County commissioners just approved an agreement with the St. Johns River Water Management District for the program that could cost the county as much as \$348,860.

In February, water management district officials approved providing the same amount toward the conversion program.

Officials said the program's goal is to lower nutrients entering the Lower St. Johns River while reducing water use, increasing green space and allowing for recreational opportunities.

"The main goal is to improve water quality," said Neal Shinkre, the county's public works director. "But this program not only helps water quality in a cost-effective way, it also improves water conservation."

County officials said they will benefit

from improved water quality and increased green space while addressing the total maximum daily load requirements of the Lower St. Johns River basin management action plan.

As part of the BMAP, the county is required to reduce nutrient discharge into the basin by about 20,350 pounds a year.

Since 2008, the county has implemented projects aimed at meeting that goal and are now within striking distance of the requirements.

"As part of our efforts to reduce nutrient pollution in the Lower St. Johns River, we have undertaken some projects over the past few years," Shinkre said. "We have added stormwater management systems and baffle boxes and (undertaken) other projects."

"What's nice about this program is that it allows landowners to diversify their production. It's a win-win situation for everyone."

The county anticipated enrolling up to 1,000 acres in the plan based on its target nutrient reduction requirement of 3,000 pounds per year and the anticipated annual removal rate of at least three pounds of nutrients per acre.

"(We) normally spend money on structural projects such as stormwater ponds that require maintenance," Shinkre said. "In this project, the maintenance is done by the farmer or landowner. And it will mean less runoff, which will lead to less nutrient pollution in the river."

The Florida Department of Environmental Protection approved total nutrient removal credits of six pounds per acre/per year of nitrogen and 3.5 pounds per acre/per year of phosphorous.

To qualify for the program, lands must have been in row crop or sod production within the previous five-year period. There must also be a clear title, a 20-year easement agreed upon for a minimum of 10 acres and a maximum of 100 acres, and no increase in runoff from conversion.

Applications will be accepted until March 2017. Formal enrollment of landowners in the program will start in April, 2017.

"We are not against crop production," Shinkre said. "In fact, we encourage production. But this is a cost-effective opportunity to diversify crop production."

Water management district funds will be applied to the purchase and planting of

timber on land enrolled in the program.

The county will be responsible for developing and implementing the program, obtaining any required permits related to construction and operation, making sure permits and conditions are complied with, performing inspections and other details.

The expiration date of the cost-share agreement is Apr. 30, 2018.

DEP has determined there are at least 43 impaired waterbodies in St. Johns County. The BMAP for the Lower St. Johns River Basin was the first of its kind put into effect in the county.

"The projects we have launched in the past have worked well in reducing nutrient pollution," Shinkre said. "We are confident that this new program will do just as well."

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nuclides accounted for 41 instances of MCL exceedances in public water supply in the period covered by the report.

Saline water accounted for 17 instances of MCL exceedances in that well category during the two-year reporting cycle, indicating that Florida's drinking water sources are showing a trend towards increasing saltiness.

In addition, shallow aquifers are increasingly tainted by fecal coliform, another instance of contamination from non-point sources.

The second half of the report characterized Florida's surface waters with respect to "Designated Use Support in Surface Waters."

This references total maximum daily load and basin management action plan management strategies implemented to meet numeric nutrient criteria.

The report broadly characterized surface waters, including estuaries, that were not discussed in the status and trends section.

The report included a tally of BMAPs currently implemented and an overview of water features such as beaches, estuaries, springs and streams, currently the subject of TMDLs.

Dissolved oxygen, eutrophication, mercury in fish tissue and fecal coliform consistently rank at the top for causes of impairment to waterbodies in Florida across all categories.

Reasons for impairment of the "coastal water category" presents an interesting contrast in impairment by cause. Mercury in fish tissue is the most abundant impairment, present along 132 miles of coastal segments.

Dissolved oxygen is second with 14 miles, and copper is third with 10 miles. The presence of bacteria leading to shellfish harvesting downgrades is fourth, occurring along 10 miles.

As noted above, the report is dense both in terms of data and its verbal characterization.

Beyond meeting EPA's programmatic reporting requirements, this report will be a useful quick reference for many Florida environmental professionals.

The report's prologue notes that Florida has substantially more monitoring stations and water quality data than any other state in the nation. Yet, the report contains almost no raw data.

Consultants and others intending to use the data summaries should determine appropriateness with reference to those EPA protocols, normalizing and other aspects of data quality control and data massage.

Those procedures are referenced in the report and the raw data used for the report are available online from Florida STORET.

With that caveat, the report is readable and understandable through its use of summary techniques referencing thresholds as a substitute for what could be a blinding flurry of numbers.

Graphical data summaries and the use of GIS data overlays to show sampling sites and trends greatly aids in understanding the broad characterization of water quality status and trends in Florida, 2012-2014.



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PEER denounces DEP's lack of enforcement in regulating water treatment systems

By **BLANCHE HARDY, PG**

Environmental watchdog Public Employees for Environmental Responsibility filed formal comments with the U.S. Environmental Protection Agency claiming that more federal oversight is needed to ensure that Florida's drinking water remains safe for human consumption.

In 2013, Florida regulatory officials submitted requests asking EPA Region 4 to approve a revision to the state's Public Water System Supervision Program to include the authority to implement and enforce a number of rules not yet delegated to the state.

EPA issued notice of their tentative approval of Florida's request for greater autonomy on July 28, 2016.

PEER comments and documentation opposing EPA's approval of Florida's request showed that more than one in eight public water systems in Florida is afflicted with pollution-related violations—many including unsafe levels of fecal coliform or chemical contamination—yet the state's enforcement of drinking water regulations has diminished to near zero.

Jerry Phillips, director of PEER in Florida and a former Florida Department of Environmental Protection enforcement attorney, said the level to which enforcement has dropped is staggering.

"It just isn't being done," he said.

DEP regulates large public facilities and delegates the regulation of smaller facilities to the state Department of Health.

PEER documents showed that nearly 700 of the roughly 5,300 public water systems in Florida are out of compliance with Safe Drinking Water Act rules. And not a whole lot is being done about it.

"Prior to 2011, we were seeing in excess of 70 potable water enforcement cases state-wide by DEP," he said. "Larger formal enforcement has dropped from a high of approximately 80 cases per year to six cases last year. In 2015, the state assessed fines in just two cases; 70 percent skated."

PEER's investigation noted that both the number of enforcement cases and penalties assessed dropped significantly in the 2010-2015 time period evaluated.

Potable water enforcement cases dropped by 98 percent from 141 to two, and fines assessed dropped by roughly 95 percent from roughly \$250,000 to \$12,000.

According to Phillips, the reason enforcement has fallen is the state's new love affair with "compliance assistance."

Phillips characterized it as a "nebulous term" noting the state has "yet to provide data proving all systems are in compliance" under the program.

As described by Phillips, compliance assistance consists of a letter of violation to the recipient that describes three paths

to resolution: 1) correct the violation to DEP satisfaction; 2) show that no violation exists; or 3) allow DEP to provide instruction to the facility on how to go about complying with the law.

Then, Phillips said, "the case goes away and there will be no formal enforcement—even though compliance assistance is only supposed to be for minor cases."

He also said that the drop in enforcement is occurring at the same time DEP is weakening drinking water standards by increasing the allowed maximum contami-

nant levels of chemicals such as benzene.

"The status of EPA's additional delegation of the drinking water program is still an issue," Phillips said. EPA has given notice of their intent to grant and has received public comments.

He noted that they are currently reviewing the comments and could reverse their decision to grant.

Phillips said that EPA was notified of the 2,000 individual drinking water violations, including 295 involving exceedances of maximum contamination levels, and the fact that only two were taken to enforcement.



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Voters approve solar amendment, but solar's future still uncertain

By **ROY LAUGHLIN**

In Florida's August primary election, just over 70 percent of voters across the state approved an extension to a tax break for solar power generation by residential and industrial property owners.

Because the Florida Legislature put the amendment on the ballot, it needed only a 50-percent-plus-one tally to win.

The measure's electoral victory shows the breadth of public support for solar energy.

The amendment was touted as a way to provide jobs across the state in the manufacturing, installation and the services sector. Organizational support was broad, ranging from the Florida Restaurant & Lodging Association to the Surfrider Federation.

The amendment still has to be implemented by the Legislature when the "devil in the details" will become apparent.

The amendment authorized the Legislature to pass a law that exempts solar generation equipment from ad valorem and tangible personal property taxes, or from considering such equipment in assessing real property valuations for tax purposes.

Lawmakers must pass the new law by Jan. 1, 2018, to extend the tax breaks until Dec. 31, 2037.

That short time frame may be problematic. Residential property tax exemptions extended by this measure were first approved by voters in 2008. They were not implemented until 2014.

The Legislature does not have six years this time to pass a law that implements the amendment.

That's because voters must decide on a related amendment before the Jan. 1, 2018 deadline, and perhaps another one in 2018 after the deadline.

Amendment 1 on November's general election ballot would allow Florida's monopoly franchise power companies to hit their customers with additional charges to use solar power equipment. Those charges will not require purview by the Florida's Public Services Commission.

In spite of the moniker "Consumers for Smart Solar," Proposition 1 is not particularly friendly to consumers who will lose the protections provided by Florida's Public Services Commission.

Nor is it "smart" to provide uncontrolled financial disincentives that could crush solar power installations in a state

where solar is the most abundant and easily utilized alternative energy source.

The other impending amendment, titled "Floridians for Solar Choice," scheduled for the 2018 ballot would allow property owners, such as on malls, condos or multi-residential rentals to generate and sell solar power to tenants.

It also allows the operation of small community solar power plants that sell solar power to immediately adjacent property owners. This amendment directly challenges the monopoly franchise of grid power generators such as FPL, Duke Energy and others.

The Consumers for Smart Solar amendment, which the power companies sponsored, is their challenge to subvert financial incentives for solar power generation.

Depending on the voters' choice on solar power in November's election, the just-passed Amendment 4 could make all the difference for a new beginning for solar power in Florida. Or, it may be totally irrelevant.



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Sinkhole opens under Mosaic Company phosphate gypstack in Polk County

By ROY LAUGHLIN

Between Aug. 26 and Sept. 15, a sinkhole opened beneath a gypstack pile at Mosaic Co.'s New Wales fertilizer plant in southwestern Polk County.

An estimated 215 million gallons of process water and sludge flowed underground through the 45-foot-diameter hole.

By Sept. 18, the flow into the sinkhole dwindled to seepage cascading as a waterfall into a gaping hole with no bottom in sight from an aerial view.

According to the Mosaic Co.'s web postings, on Aug. 27, plant operators observed unexplained water level drops in a pond around one of the gypstacks, a sign of possible leak or discharge.

The company reported it to the Florida Department of Environmental Protection, the U.S. Environmental Protection Agency and Polk County regulatory officials.

Between then and about Sept. 14, a sinkhole opened under the west cell in the lined gypstack impoundment, and water and mine tailings drained into the hole.

Plant operators began pumping water from the cell into a nearby holding area to reduce the amount of water in the leaking impoundment.

Mosaic officials believe that the sink-

hole formed under the holding cell and its liner. As it collapsed, the liner failed.

The presumption is that the highly acidic wastes with a pH of about 1.5 and enriched with metals—most notably, radioactive radium and its radioactive daughter product, radon gas—may have flowed down the sinkhole into the Floridan Aquifer.

The amount of sludge and wastewater that reached the aquifer and the extent of aquifer contamination is still being characterized. A complete understanding of the effects on aquifer water quality and flow may be months in the future.

The Mosaic Co. has an extensive monitoring well array on the 1,600-acre parcel that contained the gypstack.

In mid-September, about two weeks after the initial water loss, company officials told local news media that there was no evidence that contaminated groundwater had moved off site.

A Mosaic spokesperson said that water moves slowly through the aquifer so that it might be months before any contamination moves off the fertilizer company's property to adjacent parcels, if off site plumes ever occur.

Mosaic offered to test water wells in the area and received dozens of requests in the days since the news broke.

Process water from the gypstack im-

poundment is reused in the phosphate ore beneficiation process, where the ore is soaked with sulfuric acid to release phosphoric acid, the starting product for the manufacture of fertilizer.

Insoluble gypsum, calcium sulfate, the reaction's second product, along with clay and sand forms most of a gypstack's mass. The beneficiation process also concentrates trace elements in the stack.

The loss of process water to the sinkhole ended its use for on-site recycling. Plant operators have since been drawing the needed process water from 24-inch monitoring wells drilled to 800 feet into the lower Floridan Aquifer.

This allowed the plant to continue operations. The implication was that the pumping could pull back or slow the spread of contaminated water originating from the sinkhole collapse.

Requests to Mosaic for further characterization of the impact of the discharge on the Floridan Aquifer and the success of the company's early efforts to confine the effects to company property were not answered before deadline.

Going forward, Mosaic is primarily responsible for monitoring groundwater around the sinkhole and addressing any contamination that migrates off site.

DEP will continue frequent site visits

to make sure timely and appropriate response continues in order to safeguard public health and the environment.

Monitoring to date continues to indicate that the process water is being successfully contained, and that there is no evidence of offsite movement or threat to offsite groundwater supplies.

In 1994, a 125-foot-diameter sinkhole opened under a gypstack located in another area of Mosaic's property and sucked a similar amount of slurry into the Floridan Aquifer.

It was one of the defining events that led to phosphate manufacturing regulations intended to prevent a repeat.

Last year, Mosaic signed an agreement with EPA establishing a \$2 billion fund for long term maintenance of gypstacks in Southwest Florida, and agreed to additional plant upgrades to protect the environment.

The recent sinkhole is not only a setback for the company, but also a reality check for some of the environmental safety measures that they have undertaken.

Alum treatment facility goes online

By ROY LAUGHLIN

Late this summer, the Orange County Environmental Protection Division and local officials formally opened the Lake Down Nutrient Removal Facility.

The facility provides off-line alum treatment of stormwater runoff that enters the lake through a canal on the Northwest side of the lake.

The facility includes a channel, where alum is mixed with water, a 3.5-acre alum floc settling pond, a pump building, alum storage tanks and an additional area to be used in the future for an alum floc drying area.

That area should provide up to 40 years of alum floc storage before reaching capacity, requiring the floc to be carried off site.

Lake Down is the third largest of Orange County's Butler Chain of Lakes with a surface area of 930 acres. It is located northeast of Lake Butler, and is connected to it through a man-made canal.

For comparison, Lake Butler is 1,614 acres.

A 2007 Butler Chain of Lakes study found that Lake Down and its watershed contributed the highest annual nutrient loadings of any sub-basin in the chain.

Lake Down Sub-Basin 15, with an area of 380 acres, is responsible for 27 percent of the total phosphorus inputs to the Butler chain. It also contributes half of the runoff-generated phosphorus into the lake.

The sub-basin discharges through a well-defined channel. The new Lake Down Nutrient Removal Facility will treat water from that canal and return it to the lake minus the particulates, phosphate and particulate nitrogen.

The canal draining sub-basin 15 contributes 348 acre-feet of runoff per year to Lake Down and most or all of that will be treated at the recently completed facility.

The plant is expected to remove 182 kilograms of phosphorus per year at a cost of \$896 per kilogram of total phosphorus removed.

The nutrient reduction project was based on a 2007 Florida Department of Environmental Protection water quality study of the Butler chain, which had been designated as an Outstanding Florida Water.

Orange County began planning and permit applications for the facility in early 2013. Construction got underway in 2014, but delays moved final completion back to this summer.

The facility cost \$1.8 million with costs shared between Orange County, the Windermere Water and Navigation Control District and DEP.

DEP contributed approximately \$488,000 through a federally delegated Section 319 grant.

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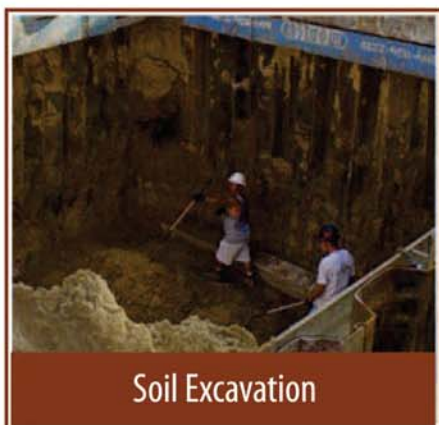
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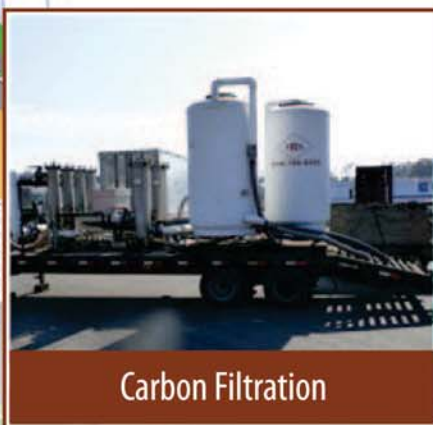
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Exploratory seismic testing moves forward to evaluate presence of oil, gas

By PRAKASH GANDHI

State environmental officials are closely monitoring the work of a Texas company that has started exploring for oil and gas in Calhoun and Gulf counties in North Florida.

Cholla Petroleum Inc., a Dallas-based company, has begun seismic testing in the two counties, triggering fears the firm will soon embark on the controversial practice of hydraulic fracturing.

Consultants for the firm have claimed for months that fracking will not be necessary.

But those opposed to fracking and other aggressive forms of drilling are concerned due to the nature of the testing and the presence of Big Oil in their backyards.

Officials with the Florida Department of Environmental Protection are assuring those concerned about the project that they are keeping a watchful eye on Cholla's activities.

"The department does not issue any permit that does not comply with Florida law," said agency spokesperson Dee Ann Miller.

She said the department will continue to monitor the company's operations to en-

sure that all permit conditions are met, and that the environment and public safety are protected.

"It is important to note that the permit for this project authorizes geophysical exploration only, not the drilling of an oil well," Miller said.

Cholla is conducting seismic testing on private land stretching from about 17 miles south of Blountstown in Calhoun County to just north of Wewahitchka in coastal Gulf County. The project is located near Apalachicola Bay.

Small explosive charges will be detonated at the bottom of hundreds of shot holes located along about 60 miles of crisscrossing lines.

Acoustic waves from the explosions go deep underground onto rock layers and bounce back to the surface where they're recorded by thousands of listening devices. The results are then analyzed to find areas ripe for oil and gas production.

Earlier this year, state officials issued the necessary permits for Cholla to conduct the testing.

The Florida Environmental Regulation Commission recently approved new limits on toxic compounds that can be discharged into rivers, lakes and estuaries.

mission.

Democratic members of Congress have asked the EPA to look carefully at Florida's rules when they arrive for review.

This was the first time that DEP extensively relied on risk-based calculations to determine human health criteria for Florida's drinking, fishing and recreational water sources.

The new methods yielded slightly relaxed water standards for some substances, one being benzene, whose standard increased three parts per billion.

Environmental advocates expected that the standard for the well-characterized carcinogen would have been tightened.

Those limits include a relaxed potable water standard for benzene, a cancer-causing chemical frequently used in fracking.

Despite opponents' concern with the potential for environmental and water supply impacts, Cholla said it will do everything it can to protect the environment. Independent observers will be monitoring their activities.

Geophysical field operations, which collect data for producing geological structural and stratigraphic models, allow for the assessment of whether there are any potential drilling targets without having to actually drill wells.

Miller said that evaluating drilling targets via geophysical means greatly reduces overall surface impacts by reducing the number of exploratory wells needed to discover new oil and gas fields.

"Hydraulic fracturing is not part of geophysical exploration projects," she emphasized.

Should the company decide to move forward with an exploratory well after the geophysical survey is conducted, it would require a completely separate permitting process, one that would include an opportunity for the public to comment, Miller said.

SUIT

From Page 1

mitted on a schedule consistent with DEP's first-ever issue of a notice of correction, published on Aug. 4. The rule extension, Judge Canter noted, applies only to a notice of change.

After the ERC approved the rule on July 26, the final step before its implementation was expected to be EPA review and approval.

The EPA ensures that state rules comply with the federal Clean Water Act, the rule's ultimate authority.

Although somewhat delayed by the administrative hearing, the rule is again on track for EPA sub-

ERC: Members needed

Activists have asked Gov. Rick Scott to appoint two new commissioners to the seven-member ERC board. One of the vacant seats is intended for a representative of the environmental community and the other to represent local government.

There were two vacancies when the board recently approved the controversial new water rule.

The ERC approved proposed Rule 62-302.530, FAC, by 3-2 margin. Activists envision a different outcome had the commission voted with its full membership.

Escambia County's new interim materials recycling facility now open for business

Staff report

Emerald Coast Utilities Authority's new Interim Materials Recycling Facility went online in September. The \$10.4 million, 54,000 square-foot IMRF is located adjacent to the Escambia County Perdido Landfill.

Escambia County and ECUA developed the facility through an intergovernmental partnership.

County recyclables have been disposed of at the landfill since ECUA temporarily terminated their recycling program in late 2015.

Prior to suspending operations, materials were being sent for recycling to a Montgomery, AL, facility that closed and thereafter to Tarpon Paper who raised their prices until the recycling fees became financially unfeasible for ECUA.

30 people were hired at the IMRF that will serve roughly 100,000 customers in Escambia and Santa Rosa counties.

The new IMRF building was fabricated by Big Top Inc. It will allow 25 tons of recyclable waste to be sorted per hour—165 tons per day, or approximately 40,000 tons per year.

Site work was completed by Brown Construction. Bulk Handling Systems provided the facility's machinery.

"The IMRF is considered a 'clean' materials recycling facility that processes recyclables sorted by the customer and placed in a single stream curbside recycling cart," said ECUA Spokesperson Jim Roberts.

ECUA and Escambia County hope the

new facility will help them reach Florida's goal of 75 percent recycling by 2020. They estimate near 70 percent of their customers are already recycling.



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Pensacola creates task force to mitigate impacts of climate change

By **BLANCHE HARDY, PG**

In August of 2014, the city of Pensacola adopted a resolution creating a Climate Change Task Force as part of their Environmental Advisory Board.

The resolution was prompted by uncharacteristic flooding within the city and vicinity due to heavy rains in June, 2012, and April, 2014.

The city council approved the resolution containing direction along with details of actions to plan for climate change impacts taken both in Florida and at the national level.

Pensacola is one of the areas identified by the Florida Department of Environmental Protection's Florida Oceans and Coastal Council as vulnerable to sea level rise.

The council is charged with developing priorities for ocean and coastal research and establishing a statewide ocean research plan.

The measures needed to establish the task force were identified in June 2015 and the council executive was directed to work with the Environmental Advisory Board chair to organize the task force in December last year.

The task force will make recommendations to the city council regarding a strategic plan to mitigate and adapt to climate change.

The EAB will hold public hearings and gather information from experts, community organizations and the public to make recommendations to the council for the organization of the task force.

Seventeen member organizations representing counties, state agencies, utilities, education institutions, financial institutions, community advocacy groups and the U.S. Department of Defense were listed from which task force participation was requested.

Among those most active in promoting the task force is a group called 350

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The effects include increased miscarriage rate, reduced semen quality, prostate cancer, birth defects and premature birth.

Heart development anomalies, one of the more frequent developmental defects in humans, were shown in the experimental studies, and also identified in the literature survey.

The correlation between experimental findings described in the first paper, and those effects identified in 45 previous studies, many of which were not experimental, gives confidence that the experimental studies and exposures tested provides some insight into long-term, sublethal human health effects on reproduction.

The researchers noted, however, that more than 1,000 chemicals are used in unconventional gas and oil operations such as fracking, and some of those chemicals have never been disclosed by the oil and gas industry. The researcher's recent study on 23 chemicals is a good start, but far from the finish line.

Harry Pepper awarded dike work. Harry Pepper and Associates of Jacksonville received a \$16.8 million contract to

replace a water control structure along the Herbert Hoover Dike surrounding Lake Okeechobee.

The U.S. Army Corps of Engineers, Jacksonville District, awarded the contract for the replacement of Culvert IP-3.

The corps announced the contract award in mid-August. The rehabilitation and replacement is expected to be completed in early 2019.

In 2011, the corps listed 32 federally owned water control structures in Lake Okeechobee's Herbert Hoover Dike as candidates for rehabilitation efforts. This is the 21st structure on that list to receive attention for upgrading and rehabilitation to the dike's structural and functional integrity.

Since 2001, the corps has spent more than \$800 million in Herbert Hoover Dike maintenance activities.

The upgrades are intended to prevent dike breaches that could cause catastrophic flooding.

Hard time for oil dumpers. U.S. District Court Judge Susan D. Wigeton of the U.S. District Court for the district of New Jersey sentenced two ship engineers to up to five years in prison after they admitted

ing Emerald Coast Utility Authority, Gulf Power, the city of Milton, Santa Rosa County, the University of West Florida, the U.S. Navy, the Florida Department of Health, the Emerald Coast Chapter of the American Planning Association, 350 Pensacola and the Florida Department of Transportation.

overboard dumping of used engine oil.

U.S. Attorney Paul J. Fishman prosecuted the case for the federal government.

The unnamed ship visited numerous ports in Florida, Maryland and New Jersey. It is owned by D'Amico Shipping Italia S.p.A. and managed by D'Amico Societa di Navigazione S.p.A.

The two crew member defendants in the case are both Italian. Chief Engineer Girolamo Curatolo, who ordered the destruction of ship records, pleaded guilty on one count of conspiring to violate the federal Act to Prevent Pollution from Ships.

First Assistant Engineer Danilo Maimone, who created bogus records to replace those destroyed, pleaded guilty to conspiring to obstruct justice.

Both men admitted making false statements to the U.S. Coast Guard during a January 2015 inspection.

The men face up to five years in prison. In addition, both face fines of up to \$250,000 or twice the gross gain resulting from the oil leaks.

Smart City Air Challenge. The EPA is offering up to \$40,000 each to two cities that build an air quality monitoring network and make the data publicly available.

The agency envisions installation of hundreds of air quality sensors that will be networked by cell phone or Internet connection, and will include a data management software and a server to make visualized data available to EPA and the public.

The agency views the funding as seed money that will encourage local communities to partner with sensor manufacturers, data management companies and academic institutions.

They hope that the project will give individuals a role in collecting the data and a better understanding of how environmental conditions affect human health and community activities.

Part of responding to the challenge grant's goals includes setting up the partnership and making the case that its activities will meet the EPA's goals.

In the end, the agency wants communities to "learn how to use data analytics, which can then be applied to other aspects of community life."

In its announcement, EPA noted that sensors are becoming less expensive and are routinely used to measure environmental conditions. However, the agency is not ready to endorse electronic sensor network data use for regulatory purposes.

A benefit to the EPA from this challenge will be to help local communities and the agency determine where to place sensors and how to maintain the devices to ensure reliability and long term use.

Communities will determine what air contaminants they want to measure and how to use the network to better understand what's happening at a local level.

The EPA will also gain insight into how a community-led monitoring effort will manage, visualize and make available the data streaming in, and evaluate the quality of the data collected.

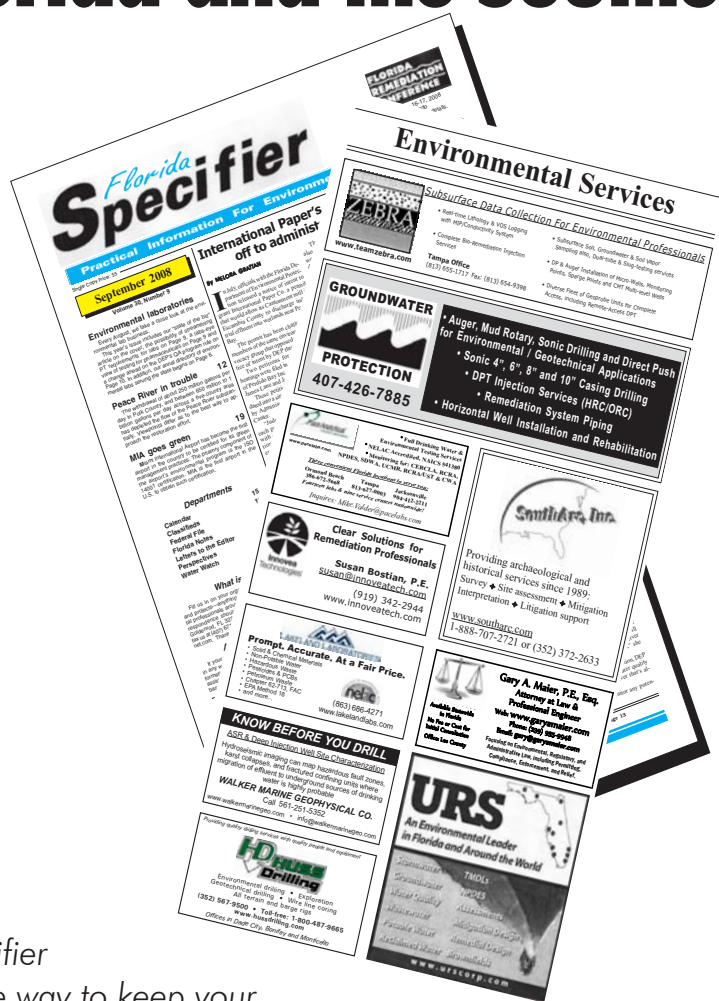
The proposal application deadline is Oct. 28, 2016. Winners will be announced about Dec. 1, 2016.

The initial award, \$40,000 to each of two communities, may be used to deploy air sensors, share data with the public and develop data management best practices from sensors.

Additional funding of up to \$10,000 to each of the winning communities in 2017 will be based on accomplishments in collaboration.

More information is available at www.challenge.gov/challenge/smart-city-air-challenge.

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Calendar

October

OCT. 1-2 – Exam: Backflow Prevention Recertification Exam, Bradenton, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 1-2 – Exam: Backflow Prevention Recertification Exam, Tampa, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 3-5 – Course: Asbestos Refresher: Inspector, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 4-7 – Review: Wastewater Class C Certification Review, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 5 – Charity Event: 7th Annual FRC Charity Golf Tournament, Ritz-Carlton Golf Club, Grande Lakes, Orlando, FL. Presented in association with the Florida Remediation Conference. All proceeds to Second Harvest Food Bank of Central Florida. Call (407) 671-7777 or visit www.enviro-net.com.

OCT. 6-7 – Exam: Backflow Prevention Recertification Exam, Lake Buena Vista, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 6-7 – Conference: 22nd Annual Florida Remediation Conference, Orlando, FL. Presented by National Technical Communications Co. Inc., publishers of the Florida Specifier. Call (407) 671-7777 or visit www.enviro-net.com.

OCT. 7-8 – Exam: Backflow Prevention Recertification Exam, Venice, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 11 – Course: DEP SOP's for Water Sampling and Meter Testing, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 13-14 – Exam: Backflow Prevention Recertification Exam, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 14-22 – Course: Backflow Prevention Assembly Tester Training and Certification, Venice, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 17-21 – Course: Asbestos: Contractor/Supervisor, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 18 – Course: Initial Training Course for Spotters at Landfills, C&D Sites and Transfer Stations - 8 Hour, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 18 – Workshop: Unidirectional Flushing Workshop, Tavares, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 18 – Course: Refresher Training for Experienced Solid Waste Operators - 8 Hour, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 18-19 – Course: Refresher Training for Experienced Solid Waste Operators - 16 Hour, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 18-19 – Course: Initial Training for Transfer Station Operators and Materials Recovery Facilities, 16 Hour, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 18-20 – Course: Initial Training for Operators of Landfills and C&D Sites - 24 Hour, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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OCT. 18-20 – Course: Initial Training for Operators of Landfills and Waste Processing Facilities, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 19 – Course: Water Distribution System Pipes and Valves, Tavares, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 19 – Conference: 2016 Annual Conference of the Southeast Stormwater Association, Birmingham, AL. Call (866) 367-7379 or visit www.seswa.org.

OCT. 19-22 – Conference: American Council of Engineering Companies 2016 Fall Conference, Colorado Springs, CO. Call (202) 347-7474 or visit www.acec.org.

OCT. 25-26 – Course: SCADA and Electrical Training: What Utility Staff Need to Know, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 25-27 – Course: Activated Sludge Process Control and Troubleshooting, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 26-27 – Conference: 52nd Annual Technical Conference of the Florida Section of the Air & Waste Management Association, Tampa, FL. Visit flawma.org.

OCT. 26-28 – Meeting: Fall Meeting of the Florida Society of Environmental Analysts, Jupiter, FL. Call (941) 748-5700 or visit www.fsea.net.

OCT. 27 – Seminar: The Future of Biosolids Process & Management Technology, Orlando, FL. Presented by the Florida Water Environment Association. Contact Jody Barksdale at (813) 769-8948 or visit www.fwea.org.

OCT. 27-28 – Exam: Backflow Prevention Recertification Exam, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 28-29 – Course: Backflow Prevention Assembly Repair and Maintenance Training and Certification, Venice, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 31 -NOV. 4 – Course: Backflow Prevention Assembly Tester Training and Certification, Destin, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

November

NOV. 1-3 – Conference: Clean Gulf, Tampa, FL. Produced by Access Intelligence. Contact Jill Dean at (713) 343-1880 or visit www.cleangulf.org.

NOV. 1-4 – Seminar: 2016 National Clean Water Law Seminar, Kansas City, MO. Hosted by the National Association of Clean Water Agencies. Call 1-888-267-9505 or visit www.nacwa.org.

NOV. 2 – Course: Asbestos Refresher: Inspector, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 2 – Course: Asbestos Refresher: Management Planner, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 3 – Course: Asbestos Refresher: Contractor/Supervisor, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 3-4 – Course: Sequencing Batch Reactor Operation, Make It Work For You, Crestview, FL. Pre-

presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 5-6 – Exam: Backflow Prevention Recertification Exam, Bradenton, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 7-8 – Exam: Backflow Prevention Recertification Exam, Destin, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

NOV. 7-8 – Exam: Backflow Prevention Recertification Exam, Altamonte Springs, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.


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 Nov. 5-6, 2016 - Bradenton
 Nov. 7-8, 2016 - Altamonte Springs
 Nov. 17-18 - Gainesville

Backflow Prevention Assembly Tester Training & Certification
 Nov. 7-11, 2016 - West Palm Beach
 Nov. 11-19, 2016 - Ft. Myers (Two consecutive Fri. & Sat.)
 Nov. 14-18, 2016 - Lake Buena Vista

Backflow Prevention Assembly Repair & Maintenance Training & Certification
 Nov. 4-5, 2016 - Venice

Hazardous Waste Regulations for Generators
 Dec. 1, 2016 - Orlando

U.S. DOT Hazardous Materials/Waste Transportation
 Dec. 2, 2016 - Orlando

Sequencing Batch Reactor Operation, Make it Work for You
 Nov. 3-4, 2016 - Crestview

Initial and Refresher Solid Waste Courses
 Nov. 8-10, 2016 - Gainesville
 Dec. 6-8, 2016 - Tampa

Respiratory Protection
 Nov. 15-17, 2016 - Gainesville

Water Class C Certification Review
 Nov. 15-18, 2016 - Gainesville

Asbestos Refresher: Inspector
 Nov. 2, 2016 - Gainesville

Asbestos Refresher: Management Planner
 Nov. 2, 2016 - Gainesville

Asbestos Refresher: Contractor/Supervisor
 Nov. 3, 2016 - Gainesville

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Session 4B: Petroleum Cleanup— When You Can't "Risk" it Away

4:00 Multi-Phase Extraction with Enhanced Biostimulation Demonstrates Contaminant Reduction at Petroleum Site

Matthew Crews, PE, Senior Project Engineer, Golder Associates Inc., Jacksonville
Multi-phase extraction with enhanced biostimulation using an oxygen injection system has been used to remediate a NAPL and dissolved-phase petroleum contaminant plume that has migrated offsite over 200 feet towards a residential area in Springer, NM. The MPE system was set to maximize NAPL recovery, minimize groundwater extraction and maintain the groundwater elevation during high vacuum MPE. The oxygen injection system is cycled to run concurrently with the MPE system, but within opposite areas of the site, such that oxygen has sufficient time to diffuse into the groundwater. Higher dissolved oxygen concentrations provide a concentration gradient to diffuse oxygen into small pore spaces. The result is the biodegradation of contaminant mass that would otherwise be unavailable for biodegradation or removal by extraction or volatilization methods. Because the resultant oxygen supply is greater than the total oxygen demand, this system creates the desired aerobic conditions for indigenous bacteria to break down hydrocarbons for a more efficient cleanup of the site.

After eight quarters of operation, approximately 54,000 pounds of petroleum contaminants have been removed, constituting approximately 97% of the mass in place Golder estimated prior to remedial action implementation. Enhanced biodegradation is estimated to account for approximately 53% of the total mass of hydrocarbons removed at the site to date. NAPL was effectively removed during the first six months of operation. Dissolved-phase contaminant concentrations have declined to levels near or below applicable cleanup target levels onsite and offsite, with the exception of residual contamination present below an active dispenser island.

4:20 From Injection to In-Situ Soil Blending; Switching Application Technology Mid-Remediation

Brantley Rudd, Vice President, Exo Tech Inc., Monroe, GA
Petroleum constituent contamination in groundwater was discovered at a state reimbursable site in Chatham County, GA, in 1995. Throughout the site history, a total of 12 monitoring wells were installed on site. Light non-aqueous phase liquid was discovered in only one well. The initial remedial approach was to perform an enhanced fluid recovery event to remove the free product and continue monitoring the remaining wells for free product. Following the extraction event, the LNAPL was removed and was not detected in the other wells. Exo Tech was contracted to reduce the dissolved BTEX that was present in four monitoring wells. Prior to the implementation of any remedial activities, the UST's were abandoned and removed from the site. The initial approach defined by Exo Tech consisted of installing 56 one-inch injection wells. Two subsequent injections would follow the installation of the wells. The first injection would consist of catalyzed hydrogen peroxide to desorb an LNAPL mass that was sorbed in the soil matrix. The second injection would consist of sodium persulfate to treat the dissolved phase over a longer period of time.

In February 2014, Exo Tech installed 56 injection wells. The injection wells were installed to an approximate depth of 15 feet bgs. During the installation of the injection wells, LNAPL was discovered in an area that has historically never exhibited LNAPL. It was determined to continue with the injection of CHP but to focus the efforts in the area of the LNAPL. Two consecutive injections of CHP occurred on-site. The CHP injections consisted of mixing a 7% solution and injecting it in the LNAPL area. After the second injection it appeared that there was more LNAPL sorbed in the soil matrix than anticipated. It was determined to evaluate our approach and find a more economical way to introduce the oxidant. With the amount of LNAPL that was assumed to be present and with the site availability, it was determined to perform in-situ blending to introduce the CHP. An area of approximately 1,950 square feet was delineated. This area covered the assumed LNAPL area and some areas of high dissolved. The blending was performed by first removing approximately five feet of overburden. After reaching the impacted zone, the iron activator was blended into the soils. While the iron was being introduced, the hydrogen peroxide was being prepared. The hydrogen peroxide was dissolved to an approximate ratio of 12.5% and pumped into the excavation where it was blended thoroughly until a complete homogenous mixture was achieved. Backfilling was performed concurrently and Exo Tech demobilized.

Following the CHP blending treatment, the site was allowed to rest and the groundwater was allowed to return to background elevation. Sampling events were performed on a quarterly basis. No presence of LNAPL was detected on site and a no further action was granted.

4:40 Life Cycle Risk Management: A Strategic Approach for Focused LNAPL Remediation

Manivannan Nagaiah, PE, Project Engineer, Langan, Fort Lauderdale
Remediation of light non-aqueous phase liquid to the "maximum extent practicable" at sites both large and small can often be associated with high costs and uncertain timelines. This presentation describes the application of a risk-based, strategic approach for focused LNAPL recovery at a 70-acre asphalt refinery in Savannah, GA. This approach is centered on the development of a robust conceptual site model and recoverability analysis through testing and evaluation of LNAPL transmissivity. Site-wide LNAPL accumulations resulting from historical releases exist in a complex geologic setting adjoining the Savannah River.

We initially developed an LNAPL conceptual site model based on prior activities and in consideration of existing and potential sources, pathways and receptors. Our evaluation of the LCSM identified data gaps to be addressed and led to implementation of LNAPL recoverability testing utilizing vacuum extraction and baildown test methods. We subsequently conducted pilot testing to further evaluate remedial technologies including multi-phase extraction and LNAPL skimming.


Based on the investigation and testing findings, we defined priority areas for remediation on a site-wide basis that align with the refinery goals and objectives. We developed a focused and phased recovery program that provides flexibility for remediation of LNAPL toward attainable end-points and is consistent with the Georgia Environmental Protection Division Voluntary Remediation Program.

The program's streamlined approach allows for continuing operations and site redevelopment as well as a significant savings to the refinery. The LNAPL recovery program is designed to provide flexibility, efficiency and responsiveness to address existing product, and to re-assess recovery needs based on delineation, monitoring, data evaluation and performance assessments. The recovery approaches were proposed using available infrastructure and off-the-shelf equipment and systems, resulting in cost savings.

The proposed five-year program has been approved by the Georgia EPD, and recovery implementation efforts are ongoing. In describing the program components, we will also present a brief overview of the ongoing investigation and site remediation activities.

5:00 FRC Reception in Exhibit Hall
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FLORIDA REMEDIATION CONFERENCE

Day 2

Day Two, Friday, Oct. 7, 2016

Concurrent Sessions

Session 5A: Enhancing Your Foundation for Remedial Success

9:00 Innovative Use of Technology at Former NAS Cecil Field, Jacksonville

Kara F. Wimble, Project Manager EnSafe Inc., Jacksonville
EnSafe is conducting long-term monitoring at former NAS Cecil Field in Jacksonville and maximized multiple technological applications to optimize field and associated reporting activities. EnSafe's innovative use of technology minimized limitations on current property owners so they could further develop and manage the sites for reuse as an industrial park and aviation center.

We incorporated an innovative application of existing technology to setup a Microsoft Office365 SharePoint website for the geographically-dispersed Cecil Field Team to collaborate on documents and data, and managed field data by implementing ESRI's Collector for ArcGIS for use on smartphones and tablets to access geographical information system maps, collect data using electronic forms, and capture field photographs.

In addition, an application was created to automate the extraction of data from EQUIS to perform statistical analyses and trend graphing using customized macros within Microsoft Excel, reducing the labor effort by 90% over previous methods.

Finally, we introduced the Cecil Field web-based mapping tool originally built using ESRI's Flex Viewer and migrated to ESRI's new WebApp Builder for ArcGIS. This tool allowed non-GIS technical team members to present mapping information in real-time during team meetings to facilitate discussions and decision making.

The collective successes of the Cecil Field Partnering Team were recognized in 2014 by receiving the Fiscal Year 2013 Chief of Naval Operation, Secretary of Navy and Department of Defense Environmental Restoration Team Award, and in 2016 for the ACEC - Grand Award. EnSafe's innovative use of technology optimized the LTM program at former NAS Cecil Field in Jacksonville, FL, resulting in a cost savings of approximately \$1M.

Continued on Page 17

9:30 DNAPL Source Area Delineation Using MIP and HPT Technology at Space Launch Complex 16, Cape Canaveral Air Force Station, Florida

Timothy Jellett, Senior Scientist, HydroGeoLogic Inc., Orlando
John Langett, GS-12, DAF, Project Manager, Patrick Installation Support Team
Brad Jackson, PG, CHMM, U.S. Army Corps of Engineers, Mobile, AL

The ability of dense non-aqueous phase liquid to migrate vertically and laterally makes subsurface delineation challenging and costly. Use of membrane interface probe and hydraulic profile tool technologies can reduce an 18- to 24-month field investigation to approximately 3 to 4 months and provide three-dimensional imagery of the source area.

This approach was used successfully for Space Launch Complex 16 at Cape Canaveral Air Force Station, FL. SLC-16 is an inactive missile launch site. Prior groundwater investigations had identified a DNAPL source area with trichloroethene concentrations as high as 1,000,000 micrograms per liter 1,200 feet west of SLC-16 and SLC-19.

MIP and HPT methodologies provided real-time data, qualitative information on variations in contaminant concentrations throughout the source area, and 3D images of the source area. The 3D images facilitated placement of the confirmation samples needed to delineate the contamination to the target concentration of 10,000 ug/L TCE.

10:00 Design Verification Program: Lessons Learned from Pre-Application Assessments at In-Situ Remediation Sites

Doug Davis, Technical Services Manager, Regenesys San Clemente, CA

This presentation will focus on pre-application design verification steps that directly improve existing design assumptions prior to field application. The goal of this program is to determine what "lower-cost" field-based methods might provide significant benefits into design and application method selection prior to in-situ application, thus resulting in improved remedial performance outcomes.

Over the past 20 years, application of remedial substrates has had an uneven track record in terms of performance. Generally speaking in-situ remedial performance is the result of multiple factors. This presentation will focus on the identification of aquifer characteristics that can be documented using traditional field methods and provide the most insight into the remedial design and application programs. Specifically this presentation will focus on those target treatment zone, TTZ, characteristics that directly affect application programs and ultimately remedial outcomes.

On most remediation sites, two of the more important TTZ characteristics are soil type and the positional relationship between the soil types. The deposition process of sediments has a critical bearing on COC mass storage and distribution as well as remedial reagent selection and application methods. To assist design and application teams, a set of routine pre-application "design verification" steps were developed and performed on select project sites. Using these steps to identify the relationship between COC mass storage and distribution units within TTZ has contributed to an overall improvement in application programs and is seen to be a key element in higher remedial success rates.

This presentation will discuss the use of a set of lower-cost traditional field-based logging techniques for remedial assessment that have been proven to provide information in design and application program prior to field mobilization. These steps were originally developed for in-house projects across the U.S. As part of this pre-application program, a series of design verification steps were performed to systematically identify TTZ characteristics that might either limit or enhance remedial performance. These characteristics often directly affect the application strategy and methods and, in some cases, remedial reagent selection. Included in these are the quantity of sand size particles present and the use of clear-water injection testing. This discussion will include a couple of case studies as well as data sets collected from over 30 sites across the US.

Understanding percentage of sand size particles present as well as the size sorting in the TTZ can drive application and performance results. As an example, consistent continuous core collection and use of soil particle settling tubes as part of the process of soil logging has assisted in better field accuracy in this area.

Monitoring aquifer response during pre-injection testing greatly increases the ability to predict a more accurate TTZ accommodation rate and volume. Monitoring aquifer response has provided valuable insight into TTZ limitations and improved the process of project infield adjustments.

Session 5B: Emerging Contaminants: Remediation of Perfluorinated Compounds

9:00 Best Practices in Sample Collection, Sample Preparation and Analysis of Polyfluorinated Environmental Contaminants

Tim Fitzpatrick, Bus. Dev. Manager, AXYS Analytical Services Ltd.

Per- and Polyfluorinated Alkyl Substances—PFAS or PFCs—such as perfluorooctanesulfonate and perfluorooctanoate are ubiquitous in the environment. The decades of PFAS use in aqueous film forming foams in airports and defense installations have led to groundwater and ecosystem contamination. They are thus targets of increased environmental monitoring, regulation and remediation.

The unique environmental and analytical behavior of these compounds and ever-decreasing action level concentrations necessitate the standardization of best practices for their quantitative analysis in multiple compartments including water, soil, sewage treatment plant discharges and biological matrices.

In this work, we present some of our best practices in the sampling and measurement of PFAS. Issues discussed include the role of isotope dilution and use of labeled standards for quantitation, mass spectrometry choices, role of benchmarking, reduction of laboratory background levels, sampling and sub-sampling techniques to avoid surfactant related heterogeneity, analyte stability and role of container materials, choices of whole water vs. filtered phase analysis, choice of analytes to monitor and more.

9:30 Treatment of Emerging Contaminants of Concern with Activated Ozone

William Kerfoot, PhD, Principal, Kerfoot Technologies Inc., Mashpee, MA

Perfluorinated compounds, for example PFOS and PFOA, and 1,4-dioxane have become emerging contaminants of concern in groundwater and soil. Numerous states have begun to develop desired not-to-exceed levels for the compounds in groundwater supplies foremost, and soil levels secondarily. The purpose of this talk is to present the developing regulatory guidance, present a brief overview of ozone chemistry to treat both compounds, and site examples of treatment.

Perfluorinated compounds have found broad use in fire-fighting foams, are persistent in soils and groundwater and have bioaccumulated, particularly in fish. Treatment of the compounds are difficult because the strong carbon-fluorine bond creates a thermally stable compound requiring an oxidation potential above 2.9 volts for successful attack. Nanobubble ozone coated with hydrogen peroxide as a Perozone®3.0 solution readily attacks and decomposes the perfluorooctanoates. In permeable sandy soils, the ozone gas and liquid peroxide can be delivered through separate tubes to be combined below ground in special stainless steel laminar Spargepoints® that form coated nanobubble emulsions that are injected outwards through capillary pores. Kinetics of the reaction will be discussed, including production of fluorides and sulfate.

The compound 1,4 dioxane has been found with chlorinated solvent spill areas. Being highly water soluble, the associated plume may be larger than the initial TCA or related chlorinated compound plume. Twelve states have developed groundwater and/or soil target levels or remediation goals for the compound. It can be treated in-situ, or in-line treatment can be added to pump and treat systems.

10:00 Treatment of Perfluoroalkyl and Polyfluoroalkyl Substances in Groundwater

Gary M. Birk, PE, Managing Partner, Tersus Environmental, Wake Forest, NC

Per- and polyfluoroalkyl substances are surfactants and polymers that are widely distributed across the higher trophic levels and are found in air, soil and groundwater at sites

across the U.S. Surfactant applications used heavily in the military include aqueous film-forming foams used to extinguish fires involving highly flammable liquids. The toxicity, mobility and bioaccumulation potential of PFASs pose potential adverse effects for the environment and human health. They are persistent in the environment, among the strongest organic compounds and thus considered non-degradable.

Practitioners have difficulty remediating these compounds at a reasonable cost because PFAS tends to be highly soluble, does not favorably partition into the vapor phase, and does not adsorb well to granular activated carbon. To date, GAC has been the only technically feasible method to treat PFAS-aqueous media.

This talk will present a treatment train for ex-situ treatments of aqueous film-forming foam impacted water. In the pretreatment phase, PFASs are precipitated by metering the liquid surface active compound into a stirring tank. The amount of reagent can be adjusted to varying concentrations. The precipitation products are separated from the water as microflocks by simple processes such as sedimentation and filtration. The precipitants can be concentrated to a very high degree, which allows for very economical disposal as compared to GAC. Post-treatment of the remaining residual contaminants is performed by a downstream activated carbon and activated carbon/aluminum hydroxide/kaolin filter. Due to the significant reduction in the PFAS-contaminated water in the initial precipitation stage—up to 90%—the PFAS contaminant load reaching the adsorbent filter is lowered, which leads to a significant extension of the absorbers lifetime, again significantly lowering operating costs.

The presentation will also provide results of the effectiveness of an activated carbon/aluminum hydroxide/Kaolin mixture to treat PFASs. Studies have concluded that the adsorption

Continued on Page 18

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capacity of the mixture for the smaller chain fluorinated substances PFBA and PFBS is vastly superior to that of GAC. This is likely due to the presence of the noncarbon components within the mixture creating unique physical chemical interactions with the smaller chain PFAS compounds.

10:30 Break

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Session 6A: Plume Management Using Carbon Injectables

11:00 Multi-Site Performance Review of Liquid Activated Carbon for Groundwater Treatment

Chad Northington, Southeast District Technical Mgr., Regenesis, Tallahassee, FL
 There is growing interest in the use of carbon injectables to expedite groundwater cleanup through coupling contaminant destruction with sorption. While an appreciation of the theoretical benefits of this approach is widespread, so is a natural caution among experienced remediation practitioners, as is understandable with any new technology. Among questions related to effective practical application of the technology are concerns regarding subsurface distribution in the field, applicability in low-permeability or heterogeneous formations, and short and long term performance.

This presentation will examine evidence from the field exploring these and other concerns. Data will be drawn from more than 20 field applications, variously addressing chlorinated solvent and hydrocarbon impacted sites and encompassing a variety of geological settings within both the United States and Europe. Contaminants investigated range from chlorinated ethenes and ethanes to aromatic and aliphatic hydrocarbons and PAHs. Sites considered include legacy MNA sites, drycleaners, industrial sites, post-industrial development sites and gas stations. Field data will be presented describing performance against remediation goals, performance validation and also lessons learned with regard to material placement, site characterization and the importance of application-feasibility pre-testing.

11:30 Activated Carbon: A Pilot Study and Full-Scale Application in South Carolina

Matthew Valentine, PG, LRS, Principal, Woodard & Curran, Pittsburgh, PA
 A pilot study was conducted in two areas near the leading edge of a long, narrow chlorinated volatile organic compound plume located in south-central South Carolina. The pilot study included the application of an in-situ, liquid activated carbon solution that purports to accelerate biodegradation and shorten timeframes for achieving remedial objectives. The cVOC plume extends over 1,700 feet beyond its identified source. Approximately 80 percent of the contaminant mass is found in a Coastal Plain sediment aquifer that is comprised of a relatively low-permeability silt and very fine-grained sand. The impacted zone is present approximately 20 to 40 feet below ground surface. Both overlying and underlying zones are impacted to a lesser degree in the source area but unimpacted near the leading edge of the plume. A residential area is located less than 1,000 feet from the leading edge of the plume.

Enhanced biodegradation and monitored natural attenuation are effective, widely-used remediation tools, but the timeframe for treatment by these methods can be on the order of months to years. The results of a remedial alternatives evaluation recommended accelerated biodegradation using an innovative, in-situ LAC solution. The remediation agent consists of highly sorptive, micron scale activated carbon particles stabilized to transport widely through an aquifer upon injection. The stabilized colloids deposit on soil surfaces, forming a biomatrix that retains contaminants and accelerates their degradation.

Prior to implementing a full-scale remedial effort, two pilot studies were conducted to evaluate the effectiveness of the approach near monitoring wells with higher and lower total cVOC concentrations. The pilot-scale tests consisted of a remedy that coupled the LAC with a controlled release electron donor and bioaugmentation culture to promote enhanced reductive dechlorination. The performance monitoring phase indicated that total cVOC concentrations decreased by 91 percent at the high concentration well and by 100 percent in the lower concentration well.

Based on the positive results of the pilot tests, the technology was implemented as the long-term remedial solution for the site at the downgradient portion of the contaminant plume. The full-scale application involved injecting the LAC solution in three passive-diffusion barriers that transect the downgradient plume. Combined with ongoing source-reduction activities, this remedial alternative should effectively prevent the plume from migrating further downgradient, which has been a concern of both the state and federal regulatory agencies. The protective effects of the remedial approach theorized to last many years will be evaluated through ongoing performance and long term groundwater monitoring. Results from the first

Continued on Page 19

six months of performance monitoring will be available prior to the conference and will be presented.

Session 6B: Modern Iron Applications

11:00 What Your Mother Never Told You About Iron

John Haselow, PhD, PE, President, Redox Tech, Cary, NC

Ever since researchers at the University of Waterloo observed differences in halocarbon concentrations in cast iron wells, zero valent iron has been used extensively in the soil and groundwater remediation business. Most of the early applications of ZVI employed recycled granular cast iron in barrier walls. This type of iron is known as "regrind" iron. The regrind iron was typically coarse and around 200 to 500 micron. Some regrind material was also known to have trace amount of grease and cutting oils, but more recently regrind suppliers have installed wash processes to minimize the amount of undesirable organic material. As the ZVI technology matured, different materials were tested and deployed.

Atomized ZVI, which is typically made from virgin iron ore, emerged as a cost-effective alternative to regrind ZVI. Injection applicators favored the atomized ZVI for greater reactivity and consistency. Atomized ZVI is available in wide range of particle sizes, but typical mean particles sizes for injection are around 50 to 100 micron

The next advancement in ZVI was nano-scale ZVI which is known for its high reactivity, but unfortunately, also its high price. There has been some use of nano-scale ZVI but it has not gained widespread acceptance. BASF has been producing carbonyl iron powder (CIP) since 1925 but it has only recently been touted for its perceived ease of injection. Some vendors are recommending CIP for injection through well screens, where ZVI has typically be "fracked" or jetted into formations. CIP is known for its high purity and small particle sizes with a narrow distribution. CIP particles are typically in the 1 to 5 micron range.

North American Höganäs recently began providing a very high surface area ZVI with high surface area and hydrogen generation capacity. Despite development of ZVI technology over the past two decades, data did not exist on the relationship between surface area and hydrogen generation capacity as well as reaction rates with target contaminants. This presentation provides an overview of the evolution of ZVI technology as well as recent reactivity and hydrogen generation testing results.

11:30 The Effect of Emulsified Zero Valent Iron on Trichloroethene in the Presence of Chlorofluorocarbon 113

Les Porterfield, PE, Director of Florida Operations, TEA Inc., Santa Rosa Beach, FL

It has been widely reported that 1,1,2-trichloro-1,2,2-trifluoroethene, or CFC-113, in groundwater can be inhibitory to the anaerobic biodegradation of chlorinated ethenes. Emulsified Zero Valent Iron, EZVI, has been shown to be effective at degrading trichloroethene as dense nonaqueous phase liquids. A field evaluation was conducted on the effects of EZVI and other amendments on TCE degradation in the presence of CFC-113 in shallow groundwater.

The approach involved assessing post-remediation monitoring results from the implementation of a remediation injection scheme with multiple reagents that included EZVI for DNAPL treatment, vegetable oil and KB-1® bacteria culture as remediation amendments to enhance the biogeochemistry of the subsurface and accelerate the reductive dechlorination reactions. EZVI was injected to treat the residual DNAPL source in the subsurface; KB-1® bacteria culture was injected to bioaugment the existing dechlorinating bacteria, and vegetable oil was injected to provide additional carbon for the microbial populations. A detailed review of the groundwater monitoring system results was used to assess the effectiveness of the TCE treatment and to evaluate the potential inhibitory effects of CFC-113.

The results indicate that the inhibition of TCE dechlorination by CFC-113 when treated with EZVI in an anaerobic reductive environment did not occur. The EZVI treatment for the TCE DNAPL and the addition of the KB-1® bacteria culture was successful in treating the TCE with no perceived inhibition, and also resulted in the simultaneous reduction in CFC-113.

These results are being used in an ongoing laboratory treatability study with subsequent supporting field data using EZVI to remediate a DNAPL source, also containing free product levels of CFC-113, with KB-1® Plus culture capable of degrading CFC-113 and TCE. Results from the field application and laboratory evaluation will be presented and lessons learned discussed.

12:00 Day Two Luncheon

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Session 7: Regulatory Panel Discussion:

1:30 Important Changes to Chapter 62.780, F.A.C., Status Report on the Contaminated Media Forum and Updates to the Petroleum Restoration Program
Moderator: Joe Applegate, Geosyntec Consultants, Tallahassee

Panelists: Brian Dougherty, Program Administrator
Office of District and Business Support, DEP, Tallahassee
Steve Hilfiker, President, Environmental Risk Management Inc., Fort Myers
Wilbur Mayorga, PE, Division Chief, Miami-Dade County RER-DERM, Miami
Diane Pickett, PG, Administrator, Petroleum Restoration Program
DEP, Tallahassee
John Wright, PE, Assistant Chief Engineer, Petroleum Restoration Program,
DEP, Tallahassee

3:00 Break

Session 8: Management of Groundwater to Surface Water Discharges

3:30 A Novel Approach to Assess and Quantify Mass Flux of Groundwater Discharge into Surface Water

Paul Favara, PE, Global Practice Director, Vice President, CH2M, Gainesville, FL

Discharge of contaminated groundwater to surface water occurs at many project sites. Due to a lack of cost-effective tools and methods to quantify mass-flux, cleanup objectives for groundwater are typically very conservative resulting in unnecessary treatment costs. There is a need for more cost-effective tools to better assess the mass-flux of groundwater migrating into surface water boundaries and natural attenuation along the flow path of groundwater as it migrates through the groundwater transition zone. Over the past several years, a sediment-bed passive flux meter has been developed to provide cost effective and reliable mass-flux measurements.

The SBPFM builds off of the significant research on passive flux meters previously performed. The main design challenge in developing the SBPFM was converting the PFM, which measures horizontal flux in groundwater, to a vertical configuration to assess groundwater discharging through the groundwater transition zone into surface water. The SBPFM was designed to be capable of passively and directly measuring local contaminant and water fluxes and provide more accurate information on the temporal mass flux distribution through the sediments in order to better design site remedial and closure strategies. Once laboratory testing of the SBPFM was completed, the flux meter was deployed at several sites. The field deployments were designed to assess ease of deployment as well as information that could be used to determine how mass flux could be interpreted from the deployments.

This presentation will address the results of laboratory testing completed in designing the SBPFM, which led to the final configuration and field test results. The field deployments

of the SBPFM showed that the flux meters could be easily deployed near shore and could provide results for both tidal and non-tidal waters. Additionally, it was found that both activated carbon and ion-exchange resins could be used to measure a broad range of contaminants. The deployment results demonstrate that higher quality flux measurements could be achieved since the SBPFM results represents an average flux over an approximate two-week period, as compared to "point-in-time" measurements typically used in the industry. An economic assessment of a flux meter deployment compared to other sophisticated sediment flux tools also demonstrate similar benefits and an approximate 50% cost savings.

4:00 Angled Injection of BOS 100® to Mitigate PCE Intrusion into a Stream

Mike Mazzaresse, Senior Engineer, AST Environmental Inc., Golden, CO

BOS 100® was injected adjacent to and beneath a stream using a direct push angle drilling technique to successfully create a PRB and limit PCE flux from the upgradient source area into the stream.

The Superfund site is a former textiles facility where tetrachloroethylene was used in drycleaning operations. Approximately one-half mile downgradient of the source, PCE was discharging into a stream through the saprolitic formation. Based upon stream bank and bed soil sampling and groundwater modeling, it was determined that the PCE was upwelling into the stream from partially weathered rock as deep as 65 feet below ground surface. The project objective was to determine if a Trap and Treat® BOS 100® permeable reactive barrier could be effectively angle drilled in the wooded and sloped area on the upgradient side of the stream to intersect the plume and reduce or eliminate the contaminant mass flux into the stream.

In the source areas, reductions of 90% to 98% have been observed. The observations made at micro wells and stream bed piezometers demonstrate that effective distribution of the BOS 100® was achieved during the pilot test injections. The analytical data from 12 of 15 micro wells installed in the PRB displayed significant contaminant mass reductions following the pilot test. The eight streambed piezometers located directly downgradient of the PRB have exhibited decreases ranging from 88% to 100% and have illustrated time-trends consistent with the expected mechanics of a PRB. The full scale angled injection was implemented in the fall of 2015. Data from the pilot test and full scale will be presented.

4:30 Column Studies for Design Optimization of Field Pilot and Full Scale Denitrifying Permeable Reactive Barriers

Michael Lee, PhD, VP Research and Development, Terra Systems, Inc. Claymont, DE

Many of Florida's sensitive surface waters are impacted with nitrate from septic tank discharges and infiltration of urban and agricultural fertilizers. Sustainable technologies like permeable reactive barriers are being evaluated as non-traditional treatment alternatives for nitrate impacted groundwaters. Terra Systems Inc. has performed a column study to both evaluate the nitrate treatment capability of emulsified vegetable oil PRBs and determine critical PRB design parameters using nitrate-contaminated sandy soils and groundwater from a site on Cape Cod, MA.

The column study allowed for comparison of biological nitrate reduction effectiveness of different EVO formulations and EVO loadings. The columns were operated at groundwater flow rates of one foot per day which is representative of many areas in Florida.

The column study determined time to reach complete nitrate removal, removal mass and rate of primary and secondary contaminants, buffer requirements, initial radius of influence of the injected emulsion, and projected emulsion migration distance and rate. Complete nitrate reduction continued even as total organic carbon levels in column effluents fell to between 2.3 and 3.0 mg/L by day 298. Nitrate began to increase after about 340 days when TOC fell below 2 mg/L. The column study shows that EVO effectively stimulates naturally occurring denitrifying bacteria in septic tank-impacted soils and groundwater for sustained nitrate removal while providing multiple parameters for design optimization of field pilot and full scale EVO PRBs.

12:00 Conference adjourns

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RECLAMATION
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The inclusion of wetlands as part of wastewater treatment and reclamation processes is not unusual. Both treatment and receiving wetlands are used in Florida.

Systems permitted by the Florida Department of Environmental Protection currently include the use of 17 natural wetlands, comprising roughly 6,200 acres, for wastewater discharges.

To protect surface and ground waters, Florida regulations require that wastewater discharged into a wetland receive the "highest level of treatment."

"The Blacks Ford wetlands discharge is regulated as a discharge to a receiving wetland under Chapter 62.611, FAC," Cordova said. "As such, the discharge from Blacks Ford is required to meet advanced wastewater treatment levels, the highest level of treatment required by rule."

This requires the plant's wastewater discharge to meet a 5, 5, 3, 1 milligram per liter effluent annual average for carbonaceous biochemical oxygen demand 5, total suspended solids, total nitrogen and total phosphorus, respectively.

Beyond meeting wastewater discharge standards, JEA uses extensive monitoring and site inspections to assure the health of Blacks Ford Swamp is maintained.

"In addition to routine sampling of the plant's effluent before being discharged to the wetlands, JEA conducts monthly chemical sampling of the discharge from the wetlands, quarterly chemical sampling of the water within the wetlands, and semi-annual biological surveys of the wetlands to ensure the wetlands are not being adversely impacted by the discharge," Cordova said.

Using reclaimed wastewater for irrigation helps JEA reduce the volume of water withdrawn from the aquifer, preserving future potable water supplies and maintaining water table elevations.

Similarly, discharging to surface water may assist in balancing the water budget of a natural system. In the case of the

Blacks Ford, the wetland is a natural system and not dependent on the discharge.

"The discharge and reuse volumes are not adjusted or manipulated seasonally by the utility," said Cordova. "However, reuse demand cycles typically mean that wetland discharges mimic the natural cycle in that discharges to the wetlands increase during wet weather periods when reuse demand is lower."

PE, chief engineer.

Panelists will provide updates on Chapter 62-780, FAC. Risk-based cleanup criteria have been in the works for a while. When implemented, they will make pervasive changes in setting remediation targets.

In addition, panelists will provide input on the progress of PRP reform and the latest on the state's reinvigorated Contaminated Media Forum.

During lunch on Day One, Dr. Robert Knight, director of the Howard T. Odom Florida Springs Institute, will talk about springs protection in the state.

Florida is blessed with more springs than any other area in the world, and most have declining water quality due to nutrient contamination, especially nitrogen.

In the past three years, Florida has committed about \$100 million to manage and improve shallow aquifers within springsheds as a strategy to rehabilitate spring water quality and quantity.

Much of that progress is due to the competent technical involvement of the Florida Springs Institute and its public involvement both guiding and criticizing local government and DEP rehabilitation efforts.

Knight's talk provides a rare opportunity to get authoritative information from one of the most respected sources in the state about surface water and shallow aquifer water quality management.

FRC 2016 is set for Oct. 6-7, at the Rosen Center Hotel in Orlando.

Company news. HSW Engineering Inc. opened an office in Tallahassee to better serve its clients in North Florida, Alabama and Georgia. HSW Vice President Andy Lawn will lead the Tallahassee office, overseeing assessment and remediation, water resources and permit compliance.

H2R Corp. bought Gannett Fleming's drilling equipment, foundation quality assurance technology and lab facilities in Florida. Gannett Fleming has 120 employees in six offices in Florida. H2R has offices in Pompano Beach and Orlando. By the end of 2017, the company plans to increase staff by 20 percent.

McKim & Creed Inc. is expanding its services in the Fort Myers area to include water and wastewater engineering. Leading the expansion will be Thomas Pugh, PE, who serves as the firm's regional engineering manager.

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Inspectors found floor sweepers and vacuum cleaners containing residue used to clean surfaces, some of which exceed toxicity limits for cadmium.

Over the past five years, the base has invested over \$100 million in environmental compliance, conservation, pollution prevention and restoration.

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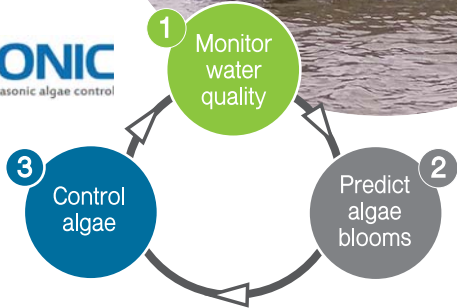
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