Florida Specifier

Practical Information For Environmental Professionals

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FLORIDA REMEDIATION CONFERENCE

Dec. 5-6, 2018

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Details begin on Page 5.

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DEP to fund septic system retrofits, upgrades

By BLANCHE HARDY, PG

The Florida Department of Environmental Protection announced a new Septic Upgrade Incentive Program for the retrofit or replacement of onsite sewage treatment and disposal systems, commonly referred to as septic systems.

The new program is intended to improve water quality and better protect Florida springs.

Program funds will be paid directly to certified septic system installers and licensed plumbers to encourage homeowners to hire participating vendors to add advanced nitrogen-reducing features to their systems to reduce nutrient pollution. Reimbursement will be provided through springs restoration funds.

The 2016 Florida Springs and Aquifer Protection Act directed the department to develop basin management action plans. Under the BMAPs, new septic systems permitted on lots less than one acre in sensitive springs areas called "priority focus areas" are required to be nitrogen-reducing systems.

New conventional systems are no longer permitted in these areas except when disposal through a central sewage collection system will be available within a five-year period.

The incentive program was proposed in order to offset homeowner costs by providing up to $10,000 for the installation of enhanced nitrogen-reduc-

SEPTIC
Continued on Page 16

Photo by Chad Northington, Regenesis

Regenesis technicians construct a trench to hold PlumeStop® Liquid Activated Carbon™, a proprietary formulation to prevent a contaminated groundwater plumes from traveling offsite. The project is one of many on the technical agenda at the 2018 Florida Remediation Conference. See story below.

SFWMD fast-tracking previously rejected deep well plan to handle runoff headed for Lake O

By ROY LAUGHLIN

During its September meeting, the South Florida Water Management District approved funding for two deep injection wells pilot projects north of Lake Okeechobee, the first of which may become an array of 30 to 60 deep wells.

The wells would be used as needed for deep disposal of runoff water otherwise bound for Lake Okeechobee.

Deep well injection into the Boulder Zone approximately 3,500 feet below ground surface would divert roughly half or less of the current drainage from Lake Okeechobee to tidewaters via the St. Lucie and Caloosahatchee rivers.

Bids for the two pilot wells are expected to be let by the end of this year.

In October of last year, Robert Verrastro, lead hydrogeologist in the district's Water Supply Bureau, and Cal Neidrauer, PE, chief engineer in the district's Hydrology and Hydraulics Bureau, made a presentation to the district governing board of a deep injection well array concept for stormwater runoff disposal to reduce polluted Lake Okeechobee releases to tidewater.

The presenters analyzed data back to 2009 to calculate the estimated reductions in annual Lake Okeechobee discharges.

The two largest Lake O discharges to tidewater, which were responsible for massive algal blooms in the outflows, occurred in 2013 and 2016.

If 50 deep injection wells capable of injecting 15 million gallons a day each had been in operation then, the 2013 outflows would have been reduced by 41 percent and the 2016 event would have been reduced by 51 percent.

The duration of outflows in 2016 would have been reduced from four months to one month. So at best, the planned injection well array is a 50 percent solution.

The board presentation noted that the wells would be used only during

WELLS
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FRC preview: Quality speakers, content key this year's event

By ROY LAUGHLIN

The 2018 Florida Remediation Conference provides a great opportunity to get a comprehensive overview of soil and groundwater cleanup in Florida.

"This years' conference delivers an excellent blend of content and speakers with ample opportunity to learn about enhanced conceptual site model development and the critical role it plays in effective site remediation, aggressive and passive in-situ remedial technologies, liquid injectables, bioremediation advancements and evaluating the costs of life-cycle remediation," said Jim Langenbach, PE, senior principal environmental engineer with Geosyntec Consultants Inc. in Titusville and FRC conference chair.

In the opening session, Michael Goldstein, Esq., managing partner at The Goldstein Environmental Law Firm in Coral Gables, will bring attendees up to speed with the sometimes complicated and counter-intuitive aspects of brownfield remediation and redevelopment.

Goldstein was a pioneer in the early days of brownfield regulatory develop-

FRC
Continued on Page 15

EPA deletes Jacksonville oil pits site from Superfund National Priorities List

Staff report

In mid-September, the U.S Environmental Protection Agency announced that the White House Oil Pits Site in Jacksonville would be deleted from Superfund's National Priorities List.

The site, currently owned by the city of Jacksonville, was contaminated by Allied Petroleum Product Co.'s lax discharge and disposal practices.

Since 1983 when the site was first listed, the EPA, the Florida Department of Environmental Protection and responsible parties have worked to clean it up. The site is no longer considered to be a threat to human health or the environment.

Dropping the site from the Superfund NPL opens up prospects for other uses. Currently it is a flood plain buffer site but could be used for recreational purposes, according to the agency.

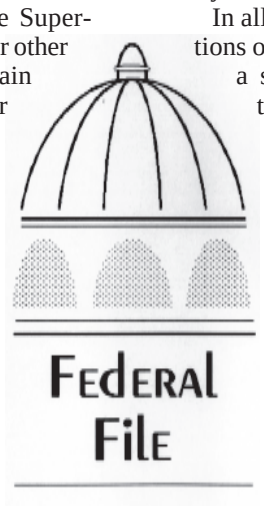
In 2013, the EPA issued its initial five-year review describing the remediation performed in the 1980s and mid-1990s as "functioning as intended through the use of stabilization/solidification, slurry walls, a cap and a fence to control the potential spread of contamination."

The report concluded that the remedy at the site provided short-term protection of human health and the environment.

The successor five-year review of the site was scheduled for May, 2019. Under prior administrations, the EPA typically relied upon a recent five-year report to determine deletion status.

The agency did not explain why this site was deleted from the NPL before completion of its second five-year review. Instead, they justified deletion of the site based on new program priorities as specified by their Superfund Task Force.

In all, EPA deleted 18 sites and portions of four more in fiscal year 2018, a significant increase over the three full or partial deletions in fiscal year 2016.



EPA sacks advisory scientists. In mid-October, the EPA dismissed at least 20 non-EPA, non-industry scientists from two of its Clean Air Act advisory boards, leaving them with no independent scientist members.

Scientist members on the two air pollution advisory boards provided technical expertise that informed regulations on air particulates such as soot and ground-level ozone.

In place of advisory boards that include independent scientists, the EPA under Andrew Wheeler's guidance has reformatted the Clean Air Scientific Advisory Committee as a seven-member group consisting largely of industry-paid scientists and consultants to review key science assessments in the CAA's mandated ongoing reviews.

The cyclic five-year reviews are the technical basis for periodic revisions of ambient air quality standards.

The Particulate Matter Review is scheduled for release next year. Its 20-member panel that was dismissed in October had finished a review that reportedly endorsed the need for stricter standards for soot emitted by cars, power plants and other sources.

This is not the first instance of scientists being removed from EPA scientific advisory boards, just the most recent in a dismissal series that began in 2016.

By removing bona fide scientific members of committees, the Trump administration's EPA can more easily weaken environmental standards, an industry-friendly move that has expensive consequences for public health and societal costs down the road.

Lautenberg Act update. EPA announced how it plans to comply with provisions of the Lautenberg Act to speed up Toxic Substances Control Act chemical reviews in fiscal year 2019.

At the top of the list, the agency explained the risk assessment strategy that it will apply to the next group of 20 chemicals reviewed.

The EPA will be asking the public for input to select priorities for risk evaluations, even for chemicals that may be low priorities for the EPA based on rational evaluation.

By December, 2019, the agency will designate at least 20 chemicals that are "high priority for risk evaluations" as well as 20 that are "low priority" with no risk assessment warranted in the short term.

The EPA also proposed a longer-term risk-based strategy for managing more than 40,000 active chemicals subject to TSCA.

The agency is proposing to classify chemicals in "bins" that can be used to inform multiple activities and priorities throughout the agency, including within the TSCA program.

EPA is currently accepting public comments prior to an online public meeting tentatively set for early 2019.

They will also open 73 chemical-specific public dockets for each of the remaining chemicals on the 2014 TSCA work plan.

In addition, one general docket will be opened for public suggestions of risk evaluations of chemicals that are not on the work plan.

Public input will be used to "inform TSCA prioritization and risk evaluation for these chemicals."

FEDFILE

Continued on Page 22

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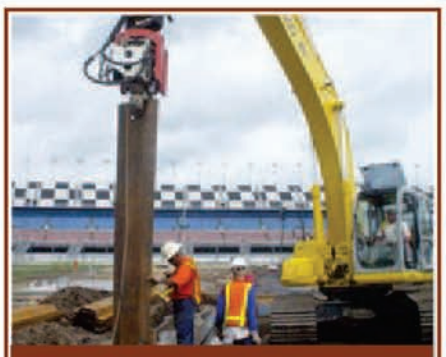
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USF developing resiliency plans for climate change tool kit

Staff report

The Florida Center for Community Design and Research in the University of South Florida's School of Architecture and Community Design is working with partners to develop resiliency strategies to deal with climate-related impacts to Florida cities.

FCCDR was established by the Florida Legislature to help create more livable and sustainable communities.

The partners will develop ideas on how to design and build Florida communities resilient to sea level rise and the resulting flooding associated with climate change. The group will also address related issues including red tide, toxic algae blooms and hurricanes.

U.S. Rep. Kathy Castor, vice ranking member of the House Energy and Commerce Committee, is supporting the initiative that includes Hillsborough County government and the Tampa Bay Regional Resiliency Planning Council.

Ultimately, FCCDR will create a tool kid to help Florida municipalities reduce risk, and gear up for future flooding events.

Florida Notes

Gainesville commits to clean energy. The city of Gainesville committed to achieving 100 percent renewable energy and zero greenhouse gas emissions by 2045.

The city commission passed the renewable energy resolution in mid-October.

Gainesville is the fifth Florida city to make the commitment following the cities of Largo, Orlando, Sarasota and St. Petersburg, and the 90th city to do so nationally.

"By passing this resolution, the city is declaring its intention to move away from a dirty fossil fuel economy to one based on clean energy innovation," said Roberta Gastmeyer, a member of the Suwannee-St. Johns Group of the Sierra Club Executive Committee and chair of the Gainesville Ready for 100 Action Coalition.

"We are excited by the opportunity to work with Gainesville's excellent Utility Advisory Board to ensure all residents will benefit from this transition, which will provide a healthier, more equitable and more resilient community,"

Siesta Key lawsuit simmering. In late September, a Siesta Key citizens group, Save our Siesta Sands 2, filed a 60-day notice of intent to sue the U.S. Army Corps of Engineers.

The group opposes the proposed dredging of Big Pass Shoal to replenish significantly eroded Lido Beach.

They said the corps did not meet the standards required by law to pursue the project because they conducted an environmental assessment rather than a more comprehensive environmental impact statement.

They are concerned the corps will dredge and remove materials currently protecting Siesta Key.

The group's attorney argued that the proposed action violated the National Environmental Policy Act, the Clean Water Act and the Endangered Species Act.

They want the corps to consider dredging other borrow areas rather than risk red tide events, potential water craft navigation issues and other impacts on the local economy that may occur by altering Big Pass Shoal.

Save our Siesta Sands unsuccessfully challenged permits issued for the project in the past.

The *Sarasota Herald Tribune* reported that, under the current schedule, the city will start dredging approximately one million cubic yards of sand in the spring of 2019 and complete the work by June of that year.

An additional 500,000 cubic yards of sand would be dredged for refurbishment of Lido Beach every five years thereafter.

Polk goes solar. Polk County residents are participating in a new Solar United Neighbors cooperative.

The group has helped start 38 solar co-ops in Florida since 2015.

After several months of planning, the Polk co-op kicked off in September.

Members pay for their systems at a bulk discount rate by joining the co-op. Up to a 30 percent federal tax credit may be gained on qualifying costs.

Solar United Neighbors assists in creating these co-ops and bringing homeowners together in a group.

They provide unbiased installer-neutral support to participants explaining how solar power works, how it can be financed and how it is installed.

Contractors are hired by a volunteer procurement team through a competitive bidding process. The selected contractor then provides bids to each member home according to the needs of each structure.

According to information published by SUN, a typical residential system costs approximately $7,000 for a four-kilowatt system and $14,000 for an eight-kilowatt system, after tax credits.

Disney solar. The Walt Disney Company is being heralded for going green. The company will shortly generate enough renewable energy to power two of their four Walt Disney World Resort parks.

WDC is set to open a new 50-megawatt solar power facility by the end of the year. The facility is located within a 270-acre area dedicated to renewable energy just outside Disney's Animal Kingdom.

According to Disney Parks Animals Science and Environment group, the solar facility will include half a million solar panels and is expected to reduce greenhouse gas emissions by more than 57,000 tons per year, roughly the equivalent of removing 9,300 automobiles from the roads annually.

The facility's power output will go directly to the local grid. During peak sun hours, up to 25 percent of WDW's power needs will be met through solar. Its output capacity will be equivalent to powering 10,000 homes per year.

The new facility is part of the effort the company has launched to reach its 2020 goal of reducing net greenhouse gas emissions by 50 percent compared to 2012 levels. In addition to reducing greenhouse gases, Disney has committed to an ecologically sound facilities.

Blackwater River State Forest expanded. Florida Commissioner of Agriculture Adam Putnam announced the addition of 800 acres to the Blackwater River State Forest through acquisition of the Florida Forever Wolf Creek Forest Project Area.

The Florida Forest Service partnered with the Florida Department of Environmental Protection, Santa Rosa County, the U.S. Navy's Naval Air Station Whiting Field, the U.S. Forest Service and the Trust for Public Land to secure the acquisition through the Forest Legacy Program.

The Wolf Creek Forest Project Area provides habitat for a number of listed and endangered species and is a major wildlife corridor fronting Big Coldwater Creek.

"Florida's state forests are vital ecological and economic resources for our state, and we must continue to prioritize the protection of Florida's unique natural spaces," Putnam said in a statement. "This addition to Blackwater River State Forest

NOTES

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Visit us in Booth #103 at the 2018 Florida Remediation Conference

SFWMD increases surface water flow to Florida Bay through Shark Slough

Staff report

At the end of its second year of phased-in operation, the South Florida Water Management District announced the MODFLO program, part of the district's 2016 Florida Bay Initiative, delivered 40,000 acre-feet of water to Shark Slough.

That water flowed to Florida Bay.

In its first two years, the new delivery schedule provided 68,000 acre-feet in total.

The MODFLO program deliveries are possible now that the district has completed control structure modifications and pumps stations near Homestead at S-199 and S-200.

By the end of the year, additional pumping capacity at the stations will increase capacity to 44,000 acre-feet per year.

The reliable delivery of additional water will improve wildlife habitat in northeastern Florida Bay and could be crucial to reversing seagrass die-off in the bay during extremely hot dry years.

The most recent and one of the worst seagrass die-offs occurred during the summer of 2016.

This water delivery program is the first sustained effort to significantly increase water flow through Shark Slough to Florida Bay since the Everglades restoration plan was signed in 1995.

Hernando WWTP begins operation. Hernando County's Glen Wastewater Treatment Plant began operation again in October, capping more than a decade of planning, revising facility consolidation and construction of expanded treatment capacity to serve northwest Hernando County residents.

THE WATER WATCH

The wastewater plant now has a three million gallon-per-day treatment capacity and potentially all of that can be reclaimed and distributed for reuse as irrigation water.

The increased reuse capacity is intended to conserve Floridan Aquifer drinking water supplies and reduce nutrient runoff in the Weeki Wachee springshed.

The spring is experiencing increased algal growth at its mouth and along the spring's run.

In 2008, five wastewater treatment plants served residents in western Hernando County and Spring Hill. Most of those plants had capacities of less than a million gallons a day.

In 2013, the county revised its master plan to focus on expanding capacity and increasing treatment capability at two wastewater treatment plants, the Airport Plant and Glen Plant.

This latest plant to restart operations is a significant component of the plan's implementation efforts.

Mid-Clay wastewater facility commissioned. In late October, the Clay County Utility Authority reached a milestone when it commissioned Phase 1 of its Mid-Clay Wastewater Treatment Facility expansion.

The plant expansion increased treatment capacity from 650,000 to 1.5 million gallons per day.

The benefits of the expansion include the addition of an advanced wastewater treatment capability to service approximately 2,000 residential lots that would have otherwise used septic systems for treatment.

The facility's increased capacity also relieved pressure on CCUA's existing Ridaught Landing Wastewater Treatment Plant.

Part of Clay County along the First Coast Expressway is undergoing rapid development due to regional population spillover from Duval County. The Ridaught plant bears the brunt of that demand for increased capacity.

With the Mid-Clay facility now in operation, CCUA can spread demand among the two plants and reduce Ridaught's treatment flows well below its regulatory threshold, giving both plants reserve treatment capacity.

Phase 1 costs totaled $18.5 million, with some additional upgrade activities yet to be completed. A second phase of the project will begin in 2019.

Martin County fertilizer ban. After another year of harmful algal blooms in its coastal estuaries, the Martin County Board of County Commissioners considered, then rejected, extending their summer fertilizer use ban.

The proposed ban was similar to those adopted by several Martin County municipalities, including the town of Sewall's Point and the city of Stuart, which have extended the fertilizer ban from four to six months during the summer rainy season.

After an hour of presentations and discussion, the commissioners may have been convinced by staff that extending the fertilizer ban could possibly increase the level of erosion if fertilizers could not be applied during the autumn months to promote plant growth. Plant roots would have increased capacity to hold soil during the rainy season.

Negative impacts on landscapers was also cited. The Florida Turf Growers Association and the Florida Farm Bureau also opposed the extension.

In its updated 2014 fertilizer ordinance, the county banned the application of fertilizer containing phosphorus at any time. Slow release, 50 percent nitrogen fertilizer may be applied between Oct. 1 and May 30, usually seasonally dry months.

The application of nitrogen fertilizer is banned from June 1 to Sept. 30 except for farms and golf courses, and application is allowed only when rain is not forecast.

In addition, it established a 25-foot fertilizer-free buffer around wetlands and water bodies.

Wildwood water supply capacity. In early October, the Wildwood City Commission approved a $900,000 contract with U.S. Water Services Corp. to increase the city's public water supply system capacity.

The project includes the replacement and upgrading of equipment as part of enlarging capacity.

The city commission also approved a $19,000 contract with Kimley-Horn for project administration.

The recently approved spending is part of a planned $1.9 million upgrade necessary to meet Wildwood's rapid population growth.

The Villages of Southern Oaks is a primary contributor to that growth, and impact fees from it and other development will be used to fund the expansion.

In addition to the existing plant upgrade, the city is constructing the Oxford Water Treatment Plant west of U.S. 301 at a cost of $6.6 million. It will also serve part of the rapidly growing Villages of Southern Oaks.

New River runoff. The city of Fort Lauderdale received a series of complaints from residents along the New River, noting cloudy discharges in the waterway.

City inspectors found that the discharge of silt, sediments and debris from several construction sites into the city's storm sewers was responsible.

In September, the city issued citations to eight construction companies, imposing fines of $150-$500.

Broward County also began an enforcement action against a construction contractor in the downtown area.

Since the enforcement actions, contractors have installed filter fabric and gutter protection, and cleaned gutters, sidewalks and streets of soil and spills.

Inspectors continue to visit construction sites daily.

Lee County flood management. A recent agreement between the Lee County Board of County Commissioners and the South Florida Water Management District transferred maintenance authority for 13 county waterways and canals to the district.

Under the agreement, the county and water management district will develop annual work plans for waterway maintenance aimed at significantly reducing flooding.

In 2017, heavy summer rains followed by Hurricane Irma caused extensive flooding throughout the county.

Work during the agreement's first year will include maintenance at three waterways that experienced significant flooding following the hurricane, including Orange River in East Lee County, Mullet Creek in Fort Myers and Oak Creek in

WATCH

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Dec. 5-6, 2018
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FRC 2018: Day One, Wednesday, Dec. 5, 2018

9:00 Opening Session

A Word from the Chair
Jim Langenbach, PE, BCEE, Senior Principal, Geosyntec Consultants Inc., Titusville

Brownfields Ascendant – Economic Trends, Practice Opportunities and Litigation Avoidance for the Redevelopment Focused Environmental Consultant in Florida
Michael Goldstein, Esq., Managing Partner, Goldstein Environmental Law Firm, Coral Gables

A National and International Perspective on PFAS in the Environment
Rula Deeb, PhD, Senior Principal Civil and Environmental Engineer
Geosyntec Consultants Inc., Oakland, CA

Morning Break 10:00 - 10:30

Session 2: Per- and Polyfluoroalkyl Substances (PFAS)

10:30 Separation or Destruction - The Practice and Development of PFAS Treatment and Remediation
Dora Chiang, PE, Vice President, Technology Strategy Leader, CDM Smith, Atlanta, GA

Per- and polyfluoroalkyl substances comprise a diverse group of fluorinated chemicals used for over 50 years in various military and industrial applications and consumer products. PFAS are not biodegradable and relatively soluble in the environment. Their unique characteristics make this class of contaminants difficult to treat and to meet the cleanup criteria at parts per trillion levels. While need and policy of PFAS cleanup are still evolving, current practice of PFAS treatment has focused on 1) breaking drinking water exposure pathways, 2) emergency response, and 3) on-site IDW treatment. Treatment technologies are also under development to address PFAS in the source areas and how dissolved groundwater plume can be managed and remediated. This presentation will be divided into two parts. The first part will discuss the "ready-to-go" technologies that are commercially available to mitigate the impacted waters. GAC has been considered the most economical and commercially available treatment technology for PFOA and PFOS, while ion exchange resin and reverse osmosis are also promising. The second part of presentation will discuss cross-agency funded PFAS treatment technologies that are currently under development. These technologies typically have research objectives of treating a wider range of compounds including co-contaminants and short-chain and precursors of PFAS. PFAS destruction technologies have also been looked into as stand-alone technology or as part of treatment train coupling with separation technologies. This discussion will bring attendees up to date on the uses, selections and development of PFAS treatment technologies.

10:50 Design/Build of an Emergency Granular-Activated Carbon System to Remove Perfluorocarbons from Drinking Water, Wright-Patterson Air Force Base, OH
Bill Scoville, PE, PMP, Business Development Director/Program Manager
APTIM, Cincinnati, OH
Treva Bashore, Remedial Project Manager, AFCEC/CZO, Wright-Patterson AFB, OH
Jessica Frehse, EI, Project Engineer
USACE Rapid Response and Cost Reimbursable TCX, Offutt AFB, NE

Under a U.S. Army Corps of Engineers, Omaha District, Rapid Response contract, APTIM provided immediate response to modify the existing groundwater treatment process to remove perfluorooctanesulfonic acid and perfluorooctanoic acid detected in two drinking water wells on Wright-Patterson Air Force Base, OH, to meet the U.S. EPA health advisory standard of 70 parts per trillion of PFOS, PFOA or their combined concentration. APTIM developed the detailed design, constructed the system modifications and performed one year of operations and maintenance. APTIM was awarded the task order on July 1, 2016, and immediately obtained facility drawings and other utility drawings to evaluate designs for the temporary GAC system. Design-phase services performed by APTIM included evaluating alternatives to address the increased back pressure generated by adding GAC vessels; assessing treatment system location options based on ease of line access, available footprint and access for large trucks to deliver GAC during change-outs; and conducting rapid column tests using the proposed GAC to demonstrate the removal effectiveness of the proposed system. The construction was performed from January, 2017, through May, 2017, and the system was started up in June, 2017, just 11 months after notice-to proceed. As of July 1, 2018, the system has treated more than 325 million gallons with no sign of breakthrough and no need for backflushing. APTIM's low maintenance design requires less than eight hours/week of operational support. Vessel pressures and flow rates are continuously monitored via a process logic control system that is tied into the drinking water plant's SCADA system for emergency shutdown. See us at Booth #5.

11:10 In-Situ Thermal Remediation of Emerging Contaminants
Chris Thomas, Sr. Project Mgr., TRS Group Inc., Longview, WA

Emerging contaminants, such as 1,4-dioxane and per- and polyfluoroalkyl substances, resist in-situ treatment by conventional advective flow-based technologies. Effective remediation is limited to expensive, ex-situ treatment by advanced chemical oxidation or filtration. Concentrations of 1,4-dioxane in groundwater were recently observed at two ISTR projects where heating was used for treatment of chlorinated solvents in groundwater. Additionally, recent ISTR bench and field studies show significant PFAS concentration reductions in soil. Recent testing evaluated the effects of 1,4-dioxane treatment by steam stripping. The tests showed that the vapor-liquid equilibrium mass fraction ratios of 1,4-dioxane to water increase substantially as the system approaches the boiling point of water. The bulk of 1,4-dioxane remains in the vapor phase where it can be readily treated using vapor phase activated carbon. The PFAS tests drove temperatures of the PFAS to levels where they exhibited elevated vapor pressures, resulting in more than 99.99 percent removal. A vapor collection system collected the volatilized PFAS and subsequently condensed and filtered them for disposal. A similar approach (heating for volatilization, vapor collection and condensation) would be used in a full-scale field application, primarily focused on source zone remediation. The presentation will include the fundamentals of heating emerging contaminants, recent results from PFAS bench and field tests and lessons learned from full scale field applications using ISTR for 1,4-dioxane remediation.

11:30 Eliminating Risk of PFAS Contamination: Low Cost In-Situ Remediation with Colloidal Activated Carbon
Chad Northington, PE, Southeast District Manager, Regenesis, Tallahassee

Colloidal activated carbon is emerging as a low-cost in-situ method to eliminate the risk associated with PFAS compounds in groundwater. By coating flux zones of an aquifer with colloidal activated carbon, a permeable sorption barrier is created in situ, purifying groundwater as it passively migrates. PFAS constituents from up-gradient source zones are rapidly sorbed to the carbon and removed from the mobile dissolved phase. By removing PFAS from the mobile phase, the route of exposure to down-gradient receptors is eliminated, thereby eliminating the down-gradient public health risk associated with PFAS. Colloidal carbon isotherm, retardation and sorption test data are presented for specific PFAS compounds indicating excellent sorption capability and increased performance with decreasing carbon particle size. The potential for competitive sorption/elution is discussed. Plume modeling is presented indicating longevity of in-situ colloidal carbon treatment for PFAS to be on the order of multiple decades before reapplication is required. Data are presented from field case sites where a single application of colloidal activated carbon resulted in orders of magnitude reduction in PFAS groundwater concentrations to below U.S. EPA health advisory levels. Design considerations for plume management are discussed including amending existing pump and treat systems to reduce project cost and to eliminate down-gradient risk to public health.

12:00 Day One Luncheon Sponsored by Advanced Environmental Laboratories

Concurrent Session 3A: Aggressive In-Situ Technologies

1:15 Neutral Buoyancy Control for Surfactant-Enhanced Aquifer Remediation of DNAPL
Sangho Bang, PhD, Technical Associate, Tersus Environmental, Wake Forest, NC

Various technologies for the remediation of subsurface contamination by dense nonaqueous phase liquids in groundwater are applied at numerous sites throughout the U.S.

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FLORIDA REMEDIATION CONFERENCE

FRC 2018 Schedule of Activities

Tuesday, Dec. 4, 2018

9th Annual FRC Charity Golf Tournament at Rosen Shingle Creek Golf Club
- 10:30 pm: Registration opens for FRC 2018 Charity Golf Tournament
  All proceeds to The Pink Butterfly Foundation
- 12:00 pm: Play begins
- 5:30 pm: Post-play ceremony and BBQ at the club

24th Annual Florida Remediation Conference at Rosen Centre Hotel
- 5:00 pm - 9:00 pm: FRC Exhibitor Move-in and Setup at the Rosen Centre
- 5:00 pm - 9:00 pm: Conference registration desk open at the Rosen Centre

Wednesday, Dec. 5, 2018

24th Annual Florida Remediation Conference at Rosen Centre, Day One
- 7:30 am - 5:00 pm : Conference registration desk open at Rosen Centre
- 7:30 am - 9:30 am : Coffee/munchies in exhibit area
- 7:30 am - 7:00 pm: Exhibit hall open
- 9:00 am: FRC Day One, conference convenes
- 5:00 pm: Conference adjourns for the day
- 5:00 - 6:30 pm: FRC Reception in Exhibit Hall

Thursday, Dec. 6, 2018

24th Annual Florida Remediation Conference at Rosen Centre, Day Two
- 7:30 am - 5:00 pm: Conference registration/help desk open
- 7:30 am - 9:30 am: Coffee/munchies in exhibit area
- 7:30 am - 12:00 pm: Exhibit hall open
- 8:30 am: FRC Day Two, conference continues
- 12:00 pm - 3:00 pm: FRC Exhibitor Breakdown
- 5:00 pm: FRC 2018 adjourns

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This study provides a method for removing subsurface contaminants by density modification of DNAPL, using a co-solvent and interfacial tension reduction during DNAPL displacement with surfactant flushing. In laboratory testing, different injection sequences were applied for the efficient recovery of NAPL in extraction wells and neutral buoyancy control during DNAPL migration. This system exhibits significant differences from conventional technologies in at least three aspects. First, the formulation is composed of green chemicals that minimize toxicity to both human and environmental receptors. Both surfactants and co-solvent in the formulation meet environmental regulations in most states. Second, low interfacial tension is achieved with low surfactant concentrations. The remediation technology only requires less than 1 wt% of surfactant to form microemulsions within the DNAPL phase. Low cost makes this technology more economically feasible for most remediation sites. Third, the newly developed formulation is also a single-stage injection system that achieves lateral migration of DNAPL and low interfacial tension, and eliminates the need for multiple injection steps. This can minimize the number of injection steps and reduce the project cost in field applications. Recently, this remediation technology was demonstrated in the field as a pilot test. The test revealed that DNAPL was effectively removed with less logistical issues and complexity. Thus, we believe that this newly developed formulation provides significant improvements both technically and economically.

1:35 Proven Benefits of Combining Surfactants with Chemical Oxidation for Remediation
Dan Socci, Chief Executive Officer, EthicalChem, South Windsor, CT

Independent research by the University of Madrid documents the limit of traditional in-situ chemical oxidation and highlights the benefit of a combined surfactant-oxidant approach. Results also demonstrate the importance of selecting an optimal surfactant for use with the activated oxidant. This presentation will draw upon this research to show how traditional oxidation technologies are highly effective in aqueous phase destruction but require the addition of a surfactant to fully treat soil contamination, which is consistent with full scale field experience. Untreated soil contamination causes groundwater concentrations to re-establish over time after chemical oxidation treatments, a reoccurrence known as rebound. Using a combined oxidant-surfactant solution, contaminant delivery to the oxidants can be optimized via contaminant desorption and emulsification by the surfactants. The combined oxidant-surfactant solution reduces interfacial tension between contaminant and groundwater. Organic contaminants that are immiscible with water are therefore brought into the aqueous phase by the surfactant where they are available to the oxidant for efficient oxidation. Field case studies of successful surfactant-enhanced in-situ chemical oxidation implementations will also be discussed.

1:55 Combining Persulfate, In-Situ Ferrate Generation and Enhanced Bioremediation for Safer, More Effective Remedial Actions
Will Moody, Director of Bus. Development, Provectus Env. Products Inc., Freeport, IL

Ideally, in-situ chemical oxidation will rapidly oxidize organic contaminants of concern in a safe and effective manner (i.e., materials easy to handle on site; no extreme activation chemistries such as heat or grossly elevated pH; no generation of secondary contaminants). And, importantly, remedial actions are completed via a one-time application event. However with essentially all conventional ISCO technologies, the oxidation reactions are partially incomplete and contaminant desorption / rebound is a very common problem. When ferric oxide is used to activate persulfate, the process quickly yields ferrate in addition to the sulfate radicals. Ferrate functions both as an oxidant and subsequent coagulant in the form of Fe(III) hydroxides that can immobilize heavy metals. Ferric iron activation of persulfate also enhances subsequent utilization of sulfate and iron as terminal electron acceptors for facultative redox reactions that sustain bioremediation of residual contaminants and partially oxidized compounds. This combination of chemical and biological treatment mechanisms allows for more cost-efficient treatment while supporting sustained, secondary bioremediation processes to manage residuals and prevent contaminant rebound. Provect-OX® is a pre-mixed, dry powder containing sodium persulfate, ferric oxide and buffer that can be easily applied into a subsurface environment via direct mixing, hydraulic fracturing, pneumatic fracturing and direct push injection of slurries. Ferrate and sulfate radicals will be continuously generated in situ to support extended oxidation of persistent compounds, provided that persulfate is maintained with iron as an activator. Thereafter, the residual iron and sulfate will support bioremediation processes to manage partially oxidized compounds and residual contaminants that continually desorb from the matrix over time (ca. 3 to 5 years). This presentation will outline parameters considered for calculating material requirements, discuss field application considerations and summarize performance data and costs from example projects.

2:15 Klozur CR Followed by Klozur One - Chemical Oxidation and Mass Flux
Patrick Hicks, Technical Sales Manager, PeroxyChem LLC, Raleigh, NC

Activated Klozur® persulfate is one of the most prevalent remedial technologies having been implemented at thousands of sites to successfully remediate contaminated aquifers around the world. The Klozur persulfate can be used simultaneously with PermeOx Ultra® to both activate the persulfate (alkaline) and supply dissolved oxygen for long-term support of microbial respiration (aerobic bioremediation). This product, 50 percent sodium persulfate and 50 percent calcium peroxide, has been available for many years as Klozur CR. The calcium peroxide acts as the activator and is stored in the same shipping container with the persulfate. The new blended activator-persulfate system, Klozur One®, can be safely stored, transported and batched together while still effectively treating the different contaminants of concern. The objective of this work was to test if in-situ chemical oxidation could be implemented to control dissolved petroleum constituent contaminant mass flux. A suitable site was identified and the first injection of Klozur CR was performed through wells on March 23, 2017. A subsequent injection of Klozur One was performed on Nov. 28, 2017, through the same injection wells. The injection wells are located approximately eight meters up-gradient of a monitoring well. Periodic monitoring of geochemistry and petroleum constituents in the monitoring well and injection wells were performed. This presentation will illustrate site data showing the fluctuations of key parameters as the site transitioned from Klozur CR to Klozur One. Overall, greater than 90 percent reduction in contaminants was observed, which has allowed the site to be evaluated for potential risk-based closure.

2:35 The Use of LDA Rig for Steam-Enhanced, In-Situ Soil Mixing Treatment of Impacted Soils and Groundwater
Jason Marberry, Project Manager, FECC Inc., Orlando

The National Aeronautics and Space Administration, Kennedy Space Center, Remediation Program implemented a groundwater interim measure between September, 2014, and February, 2015, to remediate a trichloroethene groundwater source area at the Wilson Corners site. The groundwater plume is associated with the release of chlorinated solvents—specifically TCE—from historic precision cleaning and laboratory operations. A summary of the groundwater interim measure using soil mixing with steam and zero valent iron, also referred to as large diameter auger, was presented at the 2015 Florida Remediation Conference. The objective of this presentation is to provide performance monitoring results. The interim measure was designed to remediate an area of 0.33 acres from the surface to 58 feet below land surface where TCE concentrations were greater than 3,000 micrograms per liter. Within the planned treatment area footprint was an area of ~0.028 acres where historic TCE results were 100,000 µg/L or higher. The maximum TCE concentration observed prior to treatment was 290,000 µg/L. The maximum TCE concentration observed during treatment was 4,582 parts per million vapor from the effluent vapor stream. The objective of the interim measure was to reduce TCE concentrations to less than the Florida Department of Environmental Protection natural attenuation default concentrations. The interim measure met this objective through the treatment of 308 cells for a total treatment volume of 24,535 cubic yards. Real-time adjustments of treatment protocol, enabled by on-site gas chromatographs providing data for TCE, its daughter products and Freon 113, was an important tool in ensuring all targeted source material was treated. Performance monitoring events occurred at nine and 18 months following treatment. To allow flexibility, groundwater samples were collected using a direct push technology drilling rig. For the first performance monitoring event, a total of 168 groundwater samples were collected from 25 locations at depths ranging from 7 to 62 ft bgs. During the first event, groundwater temperatures ranged from 80 to 118 degrees Fahrenheit, with an average temperature of 98.2 ºF. Samples with temperatures above 98 ºF were cooled prior to analysis by passing the water through a coil of stainless steel tubing immersed in an ice bath before filling the sample container. For the second performance monitoring event, a total of 74 samples were collected from 15 locations. Eighteen months post-treatment, concentrations of TCE and cis, 1-2, dichloroethene concentrations remain below DEP NADCs within the treatment area, meeting the interim measure objective. Vinyl chloride concentrations are greater than NADCs in two monitoring wells at a maximum of 400 µg/L. These sampling locations are down-gradient of an untreated area and may be representative of the surrounding groundwater plume infiltrating into the treatment area. Performance monitoring results overall demonstrate a 99.94 percent

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FLORIDA REMEDIATION CONFERENCE

Dec. 5-6, 2018

Rosen Centre Hotel
International Drive, Orlando

List of 2018 Exhibitors/Sponsors

Action Environmental
Adler Tank Rentals
Advanced Environmental Laboratories
AirQuest Environmental / GeoQuest
Alpha-Omega Training & Compliance
ALS
APTIM
AST Environmental
Bio-Enhance Remediation
Blackline Safety
Carbon Service & Equipment Co.
Carbonair Environmental Systems
Carbonworks USA
Cascade
Chongqing Changyuan Group Ltd
Clark Environmental
Clean Earth
Clean Harbors
Cliff Berry
Cross Environmental Services
Custom Drilling Services
Dakota Technologies
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Dexsil
Directed Technologies Drilling
Directional Technologies
ECOFLO
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Enercon Services
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Enviroprobe Service
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Republic Services
Sewer Equipment Co. of America
SGS
SiREM
Terra Systems
Terracon Consultants
TerraStryke Products
Tersus Environmental
TestAmerica Laboratories
The Goldstein Environmental Law Firm
TRS Group
United Rentals Fluid Solutions
Universal Engineering Sciences
US Ecology
US Environmental Rental
Vapor Pin Enterprises
Vertebrae Well Systems
Walker-Hill Environmental
Waste Connections
Waste Management
XENCO

FRC hosts the largest annual exhibit of soil and groundwater cleanup companies in the Southeast U.S. Don't miss it.

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reduction of the target volatile organic compounds and 99.99 percent reduction in TCE mass within the area treated.

Concurrent Session 3B: Conceptual Site Model Development

1:15 The Role of Data Gap Analysis/Filling in Developing Conceptual Site Models
Ziqi He, PE, PhD, Senior Engineer, HSW Engineering Inc., Orlando

The use of the conceptual site model is an important step in streamlining the representation of contaminant releases, their fate and transport in the environment, and exposure to human and ecological receptors to contamination. Performing data gap analyses are critical for developing/updating/refining a CSM throughout a life cycle of a project. Inadequate data, unknown conditions and data misinterpretations often lead to inaccuracy in the CSM, which causes uncertainties in decision making and cost allocations. Typical data gap analysis approaches include understanding historical site layout/operation and waste management, regional and local geology and hydrogeology, environmental sequence stratigraphy, fate and transport of contaminants, 3D modeling/presentation and statistical analyses. Data gap analyses were performed at several complex sites to evaluate the existing CSMs and path-forward strategies were recommended. Subsequently, the Triad approach and high-resolution site characterization strategies/techniques, as well as real-time technologies and advanced forensics analyses, were applied to fill the data gaps and refine the CSM. The refined CSM helped with better representation and communication between the responsible parties and regulatory agency.

1:35 Honing the CSM During Treatment Using Horizontal Investigative Tools
David Cochran, PE, Principal Engineer, Cameron-Cole LLC, Pensacola

Often assessment is a prolonged activity. Repetitive events and a feedback loop that requires iterations is necessary. Assessment often takes longer than expected. Meanwhile, the plume moves and changes. Obstacles on and off site typically present the biggest problems in obtaining a clear understanding of the magnitude and extent of contamination. Then, as treatment begins, site feedback often continues to change the site CSM and, as hindsight is 20/20, the approach to remediation that "would have been taken". One tool that is typically used in the wrong phase is the Vertebrae™ well system. These well systems are usually installed during the remediation phase of the project, but in every instance, once sampled, have provided a more thorough understanding of the magnitude and extent of contamination. The assessment capabilities are more important than the remedial qualities since all future action at the site depends on a detailed, accurate CSM. Two sites are covered that illustrate that an inadequate understanding of the contaminant mass under surface obstacles near the point of release can result in the under estimation of contaminant mass. Both sites to be discussed are fuel sites in the state of Florida program. One was largely impeded by a building where the other had a canopy and dispenser that impeded data collection at the point of release.

1:55 Application of Geostatistical Analysis for the Evaluation of the Dynamics of a Chlorinated Solvent Plume
Leif Layton, PhD, Associate Engineer III, Env. Consulting & Technology Inc., Tampa

The evaluation of the dynamics of contaminant plumes is an integral element of corrective actions for contaminated sites. When a sufficient number of monitoring wells are available, the temporal and spatial trends of plumes are often evaluated using hand-drawn isopleths of individual chemicals based on concentrations in groundwater and site-specific characteristics. This approach relies on the knowledge and experience of the site manager and may be subjective. Geostatistical analysis was performed to assess the dynamics of a chlorinated solvent plume within a semi-confined aquifer in Tampa. Plume stability and migration overtime were assessed using methods based on those developed by Joseph Ricker. Molar concentrations of trichloroethene and its daughter products were considered to account for degradation processes in the site's conceptual site model. Isopleths were generated using kriging, with significant attention given to modeling the experimental variogram to provide a reliable estimate of the variation of the plume concentration within the aquifer. Multiple isopleths were created for each data using different techniques to improve the kriging results (e.g., addition of control points to data sets, consideration of geometric anisotropy) and evaluated. Estimates of the plume's mass and centroid coordinates were calculated by spatially integrating the kriging-generated chlorinated solvent concentrations, and the results were used to assess the spatial and temporal trends of the plume and evaluate remedial action at the site.

2:15 Proven Method to Accurately Access Location and VI Potential to Better Define your CSM
Laurie Chilcote, Director, Marketing & Sales, Cox-Colvin & Assoc. Inc., Plain City, OH

The ability to accurately assess the location and vapor intrusion potential of VOC sources beneath buildings is vital in developing an effective conceptual site model. Recent advancements in the VI field have significantly streamlined and improved the assessment process. Through these advances, the professional can complete a thorough and accurate assessment of sub-slab vapor conditions in less time and at lower cost. Information generated by an accurate assessment can then be leveraged using GIS to increase the understanding of a VOC source's age and the potential release mechanism to better define your CSM. This discussion will include standard disposal practices prior to the adoption of environmental regulations, reasons why interviews with site personnel may cause the professional to focus on the wrong areas, and reasons why streamlined methods are effective means of improving data quality, data density and the understanding of VI potential. It will demonstrate how GIS methods can help the professional develop a more accurate understanding of the VOC sources and the CSM. The discussion presents three case studies of large manufacturing facilities that had been active as early as 1880. At least one had a long-documented history of chlorinated solvent use. In each case, the use of high quality, rapidly obtained active sub-slab soil gas measurements from narrowly spaced grid systems provided information necessary to locate VOC sources and better define the CSM.

2:35 More than Just Sand and Clay: Heavy Minerals and Implications for Groundwater Plume Management
James Studer, PE, Principal Technical Consultant, InfraSUR LLC, Albuquerque, NM

Florida is blessed with not only abundant carbonate-dominated bedrock but also an extensive mantle of unconsolidated sediments including vast amounts of sand with varying silt, clay and shell-lime content. Throughout the state, surficial and intermediate aquifer systems comprised largely of sand inter-bedded with clay are utilized for water supply. They are vulnerable to contamination by human activities. Active management of contaminant plumes may be necessary to ensure protection of shallow potable water as well as the ubiquitous Floridan Aquifer system that the surficial and intermediate aquifer systems overlie. For a specific area of the state, the existence, lithological structures and mineralogical compositions of surficial and/or intermediate aquifer systems are determined in large part by geology. Pleistocene and Holocene sediments deposited by marine, alluvial-fluvial and/or aeolian processes may comprise the entire permeable horizon of a surficial aquifer. Here, essentially inert quartz grains or carbonate shells often dominate the mineralogy. But surficial and intermediate aquifers in many areas of the state include clastic deposits with noticeable departures in mineralogical composition. These coincide with older sediments of Miocene, Pliocene and, in some locations, Pleistocene age. Where present, the noticeably different character may be important to the scientist and engineer seeking to understand the potential for natural attenuation of, or efficacy/optimization of active management strategies for, groundwater contaminated by organic or inorganic chemicals. Florida depositional history was highly influenced in the Miocene to Pliocene by uplift rejuvenation of the southern Appalachians, sea level changes and massive erosion and southward-directed fluvial-deltaic transport of igneous/metamorphic siliciclastic sediments. The world-class heavy mineral placer deposits and kaolin clay deposits of northern Florida are a result, but clastic sediments containing, in some places, significantly high percentages of heavy minerals (and feldspars) also found their way into parts of the Panhandle, Central and South Florida. Careful review of the geologic literature and customized on-site investigation at groundwater contamination sites can reveal where surficial and intermediate aquifer systems are (or are not) mineralized. University and U.S. EPA research can be applied, with caution, to assess the potential for natural reactivity to pollutants by heavy minerals (e.g., iron-bearing and sulfide-bearing minerals such as magnetite and iron sulfide). Biogeochemical manipulation experience within the remediation community can be leveraged to optimize in-situ groundwater treatment and performance assessment approaches. Important considerations pertinent to remedial planning, supplemented with site characterization data, will be presented.

Afternoon Break: 3:00 - 3:30

Concurrent Session 4A: Speed Talks

3:30 1) Rapid Field Screening of VOCs on Contaminated Sites Using a Portable GC
Brian Bendis, Technical Sales Representative, Pine Environmental, Tampa

2) Vapor Pin: A Reliable Sampling Device
Laurie Chilcote, Director, Mktg. & Sales, Cox-Colvin & Assoc. Inc., Plain City, OH

3) Electronic Field Data Collection - When Will it Make Cents?
John Gobins, Founder, GroundLogs, Flushing, NY

4) The Role of Passive Samplers in Site Assessment and Remediation
Tim Fitzpatrick, Business Dev. Mgr, SGS AXYS, Sidney, British Columbia, Canada

5) Enhanced Hydrocarbon Fingerprinting
Kesavalu Bagawandoss, PhD, JD, Laboratory Director, TestAmerica, Nashville, TN

6) Drone-Enabled Technology for Assessment
Brent Klavon, Director, Commercial Drones, Aviation Systems Eng. Co. Inc., Jacksonville

7) Changing the Perspective on 30 Years of Granularity with HRCD
Lance Robinson, PE, Vice President, EN Rx Inc., Parrish

8) Horizontal Directional Drilling and Well Installation for Substrate Injection
David Bardsley, PG, Vice President, Directed Technologies Drilling, Bellefonte, PA

9) Sustained ISCO of 1,4 Dioxane and Chlorinated VOCs Using Sustained Release Chemical Oxidant Cylinders
Tim Colgan, U.S. Sales Manager, Remediation, Carus Corp., Peru, IL

10) Life Cycle Considerations for PFAS Water Treatment
AnnieLu DeWitt, Remediation Technologies Business Development Manager
Clean Harbors, South Portland, ME

Concurrent Session 4B: Liquid Carbon Injection

3:30 First Use of PetroFix™ - A Radical Advance in Liquid Activated Carbon
Wm. Gordon Dean, PE, VP, Advanced Environmental Technologies LLC, Tallahassee

Advanced Environmental Technologies was selected by Regenesis to perform the first ever in-field test of their newest liquid carbon technology, PetroFix™. PetroFix is an evolution of their PlumeStop liquid activated carbon technology developed specifically for petroleum hydrocarbon-impacted sites. PetroFix is designed to treat groundwater in higher concentration (i.e., approximately 10 to 100 parts per million total organics) target treatment zones where free product is not observed. The Reef Deli site in Panama City was selected for the test. Approximately 1,000 gallons of gasoline was discharged in March, 2007. A source removal was conducted and several remedial technologies were utilized to address the groundwater plume with limited success. Petroleum contamination migrated beneath the adjacent road and onto the downgradient property. Groundwater concentrations have been in the thousands of micrograms per liter in the off-site well since 2008 depending on rainfall, depth to water and mass flux from beneath the road. Since February, 2016, BTEX plus naphthalene concentrations have varied from 1,310 µg/L to 14,300 µg/L. TRPH concentrations varied from 4,300 µg/L to 11,000 µg/L during that time. AET and Regenesis injected a total of 1,700 pounds of PetroFix and electron acceptors into 13 DPT injection points around the off-site well in March, 2018. A 60-day post-injection sample was collected in May, 2018. All contaminants were below both laboratory detection limits and Florida groundwater cleanup target levels. A subsequent 90-day post-injection sample was collected in June, 2018. All contaminants remained below laboratory detection limits and GCTLs. Full scale site remediation is being designed based on the test results.

4:00 Distribution of a Carbon Slurry Injectate as Examined by Extensive Soil Cores, Documented by Photographs and Modeled
Bill Brab, CPG, PG, Senior Project Manager, AST Environmental Inc., Midway, KY

The key to in-situ remediation is the ability to ensure contact of injectate and contaminants. Limited excavation and sampling studies have been conducted to characterize injectate distribution, but to date no studies have comprehensively characterized the distribution of activated carbon-based materials using extensive soil core logging. Questions exist regarding the distributional characteristics of carbon slurry injectates in the subsurface when installed by high-pressure injection. One month after injections were completed, twelve continuous soil borings were advanced next to existing monitoring wells and 28 additional borings were advanced throughout the treated area. A pair of one-inch PVC wells were installed at each of the additional 28 locations, one shallow screen to test the upper portion of the aquifer and a deeper well screen for testing of the lower portion of the aquifer. All wells were sampled and analyzed for anions and VOCs to evaluate distribution of injectate. The continuous soil cores were carefully inspected macroscopically and microscopically for the presence of carbon and logged for lithology. Close to 1,000 pictures were taken to document the distribution of injected carbon slurry in various soil types and along bedding interfaces. Samples of suspected carbon in soil cores were analyzed to confirm carbon. Finally, a survey was performed to accurately define locations for all soil borings, monitoring wells and their respective elevations to support modeling.

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4:30 Multi-Site Performance Review of Colloidal Liquid Activated Carbon for In-Situ Groundwater Treatment

Chad Northington, PE, Southeast District Manager, Regenesis, Tallahassee

This presentation will discuss the use of colloidal carbon-based injectables to expedite groundwater cleanup through coupling contaminant destruction with sorption, specifically in the state of Florida. Data will be drawn from several sites using various remedial strategies to address petroleum hydrocarbon impacted sites and encompassing a variety of geological settings. Field data will be presented describing performance against remediation goals, performance validation, and lessons learned regarding material placement, site characterization and the importance of design verification testing prior to full-scale application.

5:00 FRC 2018 Day One adjourns

FLORIDA REMEDIATION CONFERENCE 2018

Day 2

FRC 2018: Day Two, Thursday, Dec. 6, 2018

Concurrent Session 5A: Young Professionals

8:30 What Can High Resolution Site Characterization and 3D Visualization Bring to your Investigation?

Fabio Fortes, Staff Engineer, HSW Engineering Inc., Tampa

This presentation will provide an overview of a site assessment project performed by HSW Engineering for a Superfund site in Florida where high-resolution site characterization and three-dimensional visualization were used to refine the conceptual site model for the contaminant fate and transport of sodium and refine remedial alternatives for ongoing cleanup activities. Using data collected from over 200 high-resolution sample locations, a 3D model was developed to visualize the present contaminant plume behavior and hydrogeology information. These data and the corresponding 3D model helped streamline and clearly define the targeted remedy strategy for the site that surpasses traditional methods. In this presentation, participants will leave knowing the advantages that high-resolution site characterization has in comparison to other traditional groundwater sampling methods, the lessons learned during the site assessment project, and with a better understanding of the effectiveness of using 3D or 4D visualization.

8:50 Using the R Programming Language to Enhance and Streamline Data Processing, Analysis and Visualization

Justin Spengler, Environmental Engineer, Golder Associates Inc., Jacksonville

Integrating computer software into data processing is essential to working in a technical field today. However, many processes are still performed using dated methods of manual manipulation where computer programming is more efficient. The programming language R is a free software program designed for statistical computing and data visualization that can improve upon traditional data processing methods, particularly when the analysis required is intensive and/or repetitive. Two examples follow. A report completed semi-annually for the past 10 years including temperature, pressure and oxygen data for a series of gas wells was imported into R, where each well's measured values were checked against regulated limits. Exceedances were flagged in a corresponding Microsoft Excel file. The program reduced the possibility of human error and significantly reduced the time needed for the task. To evaluate the effectiveness of an in-situ thermal remediation project, R was used to calculate contaminant mass removal rates and evaluate contaminant trends versus depth at 17 large diameter auger boring locations using real-time system operational data. Over 100,000 data points were generated in two distinct data sets during operation, including treatment depth, volatile organic compound concentration using a flame ionization detector and gas chromatography, and off-gas extraction flow rate. R was used to interpolate the values of one data set into the other, identify and implement baseline FID values, and generate a series of graphs and tables for each boring location. Attaining the same analytical depth by traditional methods would not have been viable due to time constraints.

9:10 Large Scale Coverage to Surgical Precision: Horizontal Injection Wells Provide Effective and Efficient Amendment Delivery

Kyle Carlton, PG, Senior Geologist, Directional Technologies Inc., Miramar Beach

Delivery of chemical amendment to the target subsurface zone is crucial to the success of in-situ injection remediation. Installation of horizontal injection wells with horizontal directional drilling accesses contaminated areas beyond the reach of vertical drilling methods. This presentation will demonstrate the versatility of horizontal injection techniques through discussion of three case studies detailing sites varying from large scale injection beneath extensive areas to smaller scale, precise injection approaches. Case Study 1: A major redevelopment project faced significant environmental challenges due a chlorinated solvent plume which extended over 1,600 feet. An in-situ chemical oxidation system needed to be installed while construction activities were ongoing. Ten single-entry horizontal injection wells installed beneath the future building sites enabled delivery of 1.03 million gallons of KMNO4 solution within a 26-day period. Case Study 2: Industrial process wastewater leaking from a drain line contributed to perchlorate concentrations in the groundwater ranging from 10 to 500 mg/L and an estimated mass on the order of 1,500 pounds of perchlorate. Two horizontal injection wells installed beneath a parking lot and building injected a soluble carbon source and bio-culture to facilitate anoxic biodegradation of the perchlorate. Case Study 3: Leaking USTs originally installed in the 1980s resulted in a petroleum plume beneath an active chemical manufacturing facility in New South Wales, Australia. Surface obstructions including warehouses, ASTs, loading racks and high traffic areas prevented vertical injection points. Three horizontal injection wells were installed beneath the infrastructure to provide hydrogen peroxide and ferrous sulphate delivery.

9:30 Remediation System Performance Evaluation

Ken McVeigh, Project Engineer, APTIM Environment & Infrastructure Inc., Tampa

What do people want? Often, the answer is "to make my job easier." Environmental service clients would certainly offer this answer. Whether the client is the environmental, health and safety manager of a single manufacturing plant, or the environmental manager of a major retail petroleum supplier, job responsibilities are often stretched well beyond comfortable levels with our "leaner" management approach. The Remediation System Performance Evaluation was developed by APTIM and three other member consultants for a national retailer to provide layered access to all project information, commensurate with the needs of the user first, and the complexity of the site last. Unlike database systems listing data in sets that can be cumbersome when plunging into the document abyss, the RSPE starts with a simple dashboard. This provides instant information as to the status of a site and whether it requires further attention. The dashboard gives the status of the technical, financial and site-sensitive parameters, but also has controls to allow the user to access additional information if needed. From the dashboard layer, the user can access sequential layers increasing in detail ranging from technical summaries to site maps and photos, to financials. This intuitive project management tool was developed within PowerPoint and is particularly useful in focusing on what is important, while still providing access to other available information on that particular topic instantly. Although this tool was originally developed for active remediation sites, it can be adapted for any site to make the user's job easier. Who doesn't want that? See us at Booth #5.

9:50 Go Big: A Cleanup Case Study of a Multi-Acre Chlorinated Solvent Plume at Launch Complex 39B

Mike Burcham, PE, Environmental Engineer, Geosyntec Consultants Inc., Houston, TX

In the late 1990s, chlorinated volatile organic compound impacts were identified at Launch Complex 39B, Kennedy Space Center, FL. Following multiple, subsequent field investigations, which relied heavily on high-resolution site characterization techniques, an approximately 27-acre dissolved CVOC plume was delineated. The dissolved CVOC impacts generally extended to 55 feet below land surface, the depth at which a fine sand/silt unit is present that retards vertical migration. A focused feasibility study was completed and the selected path forward was air sparging a nine-acre area where CVOCs exceeded their respective natural attenuation default concentrations. Air sparging was selected as the proposed remedy because the soil permeability was high enough to support the technology, the effective radii of influence development has been documented at other KSC sites, and a quick turnaround was needed due to future site use (launches are expected to resume in the near future). This necessitated an aggressive and ambitious approach to remediate a multi-acre area in a short time period. The resulting design and turnkey installation is the largest air sparge system at KSC—and potentially in the Southeast U.S.—and includes 279 air sparge wells, 32 manifold/air distribution boxes, over three miles of piping/trenching, and a mobile treatment system housing a 100-horsepower air compressor and associated appurtenances/telemetry. This large-scale system was installed in approximately six months and operation commenced in July, 2017. The system operates 24 hours a day and cycles between four operational zones. The operational schedule and parameters are continuously optimized to maximize performance. While the system is anticipated to operate for up to five years, performance monitoring activities spanning the first year of operation, through July, 2018, indicate that CVOC concentrations have been significantly reduced throughout the treatment area during the first year and it's estimated that total CVOC concentrations have been reduced by more than 90 percent.

Morning Break: 10:10 - 10:40

Concurrent Session 5B: Zero Valent Iron

10:40 Historical Perspective on the Use of Induced Fractures in Various Geologic Settings

Drew Baird, PG, Senior Geologist, FRx Inc., Charlotte, NC

The tools and methods required to create fractures vary depending on the drilling method required to reach a target treatment zone and the characteristics of the target formation. Shallow target zones are commonly reached with direct push technology drilling methods and utilize hydraulic fracturing methods that have been field-proven over a period of nearly 30 years. Deep target zones or target zones in dense, tough overburden or competent bedrock require more robust tools and methods that direct greater energy to the formation. Three projects highlight injection methods, fracture form and applied use of induced fractures. The first site, a trichloroethene source zone in glacial clay till, utilized DPT drilling and jet injection methods to create horizontal fractures filled with zero valent iron. Samples collected 18 months after injection indicated an 84 percent reduction in TCE mass in the source zone and 67 percent reduction in TCE mass flux in groundwater. The second site is a manufacturing facility in Northeast Connecticut where sand-filled fractures were used to enhance recovery of TCE from fine-grained glacial till using dual-phase extraction. The dense till required injection through dedicated wells and more robust tools and methods than those created in DPT borings. Multiple lines of evidence (e.g., drawdown, vapor pressure, vapor discharge) highlight performance improvements in fracture-enhanced recovery wells compared to conventional wells. The third site illustrates creation and use of fractures in fresh granodiorite bedrock to treat TCE at a former manufacturing site. Open-hole bedrock wells were used to create 102 new fractures with a horizontal attitude that created an interconnected, lattice-like fracture network that was used to deliver 2,860 gallons of emulsified vegetable oil to the target zone. The phased approach to the work resulted in 28 percent cost savings during Phase 2 and 58 percent cost savings in Phase 3 compared to Phase 1.

11:00 Successful Treatment of Carbon Tetrachloride and Carbon Disulfide in Groundwater Using and Improved Formulation of Emulsified Zero Valent Iron

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

Two distinct microscale iron materials were tested to compare reactivity by evaluating particle size distribution, hydrogen gas production and surface area. One of the microscale irons was clearly more reactive. Both iron materials were used to produce emulsified zero valent iron and used in a groundwater treatability test for a U.S. site to treat carbon disulfide and carbon tetrachloride. The team tested and characterized properties on two sources of iron media that would illustrate the potential reducing power of the iron. The comparative analysis showed that one microscale iron product possessed three times the surface area (2.24 vs. 0.78 m2/g) and four times the reactivity/faster electron dosing rates [4.53 vs. 1.14 ml/(g·day)]. The particle size distribution was about two times greater for the more reactive iron (e.g. 7.53 vs. 3.93 mm D50 values). Test samples were exposed to EZVI produced using the two different iron types, and also received no EZVI exposure. All samples were sent to a commercial laboratory and analyzed for CS2 and CCl4 and other compounds including breakdown/daughter products of these parent compounds. The EZVI prepared with the more reactive iron demonstrated significantly higher removal rates for CS2 and CCl4 in solution. Removal rates demonstrated during this seven-day test showed 73 percent and 91 percent for CS2 and CCl4, respectively. Based on these results, a pilot study is being performed in groundwater at the chemical facility and additional research is being performed to improve the manufacturing process for EZVI.

11:20 In-Situ Halogenated DNAPL Destruction Utilizing EZVI Technology: Applications and Advancements

Greg Booth, Senior Vice President, Provectus Env. Products Inc., Baton Rouge, LA

EZVI is a unique ISCR halogenated DNAPL destruction technology that utilizes the combined effects of biological remediation processes, abiotic chemical remediation processes

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and contaminant physical chemistry characteristics to provide rapid mass flux abatement and direct destruction of free phase and residual source materials. The EZVI technology was first implemented for full scale DNAPL remediation in 2005. Since then, it has been utilized at many sites across the U.S., Canada and the EU. EZVI was originally invented to address DNAPLs located in saturated soils and implemented as a "hot spot" type of approach. This continues to be the most common use of the technology, however, due to the unique properties of the product additional implementation approaches are enabled, including vadose application. Also, there have been recent advancements to the originally patented formulation that include both biologically mediated and abiotic processes. These characteristics should be considered by remedial practitioners when evaluating approaches that can be compatible with site specific remedial objectives. In-situ DNAPL destruction utilizing the EZVI technology is frequently utilized among seasoned professionals as the positive effects of rapid mass flux abatement and source mass destruction are realized. The following topics will be discussed: 1) What is EZVI? Background information will be covered briefly to provide an understanding of what makes the technology is unique and how it works; 2) When is EZVI a remedial option? Guidelines for the effective use of EZVI will be presented including product formulation, dosing and implementation options for vadose and saturated soils; 3) How does EZVI product composition vary and what are the consequences? Various key parameters for the technology will be discussed, including ZVI particle size, emulsion type and the associated remedial implications; and 5) What are the most recent advances to the EZVI technology? Important advancements will be discussed including antimethanogenic properties and enhanced abiotic reactivity.

11:40 Removal of Selenium using Novel ZVI Media

Alexander Korff, Product Dev. Engineer, Hoganas Environmental Solutions Inc., Cary, NC

Typical zero valent iron media has several limitations for selenium-based contaminant removal, primarily due to low reactivity, limited capacity and surface passivation. In order to address these challenges, an array of innovative ZVI media (Cleanit® media series) were engineered with customizable reactivity, particles size and surface characteristics. A batch kinetic study, using Cleanit media, was conducted with an initial selenium concentration of 10 mg/L (a mix of selenate, selenite, selenosulfate and selenocyanate) and a loading rate of 0.1 mg Se/g media. Within 24 hours, all four selenium species were removed to below the detection limit (1 µg Se/L). The pseudo first order reaction constants for each selenium species mentioned above were 25.0, 23.7, 11.1, and 1.0 h-1, respectively. The maximum removal capacities for the four species were 2.70 ± 0.12, 4.90 ± 0.03, 4.74 ± 0.22, 5.00 ± 0.00 mg Se/g media, respectively. Since selenate is the most challenging selenium species to be removed by ZVI, column tests were conducted using three different grades of Cleanit media: Cleanit-SR.1S, Cleanit-SR.2S and Cleanit-SR.3S with site soil and the impacted site groundwater. The initial selenium concentration was 2,200 µg/L. With an average retention time of 4.4 hours at a flowrate of 0.5 mL/min, all three Cleanit media demonstrated selenate removal efficiencies between 97 and 98 percent. Among the three Cleanit media tested, Cleanit-SR.1S showed the highest selenium removal capacity and low pressure build-up in the column. In summary, Cleanit media demonstrated a significant potential for organic and inorganic selenium removal for groundwater remediation.

Concurrent Session 6A:
In-Situ Bioremediation 1

10:40 History of Bioaugmentation and Assessment of Implementation Strategies for EISB - Is There a Right Way?

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

Successful enhanced in-situ bioremediation relies on the effective delivery of amendments to create the appropriate conditions where microbial populations can thrive to degrade the contaminants of concern. When designing implementation plans for electron donor and bioaugmentation cultures, each site often has unique considerations affecting the design. Having a consistent approach from site to site following published guidelines is often difficult leading to multiple implementation strategies that have been used. This presentation provides an overview of the development of organohalide respiring bacteria, as well as lessons learned from chlorinated solvent EISB projects by comparing implementation approaches. Microbiologists in wastewater and groundwater remediation have optimized bench-scale tests with extensive genetic tests to easily detoxify chlorinated-solvent contaminated groundwater. Remediation practitioners implement these findings using standard design considerations for EISB systems including geology, porosity, concentrations of chlorinated solvents and other electron acceptors, groundwater velocity and treatment size. Also, other site-specific factors come into play like locations of buildings, roadways, railways and other items that can affect the location of injection and monitoring locations. Case studies from a variety of commercial and non-traditional products and approaches will be compared in this presentation, highlighting site-specific technical and non technical factors that influence the implementation method chosen. This presentation will compare EISB implementation methods and feedback from stakeholders. Questions to be answered include why injection quantities rarely rely on pore replacement volumes yet satisfactory results are reported. Varied donor estimation processes are analyzed, explaining why hydrogen demand requires many assumptions and the demand is often dwarfed by soil retention factors. Also, analysis on weather biostimulation and bioaugmentation during the same mobilization can offer advantages.

11:05 Sustained Anaerobic Bioaugmentation via In-Situ Bioreactors

Eric Raes, PE, LSRP, Director, Remedial Services
Bio-Enhance Inc., High Bridge, NJ

The study updates the use and performance of an in-situ bioreactor in promoting reductive dechlorination of trichloroethylene in a bedrock monitoring well. The remediation has been ongoing for two years and has recently been expanded from one well to three, including an experimental ISBR design. The study also presents the testing of the longevity and potential for sustained biodegradation following ISBR removal and relocation to another well at the site. The site is a former chemical distribution facility where a deep, fractured aquifer had been impacted predominately by TCE. An ISBR unit was initially installed in an existing monitoring well to promote reductive dechlorination. The ISBR was deployed in an existing monitoring well at a depth of 60 feet below ground surface. Groundwater samples were routinely obtained at a depth of 140 feet to determine whether ISBR operation affected contaminant concentrations and geochemical conditions throughout the depth of the saturated zone. Bio-Trap® samplers were also deployed at depths of 60, 85, 105 and 140 feet BGS. After one year, the inoculated ISBR was moved to a new well, and two new ISBR remedial units were installed at the site. One of the new reactors was an experimental design to assess if nitrogen sparge gas (for circulation purposes only) could be removed. Prior to the initial ISBR deployment, all data confirmed reductive dechlorination processes were limited under existing conditions. For example, cis-1,2-dichloroethylene was detected but vinyl chloride and ethene concentrations were below detection limits. Consistent with historical groundwater monitoring, Dehalococcoidzes concentrations were low and vinyl chloride reductase genes were not detected. After approximately six months of operation, geochemical monitoring at 140 feet BGS demonstrated sulfate consumption and methanogensis. After nine months of operation, the Dehalococcoides concentration at 140 feet BGS had increased by four orders of magnitude, surpassing 1 million cells/mL. After five quarters, all chlorinated solvents were non detect. The inoculated ISBR was relocated to a new well and similar mass

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AECOM pilot tests possible solution to state's algal bloom challenge

By ROY LAUGHLIN

According to AECOM Vice President Dan Levy, "We need to start sooner rather than later to develop a way to handle algae blooms."

Levy spent about a week in mid-October with his company's demonstration-scale microalgae harvester at Bivens Arm, a lake near the University of Florida campus in Gainesville.

His intention is to deploy a nascent technology that starts with harvesting microalgae and continues through beneficial uses of the harvested algae so that the biomass and nutrients it contains are permanently diverted from Florida's surface waters.

The technology uses microbubble flocculation to concentrate particles in water, including algae cells, at the surface where they are skimmed off to a dewatering tank.

After dewatering, the resulting algae biomass can be transported to a disposal site or to a third party that has a beneficial use in mind for it.

The company has completed two projects with a mobile prototype of its filtration system. The first, in the fall of 2017, was conducted at the city of Lakeland's Lake Bonnet, a eutrophic shallow urban lake slated for development as a park.

Photo by Dan Levy, AECOM

In October, AECOM took its pilot-scale mobile algae harvester, shown here, to Bivens Arm, a lake near Gainesville, for a demonstration project to test its effectiveness for removing algae cells in water or floating algal mats.

AECOM's microalgae harvester removed 70-82 percent of the algae and nutrients contained in the cells and other particulates. The prototype demonstrated good performance at flow rates between 25 and 200 gallons per minute.

In its project report, AECOM concluded that the pilot test provided site-specific data and supporting evidence that the use of dissolved air flotation technology was effective in removing nutrients and chlorophyll-a.

Total phosphorus and total nitrogen concentrations in Lake Bonnet were reduced to levels more in line with historic background conditions.

The city of Lakeland is now considering whether to build a larger facility to permanently provide treatment capability to Lake Bonnet.

When cyanobacteria blooms erupted this summer in Lake Okeechobee and its drainage canals, AECOM engineers spent several weeks using their system to remove algal mats and algae cells from heavily-slimed canals in Lee County, underwritten by emergency response funding from the state of Florida.

With the success of that effort in mind, AECOM is considering large-scale implementation of the technology.

Levy said that an array of filtration systems ranging from one million gallons a day to 100 mgd located along tributaries to Lake Okeechobee or along the St. Lucie or Caloosahatchee rivers could end the threat of harmful algal blooms.

These could be permanent facilities used regularly to harvest algal cells with their nutrients as an ongoing maintenance activity to restore historical water quality.

The Lee County project harvested *Microcystis*, a cyanobacteria that episodically produces the microcystin toxin.

During this summer's project, the harvested algae may have been producing toxin, but it didn't affect the equipment's operators who wore avoidance gear and protective clothing.

The possible toxicity and persistence of algal toxins in harvested algae is a topic that the company will pursue as the technology matures.

Levy believe the filtration technology can be used either before a bloom to prevent it, or after the bloom becomes severe to reduce its severity and duration.

In characterizing the costs, he said he is not aware of any other process that can harvest algae as cost effectively as this one.

"It's not really a big cost," he said.

That assertion will be verified with experience.

With the plan to scale up comes the need to verify performance. In mid-October, AECOM took its mobile prototype to Gainesville for a public demonstration and to enlist possible collaboration with University of Florida scientists.

The demonstration went well, according to Levy, offering the prospect of a public-private collaboration with university researchers and experts.

The company is also focused on what to do with the harvested biomass produced.

The options include using it as a horticultural or agricultural soil amendment, for biogas production, or for the extraction of specific substances including vitamins, food additives or components of personal care products.

SFWMD approves Lower East Coast Water Supply Plan

Staff report

The South Florida Water Management District Governing Board approved an update to the Lower East Coast Water Supply Plan, a blueprint that ensures there will be enough drinking water for the residents and businesses of South Florida's Lower East Coast region.

The plan directly protects water sources in Palm Beach, Broward and Miami-Dade counties and parts of Monroe, Collier and Hendry counties for the next 20 years.

The area's six million residents and the businesses, industries and agricultural operations there use almost 1.7 billion gallons of water a day.

SFWMD updates regional water supply plans every five years. The plans identify water sources in relation to water demand over the next 20 years.

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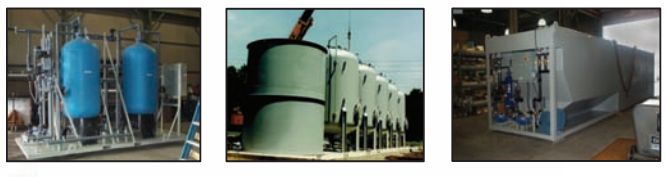

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Worldwide logging targeted in new report as major climate change driver

By BLANCHE HARDY, PG

In September, over 200 scientists, organizations and elected officials concurred to release the Stand4Forests platform demanding protection of U.S. forests as a critical and necessary climate solution component.

The release of Stand4Forests platform was accompanied by a report summarizing the latest peer-reviewed science identifying logging as a major source of carbon emissions and indicating why we need to better preserve older forests to remove carbon from the atmosphere.

The report, "Seeing the Forest: Nature's Solution to Climate Change," noted that burning wood for electricity actually releases up to 50 percent more carbon dioxide than burning coal, per unit of electricity.

Data from the Food and Agriculture Organization of the United Nations indicate that wood fuels comprise roughly seven percent of the world's total primary energy consumption. Developing countries consume 76 percent of the wood fuel used to serve 77 percent of the world's population.

"The best science is telling us that to avoid a climate catastrophe, we need to dramatically scale up forest protection at the same time we transition to truly clean, renewable energy," said Rachel Weber of Stand4Forests sponsor Dogwood Alliance.

"A new report from the United Nations Intergovernmental Panel on Climate Change forwarded the need to protect and restore forests just two weeks after over 200 organizations, scientists and elected officials released the Stand4Forests platform in the U.S.," she said.

"The newly released platform aligned with the IPCC report in demanding the protection of forests as a vital climate solution and warned against false techno-solutions like bio-energy carbon capture and storage."

The Stand4Forests group noted that the recorded amount of carbon dioxide in the atmosphere reached 411 parts per million this year—well beyond the 350 ppm that climate scientists deem safe for humans.

Logging rates in the Southeast U.S. alone are estimated to be four times that of South American rainforests.

Those rainforests are now at greater risk based on the recent election of Jair Bolsonaro as Brazil's president. Bolsonaro campaigned on a promise to exploit the Amazon rainforest for profit.

"Florida is home to some of the world's most beautiful and ecologically important forests and wetland forests in the world," said Weber. "In fact, Florida's wetland forests are worth more than $80 billion!

"From tourism and recreation, to protecting communities from flooding and storms, and providing critical ecosystem benefits, forests and wetland forests are vital to Florida's economy, quality of life and cultural heritage," she said.

Weber said that not only do forests mitigate climate change by storing and sequestering carbon, they also help protect us from the effects of climate change already underway.

"Floridians are feeling the effects of climate change right now—from rising sea levels to the increasing severity and frequency of extreme weather events like Hurricane Michael," she said. "Forests and wetland forests are critical in the face of storms like Hurricanes Michael, Irma and Maria. They absorb the flood waters, buffering communities from flooding and reducing costly property damage."

Members of the Stand4Forests platform recognize the results of climate science data indicating that the protection of forests around the world is part of the solution needed to stop the looming climate "catastrophe."

The platform hopes to propel the U.S. into a global leadership role in committing to both phase out fossil fuel use and protect the forests.

The platform is supported by signatories including 40 mayors of cities throughout the U.S., the Natural Resources Defense Council, Sierra Club and numerous leading climate scientists and advocates.

Live Oak golf course switches to reclaimed water for irrigation use

By PRAKASH GANDHI

A golf course near the city of Live Oak is doing its part to protect valuable groundwater resources by using reclaimed water for irrigation.

Instead of pumping up fresh groundwater, the Suwannee Country Club is pumping in reclaimed water to irrigate its course, located about five miles east of downtown Live Oak.

The switch has resulted in groundwater savings of more than 100,000 gallons a day.

The project rerouted the club's irrigation system from using groundwater as its primary source to Live Oak's reclaimed water distribution system.

Live Oak Mayor Frank Davis said the project has been in the works for many years.

"If we didn't use reclaimed water, then we would have to pump fresh water out of the ground," he said. "So I think this is a good arrangement for both parties."

Water reuse reduces demands on valuable surface and groundwater used for drinking water, eliminates wastewater discharges that may pollute valuable surface water and recharges groundwater resources.

As Florida's population continues to grow, so does the state's need for drinking water. Within the Suwannee Valley, the demand for water is expected to increase by 70 million gallons per day by 2035.

With the new irrigation hookup, groundwater would be used only as a backup in the event of a failure of the re-

RECLAIM
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NRDC: 30 million Americans at risk from lead, copper in drinking water

By BLANCHE HARDY, PG

The National Resources Defense Council released an analysis of the most recent U.S. Environmental Protection Agency drinking water data and found that between January, 2015, and March, 2018, nearly 30 million people in the U.S. consumed water from community treatment systems that violated the EPA's Lead and Copper Rule.

Even more alarming, the council discovered that roughly 5.5 million people are supplied with water from systems exceeding EPA's lead action level. Lead detected in water in excess of the lead action level triggers a mandatory response by the water system's supplier to reduce its levels.

NRDC noted that both the EPA and health experts agree that no amount of lead consumption is safe.

"The new analysis shows that lead was, and continues to be, a problem for many communities across the country," said Kristi Pullen Fedinick, director of science and data at NRDC. "Immediate action including an investment in local drinking water infrastructure is essential to ensuring access to safe water for all."

NRDC's assessment discovered that there were 13,991 violations of the Lead and Copper Rule by 8,339 community water systems in the country between Jan. 1, 2015, and March 31, 2018. Those systems served 29,659,654 people.

"Our new analysis provides an interactive way for the public to engage with lead-related drinking water data at the local level," Fedinick said. "The analysis showed that one out of every 11 people in the U.S. were served by a drinking water system that had a violation for lead.

"And about 5.5 million people were served by drinking water systems that detected lead in their water above EPA's action level—the level at which systems must take action to reduce lead levels.

"The action level is not a safety threshold, however, as no level of lead in water is safe," she said.

NRDC provides an interactive map on the safe drinking water page of their web site, www.nrdc.org/issues/safe-drinking-water.

Interested water consumers can track lead and copper health violations and lead action level exceedances by county.

A surprising number of Florida counties are highlighted.

"By making the data more easily accessible to the public, including mapping the areas where violations to the Safe Drinking Water Act have occurred, our goal is to ensure that the public has tools to help advocate for safe water for themselves, their families and their communities," Fedinick said.

The analysis also showed that Puerto Rico continues to struggle with lead issues. NRDC found roughly 3.4 million people there were served by systems with violations of the Lead and Copper Rule between Jan. 1, 2015, and March 31, 2018.

None of the violations were health-based and there were few exceedances of the lead action level, but the violations in Puerto Rico indicate widespread noncompliance with monitoring and reporting. Without monitoring and reporting, it is difficult to assure the reported number of violations are correct.

NRDC has been publishing data about drinking water supplies in the U.S. for some time and received acclaim for their 2016 publication, "What's in Your Water, Flint and Beyond."

The current reporting effort was undertaken as part of a data request from reporters at National Public Radio for whom NRDC reanalyzed and updated previous analyses of violations of the federal Lead and Copper Rule.

WATCH

From Page 4

Bonita Springs.

Other waterways subject to the agreement include the Estero, Orange and Imperial rivers; Bedman, Cypress, Daughtrey, Halfway, Hickey, Leitner, Mullock, Oak and Spring creeks; and the Kehl Canal.

According to local news reports, county commissioners justified the agreement by noting that it will free up the county's resources, allowing them to refocus on flooding in southern Lee County along the 10 Mile Canal.

Fort Myers Beach mini-reefs. The Fort Myers Beach City Council approved a $10,000 pilot project to install 50 mini-reefs in the city's residential canals.

The mini-reefs, installed by Ocean Habitat, reportedly improve water quality by fostering filter feeders and by providing habitat for fish.

The locations for pilot reef installations were to be determined by the end of October.

The cities of Cape Coral and Marco Island have already installed mini-reefs in various locations.

Hendry County dispersed water storage. In late September, the South Florida Water Management District approved a $124 million, 11-year contract with Alico Inc. to build and operate a 35,192 acre-foot dispersed water storage site in Henry County.

Under the contract, Alico will construct a four-foot berm around the leased land at a price of $4 million, the tab to be paid by the district.

Subsequently, the district will pay $12 million annually for a decade.

As needed, the site could store up to 30 million gallons of water. The water will be withdrawn from and, if needed, released to the Caloosahatchee River.

Alico owns about 122,000 acres of land in Florida including this site and others that are potentially developable for dispersed water management projects funded by the district or Florida legislative appropriations.

Alico will receive $356 for every million gallons of contracted water storage. In contrast, according to a *Treasure Coast Palm* newspaper report in 2015, the Caulkins water storage site in St. Lucie County receives just $233 per million gallons stored in St. Lucie County.

In spite of these high costs, district officials continue to extol the virtues of dispersed water management projects claiming that it is cheaper than buying the land outright.

The take-or-pay contracts can be canceled at any time by the district.

EAA reservoir signed into law. In October, President Trump signed the America's Water Infrastructure Act of 2018 into law.

The act authorized, but did not appropriate, funding for $6 billion worth of water projects nationally.

Notably, the act authorized federal participation in constructing the Everglades Agriculture Area reservoir, allowing the U.S. Army Corps of Engineers to begin planning and other pre-construction work on the reservoir.

The original plan was to have the reservoir operational within five years after construction begins.

The reservoir will reduce releases of Lake Okeechobee overflows to the St. Lucie-Indian River and Caloosahatchee River estuaries.

In 2017, the Florida Legislature approved up to $800 billion for reservoir construction, with the federal government expected to pay the other half.

The state Legislature capped reservoir construction funding at $64 million annually, so if the federal government eventually appropriates $200 million annually for construction over four to five years, lesser state contributions will slow the construction time table for years.

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Brevard commission enacts tough new rules for septic tank installations

By PRAKASH GANDHI

Brevard County commissioners took a major step to improve conditions in the hard-hit Indian River Lagoon by dealing with one of the main sources of pollution in the estuary—septic tanks.

Tougher septic tank rules were approved by the county commission to help improve conditions in the lagoon that has been battling surface water quality issues for years.

The rules are aimed at reducing the flow of harmful nutrients to the lagoon, particularly nitrogen.

Commissioners banned the installation of new conventional septic tanks along the beachside, on Merritt Island, and in areas of the mainland close to the lagoon and its tributaries.

The move allows the installation of only new nitrogen-reducing septic systems, which cut nitrogen emissions by at least 65 percent, in these areas.

Officials noted the tanks cost thousands of dollars more than conventional systems but better protect the environment.

"We are spending a lot of money to retrofit old septic tanks—but at the same time we are permitting new septic tanks," said Darcee McGee, assistant director of environmental protection for the Brevard County Natural Resources Department.

"That doesn't seem to make any sense," she said, "We have to stop the bleeding in addition to mopping up the blood."

The Indian River Lagoon stretches 156 miles along Florida's Atlantic Coast from Ponce de Leon Inlet in New Smyrna Beach to Jupiter Inlet north of West Palm Beach.

The lagoon is one of the most bio-diverse waterways in North America, home to thousands of species of plants and animals.

It also represents a significant part of the state's economy.

With an economic value of $3.7 billion, the lagoon supports 15,000 jobs and is responsible for $1.3 billion in annual recreational spending, according to the St. Johns River Water Management District.

But contamination of the lagoon from fertilizers and nearby septic tanks has steadily increased every year for more than a decade.

All across the lagoon, there is evidence of algal blooms that starve plant life and can destroy the marine ecosystem. In March, 2016, contaminants in the lagoon led to one of the biggest fish kills in the estuary's history.

Since the 1960s, the population of the five counties adjacent to the lagoon has doubled. Many of the 600,000 houses that surround the lagoon use septic tanks instead of a county or municipal sewage system, mainly because centralized collection systems are not available.

Septic tanks don't treat sewage. Instead, they rely on dense soil to filter out contaminants. When that process doesn't function well, wastewater leaches into tidal creeks and canals that flow into the lagoon.

The sensitive estuary also receives high levels of fertilizer runoff and takes in polluted discharge from Lake Okeechobee. When untreated sewage from septic tanks combines with these other pollutants, algae blooms are the result.

Brevard County's Save Our Indian River Lagoon Project Plan allocated $68 million to remove or retrofit 3,738 of the worst septic tanks within 10 years.

But at the same time, the Florida Department of Health is permitting 800 new septic tanks every year in Brevard.

The more efficient septic systems allowed under the new rules can cost $5,000 to $10,000 or more than conventional systems.

The new systems can remove 65 percent of nitrogen whereas the average conventional septic system removes only 0-10 percent of nitrogen in the tank itself and between 10 and 30 percent in the drainfields.

The new septic tank rules affect only the installation of new treatment systems.

The new rules apply to all cities and unincorporated areas in Brevard. However, cities and towns have the option of enacting an ordinance to opt out of the new county rule.

The mainland areas affected by the new rule include locations within 200 feet of the Indian River Lagoon's shoreline.

One exception is in the Melbourne-Tillman Water Control District area in southern Brevard County, where the buffer is within 130 feet of the lagoon shoreline.

The new septic tanks rules affect only the installation of new septic systems, including cases where conventional systems are already in the ground but need to be replaced.

There was talk of banning all conventional septic systems in the county but "the board did not feel comfortable doing that without further data," McGee said.

There are currently 59,438 septic systems in Brevard County including 15,090 that are less than 165 feet from surface waters.

Plans call for the county to spend $68 million during a 10-year period to remove or retrofit 3,734 septic systems.

Properties in areas where septic-to-sewer conversion projects funded by a lagoon sales tax are planned will be exempt from the new rules. Also exempt are repairs to existing conventional septic systems.

McGee said the new rules adopted by the board are just one piece of the puzzle to clean up the lagoon. Other measures being taken include septic-to-sewer conversion, public education and outreach, lawn measures and other steps.

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SWFWMD conducting AI-assisted seagrass mapping pilot in Tampa Bay

By ROY LAUGHLIN

The Southwest Florida Water Management District is conducting a pilot test using GIS and image analysis software to make seagrass mapping less labor-intensive, quicker to complete and more accurate.

They are working to determine whether routine automated image analysis can effectively improve their biennial seagrass mapping process.

District staff is using ESRI ArcMap and Erdas Imagine, two widely used mapping software products, to identify seagrass beds in photographs.

The photos come from a dedicated data acquisition effort being conducted by Woolpert Inc., Quantum Spatial Inc. and ESA Scheda Ecological Associates.

The photographs are taken specifically for the purpose of seagrass mapping.

According to Aaron Brown, PhD, staff environmental scientist with the Surface Water Improvement and Management program at the district, the software's data is the color of a pixel in a photograph corresponding to a one-square-foot section of bay bottom.

Artificial intelligence software mimics the human process to pick out the area where seagrass is present based on digital coding describing color in a photograph. Historical data are also used to classify current year seagrass mapping data.

Because the human classification process and that conducted by computer are based on similar classification schemes, Brown characterized the effort as "AI-assisted."

Humans are still involved heavily in the process to vet the data. The machine does the routine, repetitive technical data evaluation and summarizes the results.

Independent human judgment guiding the computer program remains essential to ensure the software acts as an effective technician.

"Runoff at the mouth of a river can change the color signature of seagrass in that area," said Brown. "If the software isn't told to treat that area differently than an area of clear, colorless water, the software may mistakenly map seagrass as unvegetated deep water or a mud flat."

AI seagrass mapping, under development for a couple of years now, is sufficiently capable that the program is being run in tandem with conventional human analysis during the 2018 Tampa Bay seagrass mapping effort.

The seagrass mapping report for Tampa Bay will include a comparison of seagrass coverage estimates derived from both procedures.

Brown said that an apples-to-apples comparison is essential to evaluate the utility and accuracy of the new AI-assisted seagrass mapping for future use.

The benefits of AI-assisted seagrass mapping include a faster photographic evaluation process and increased efficiency through automation of the routine data extraction and analysis.

In addition, Brown noted, spectral analysis by pixel may allow AI identification to account for smaller patches of seagrass than human data collection currently allows.

If the software proves its utility this year, Brown said the district will continue testing to determine if it can accurately measure percentage seagrass cover in the seagrass beds.

Adding near-infrared spectral signatures to the spectrum analyzed is another possible future capability to be tested to characterize the coverage and plant species in clear shallow water.

Brown said that if near-infrared signatures are accurate, it will aid mapping because many of the areas are difficult to get a boat into and visually assess.

In addition, cost benefits are expected to be realized.

Biennially, the district conducts seagrass mapping in four Gulf Coast estuaries: Charlotte Harbor, Lemon Bay, Sarasota Bay and Tampa Bay.

They map about 2,539 square miles from Tampa Bay to Charlotte Harbor every two years and another 1,310 square miles every four years in the Springs Coast, according to Susanna Martinez Tarokh, public information officer with the district.

She noted that the district conducts seagrass mapping more frequently than any other agency working in the Gulf of Mexico. This could help researchers and managers better understand the health of the systems.

The district SWIM program's semi-automated and AI-assisted mapping has the potential to lower the cost of mapping and improve its accuracy if reliable measurements of small seagrass patches become part of the data extracted from the photographs.

Brown said that currently there are no plans to completely automate seagrass mapping data analysis, which may define the limits of any potential financial savings that would otherwise arise by reducing payroll costs.

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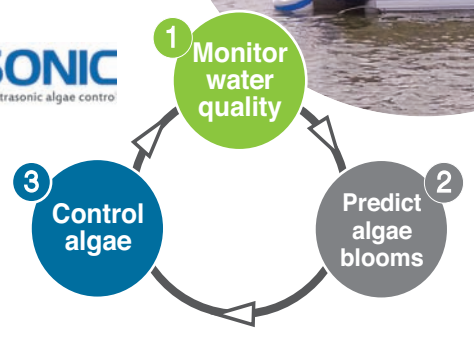

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ment and will provide an entertaining and enlightening blend of the legal, technical and business aspects of cleanup.

Hot topics

For the first time in more than a decade, a new class of contaminants has become a big deal for environmental cleanup professionals.

"While we have heard whispers regarding emerging compounds such as perfluorinated alkyl compounds for years, the PFAS issue has finally 'arrived' in the state," said Langenbach. "FRC 2018 presents an opportunity for participants to truly understand the challenges associated with assessing and remediating these complex compounds."

In each of the past three of years, the conference has included a technical session, increasingly well-attended in each succeeding year, on perfluorinated organic compounds.

This year, the subject will receive even more attention beginning in the opening session when Rula Deeb, PhD, senior principal civil and environmental engineer with Geosyntec in Oakland, CA, and a recognized international expert on PFAS, presents her talk, "Technical and Regulatory Issues Resulting from the Use of PFAS at Industrial and Military Facilities: A National and International Perspective."

This address serves as a prelude to the PFAS technical session that follows the opening session, and provides an opportunity for conference attendees to get the most recent developments in this fast-moving drama about when "better living through chemistry" goes rogue.

Other hot topics this year include strategies and project management tools that help determine and control the costs of difficult or long term remediation projects and advancement in in-situ bioremediation.

Regulatory updates

In addition to science and technology topics, FRC again features its annual regulatory session.

This year, three Florida Department of Environmental Protection officials from Tallahassee will be on hand on Day Two of the conference, joined by Wilbur Mayoraga, PE, division chief from the Regulatory and Economic Resources section at Miami-Dade County's Department of Environmental Resources Management.

From DEP, Austin Hofmeister, administrator of the department's Petroleum Restoration Program, will provide a PRP update. In addition, Teresa Booeshaghi, program administrator for the Division of Waste Cleanup, will provide an update on the state's Drycleaning Solvent Cleanup Program and Hazardous Waste Management Program.

And Brian Dougherty, an environmental administrator with the department, will discuss the latest activities of the DEP's Contaminated Media Forum and provides updates to Chapters 62-680 and 62-777, FAC.

This annual session has become one of the best opportunities of the year for soil and groundwater cleanup professionals to hear directly from DEP leadership and participate in the question-and-answer period that follows the presentations.

Focus on PFAS

The first technical session will bring participants further up to speed on perfluoroalkyl substance contamination.

The first speaker, Dora Chiang, vice president and technology strategy leader with CDM Smith Inc. in Atlanta, blends science with psychology to frame her presentation.

"Global occurrence, evolving management policy, increased concern on health impacts of PFAS compounds that have not been well studied and public outrage make "uncertainty" the buzz word when talking about PFAS," Chiang said.

The science in her talk covers interim and permanent solutions available to the cleanup practitioner today.

Next up, Bill Scoville, PE, PMP, business development director and program manager at APTIM in Cincinnati, OH, and his team will discuss a project that rapidly designed and constructed a drinking water purification system at Wright Patterson Air Base in Ohio to remove perfluorocarbons from source water.

"The primary unexpected finding was the stability of the influent concentrations," Scoville noted.

He said that the granular activated carbon filtration system was a cost-effective approach. The system that the team built meets the current 70 parts per trillion EPA health advisory and could meet what is expected to be much lower drinking water standards, perhaps with easily accomplished design and operation modifications.

In framing the challenge of perfluorinated compound as contaminants, Chad Northington, PE, southeast district technical manager with Regenesis in Tallahassee and another PFAS Session speaker, said "we're developing a strategy to accomplish treatments to reduce concentrations to levels we've never encountered before—parts per trillion."

The science and technology in his talk characterize the use of colloidal carbon to bind PFAS in groundwater. Northington noted that this is another approach for extending the use of carbon.

He further noted the paradox that perfluorinated compounds in consumer and fire safety products have improved the quality of life—but at a cost of environmental contamination and a reduced quality of life.

Costing through CSM enhancements

The development and use of conceptual site models has been a topic of significant interest at the conference for the past few years. This year, CSM used for improving cost estimation takes center stage.

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JEA conducting pilot studies aimed at using reclaimed water as potable source

By ROY LAUGHLIN

JEA, the city of Jacksonville's public utility that provides drinking water and wastewater treatment as well as electricity, is conducting pilot studies that open up prospects for potable water reuse by 2030 via aquifer storage and recovery.

JEA is considering two candidate water treatment technologies.

The first is a coagulation process that began with preliminary evaluation of two coagulation chemicals.

Tom Bartol, PE, manager of water policy, compliance and permitting at JEA, said that of the two early candidates flocculents, ferric chloride emerged as the most promising and was the subject of the complete comparison.

The second treatment was an ozone-biological aerated filtration process.

Water treated by either of these two chemical coagulation filtration methods then received reverse osmosis filtration to remove ions and molecules that passed through the first step.

The evaluations used filter materials that are common for filtration tests and membrane reverse osmosis systems that are "fairly generic," according to Bartol.

Filtration does not require exotic materials and the machinery itself is off-the-shelf. The search was for effectiveness, not novelty.

The goal is to produce water that is completely pure, or at least sufficiently lacking any substances that occur in wastewater that could be hazardous to human health.

Investigators conducted chemical analyses of the treated water to identify any chemicals that were not removed by treatment.

Bartol said that the treatments produced water that "met all primary and secondary drinking water standards."

For potable reuse, a candidate water treatment must also remove unregulated chemicals, "emerging chemicals of concern," as the EPA calls them.

Those include pharmaceuticals and their metabolites, personal care products and chemicals used in consumer products that are found in wastewater, for example, perfluorocarbon compounds used in clothing manufacture.

"We also tested for a large list of unregulated compounds to confirm the treatment performance," he said.

The chemical analysis considered the analysis signature of groups of similar chemicals, for example, perfluorocarbons, not just the ones labeled as the most common in consumer goods.

The investigation, now almost complete, was a two-year study. The filtration tests lasted approximately 22 weeks. It is now complete, and chemical analysis and other lab work is wrapping up.

JEA anticipates a final report on the study by the end of the year.

Bartol characterized the comparison study a success because "we discovered the strengths and weakness of a side-by-side evaluation of two technologies."

In about six months, technical details regarding the methods and results should be publicly available.

Once the study has been completed and reviewed, JEA expects to select one of the two filtration technologies tested and move on to the next step, pilot testing of a larger scale treatment project, Bartol said.

The focus on water treatment performance is a prelude to injection of the treated wastewater into the Floridan Aquifer to recharge potable water supply wellfields, a process known as indirect potable water reuse.

"The current intent is to use the purified water for aquifer recharge," said Gina Kyle, manager of media relations, at JEA. "We are in the process of deciding on the next phase of the project. One option is to put the project at a site where we could begin aquifer recharge."

Indirect and direct potable reuse is not a currently accepted practice in Florida. That could soon change, however.

WaterReuse Florida, an organization of equipment suppliers and consultants, is pushing for potable reuse adoption.

In a December, 2017, letter, DEP Secretary Noah Valenstein wrote Randy Brown, president of WateReuse Florida, in support of the activities of the association's Potable Reuse Commission.

DEP believes that a robust alternative water supply program should remain a statewide priority, according to Valenstein.

The WateReuse Florida commission report is expected in December, 2018.

SEPTIC

From Page 1

ing features to existing septic systems serving single or multi-family residences located in the priority focus areas of eligible counties, including Citrus, Hernando, Leon, Marion, Orange, Pasco, Seminole, Volusia and Wakulla.

Available funding will be allocated on a first-come, first-served basis.

The program is being run by DEP's Division of Water Restoration Assistance. Costs for the proposed upgrades are being assessed and have not been published by the department.

Costs for the advanced septic systems can exceed $15,000 and can be considerably more, depending on the size of the residence and the associated demand.

Eligibility is based on the location of the residence within the state's priority area maps available on-line.

A determination may be also requested through the state Department of Health's Onsite Sewage Program website.

Septic system installers and licensed plumbers may apply to participate in, and receive reimbursement for, eligible upgrades under the program by completing and submitting an application.

The application includes all required attachments, registering as a vendor with the state in MyFloridaMarketPlace and completing a Florida Substitute W9 on the state of Florida vendor website.

"We encourage homeowners in these priority focus areas to take advantage of this new Septic Upgrade Incentive Program," said Trina Vielhauer, director of DEP's Division of Water Restoration Assistance. "Every homeowner who does their part to upgrade a septic system brings us one step closer to our goal of significantly lowering nutrients in Florida's springs."

The Department of Heath noted that eligible enhancements include retrofitting septic tanks with advanced pre-treatment recirculating aerobic treatment units or replacing traditional septic tanks with upgraded nutrient-reducing technology such in-ground nitrogen-reducing biofilters, nitrogen-reducing aerobic treatment units and nitrogen-reducing performance-based treatment systems.

The system must remove a minimum of 60 percent of the nitrogen.

DEP notes that septic systems are a safe and effective means of wastewater disposal for only about 30 percent of the state's population. It is estimated that there are 2.6 million systems in operation in Florida.

National data indicates Florida houses 12 percent of the country's septic systems.

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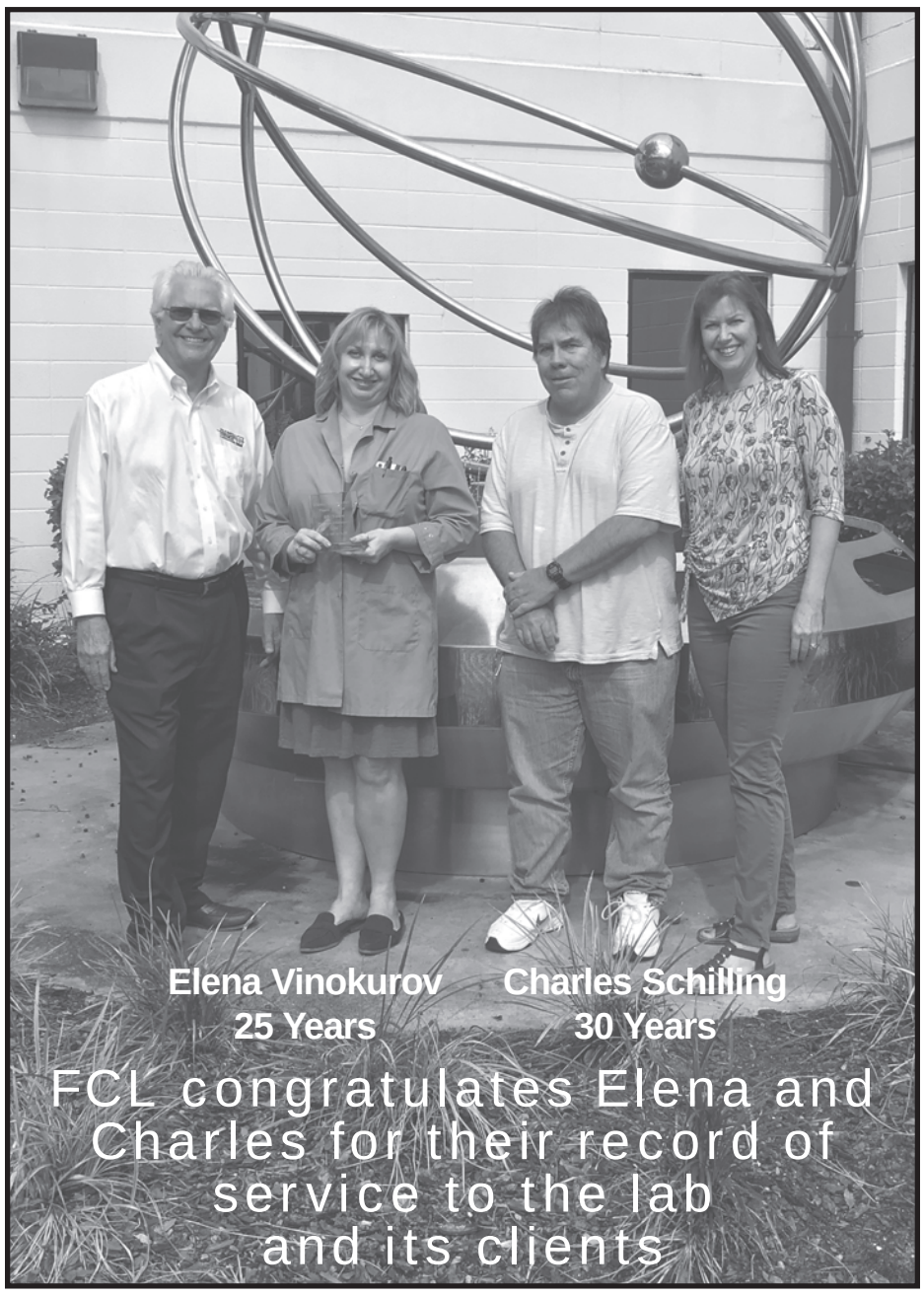

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FRC
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Paul Favara, PE, client solution leader with Jacobs in Gainesville, will open the Costing through CSM Enhancements session with a talk about money management to meet the financial challenges of long-term remediation projects.

For him, long-term extends to the inter-generational legacy of environmental contamination cleanup and how to estimate the costs before making commitments to the effort.

"Often times, default interest rates and periods of performance provide an unrealistic view of how long a project will take to complete and how much it will cost," Favara said. "Thinking in terms of discount rates and periods that take into account future generational considerations provides a more realistic basis for assessing long-term costs and time periods of remediation."

Even the young professionals at this year's event likely won't outlive the repayment on debt for some remediation projects this year if one considers both the principal and interest.

Jim Depa, 3D visual group manager with St. John-Mittelhauser & Associates Inc. in Chicago, described the utility of conceptual modeling broadly by noting how increased computing power has made 3D modeling "more accessible and affordable."

He said that complex models that used to take several days to create can now be made in several hours or even a few minutes.

This increase in speed helps environmental consultants flesh out a usefully complex model and remediation contractors to design a more efficient remedial system.

Depa said that one non-technological benefit is in explaining the problem and its solution in a way that can help the non-scientific community understand soil and groundwater contamination issues more thoroughly.

"This is especially true when short animations are created from the 3D models, showing the complexities of the contamination in the subsurface in ways that static two-dimensional maps or cross-sections never could," he said.

Until a few years ago, the DEP's Petroleum Restoration Program owned most of the remediation systems used for state-funded projects, said Simo Koncalovic, president of Remedial Systems Integrated Inc. in Tampa.

Since then, project consultants have taken the responsibility of providing the equipment, either through purchase or lease.

There's no single rule of thumb to guide the choice between owning or leasing, so "there's a big mix out there" on current projects, he said. Koncalovic will dissect the pros and cons of buying or renting cleanup equipment in his talk.

Combined remedies

About a decade ago, the use of combined remedies became more frequent as experience identified the limitations of the early, often simpler remediation methods then in use.

After a decade of using combined and phased methods, they are acknowledged to accomplish cleanups to lower contaminant target levels, and meet targets more quickly at lower costs. Experienced-based learning continues, however.

Brendan Brown, PWS, an environmental scientist with CDM Smith in Maitland, will lead off the Combined Remedies to Closure Session on Day Two.

His project's objective was the cleanup of soil and groundwater contaminated with high concentrations of chlorinated solvents. The technology used was a combination of bioremediation, zero-valent iron, and horizontal and vertical extraction wells.

"As the client's objectives for the site evolved, we applied various remedial technologies within the client's level of risk acceptance and budget funding," Brown said. "The project is on the way to success, with a no further action proposal now approved in principle with DEP."

Joseph Bartlett, PE, an environmental engineer with Geosyntec Consultants in Titusville, will discuss a site cleanup that used the "age-old" method of air sparge/soil vapor extraction.

That method, along with "aggressive optimization strategies" and the adoption of alternate site cleanup criteria under 2017 changes to Chapter 62-780 FAC, has led to expectations that the site will receive a site rehabilitation completion order with no further action by the end of the year.

The optimization strategies were successful in reducing treatment time frames, and saved the client money in the process.

Sean Rome, Florida operations manager with TRC Environmental Inc. in St. Augustine, will discuss a brownfield site remediation project that's nearing completion after work that began back in the 1980s.

The former wood treatment plant site in Jacksonville's Springfield neighborhood is also a food desert, lacking even a grocery store for its residents.

"It's a blighted area that needs a spark," said Rome.

Rome noted that the public sector regulators in this public-private redevelopment effort have been encouraging to work with.

"They understand the rationale for redevelopment," he said.

In addition to the technical sessions mentioned above, another round of Speed Talks will help wrap-up Day One's talks and the Young Professionals will have the stage first thing on Day Two.

As always, FRC features the largest group of exhibitors of any remediation event in the Southeast U.S. and exhibitor participation is up again this year as the economy remains solid in Florida.

The exhibit hall features a good mix of familiar vendors along with many new companies and their representatives eager to discuss their techniques and technologies with attendees.

The FRC conference is scheduled for Dec. 5-6 at the Rosen Centre Hotel on International Drive in Orlando. For more information, visit www.enviro-net.com.

Deadline extended for submitting CFWI water supply options

Staff report

The Central Florida Water Initiative is working with the region's utilities, water users and local stakeholders to identify water supply project options that will help meet the needs of Floridians.

One piece of the effort is the creation of a new list of potential projects to meet these needs, which will be included in the upcoming 2020 CFWI Regional Water Supply Plan.

In March, the water management districts and the Florida Department of Environmental Protection formed a new CFWI work group dedicated to developing regional water supply project options.

As part of this effort, the water management districts are reaching out to stakeholders in the Central Florida region to help develop ideas and concepts for new potential water supply, water resource development and water conservation project options.

The districts are particularly focusing on identifying projects that achieve water conservation, provide reclaimed water to new users, develop alternative water supplies or benefit natural systems.

Organizations or individuals that would like to submit a project option or concept for consideration are encouraged to contact their respective water management district representative.

For the Southwest Florida Water Management District, email R. Thomas Kiger, PE, at thomas.kiger@swfwmd.state.fl.us or call (352) 796-7211, ext. 4536.

Fot the St. Johns River Water Management District, email Lori Burklew at lburklew@sjrwmd.com or call (407) 659-4813.

For the South Florida Water Management District, email Richard Nevulis at rnevul@sfwmd.gov or call (561) 682-6242.

The districts requests responses by April 1, 2019.

A project option form is provided at https://cfwiwater.com.

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SFWMD deep injection wells will replace one wasteful water management practice with another

By NICOLE JOHNSON

At the South Florida Water Management District's recent governing board meeting, the district promoted a new idea for dealing with the water quality woes stemming from the mass discharges of polluted water down the Caloosahatchee and St. Lucie rivers.

This proposal would pump water during high-flow events over 3,000 feet underground using deep injection wells, or as the district has recently rebranded them, "emergency estuary protection wells."

There are a number of problems with this idea. First and foremost, it only looks at one half of the water management equation.

First, the Caloosahatchee River and its estuary oscillates back and forth between extreme low flows and extreme high flows, and both are tremendously damaging. During the first half of 2018, the Caloosahatchee experienced a minimum flow and level exceedance, meaning the estuary wasn't getting enough freshwater before the high rainfall events in May, followed by the discharges that started in June.

We should all be focusing on solutions that address the needs of the entire system and recognize that throwing water away during excess times sets us up for extreme drought and low-flow conditions in the future.

Recently, drought conditions have occurred more often than not, and pursuing any plan that would permanently remove freshwater from the system is not an appropriate way to expend taxpayer dollars or agency resources.

In fact, the comprehensive report on Florida's water future entitled "Water 2070," prepared by the Florida Department of Agriculture and Consumer Services, 1000 Friends of Florida and the GeoPlan Center at the University of Florida, clearly indicated that Florida is on an unsustainable path for water supply.

Florida needs all of its freshwater if we are to support a growing population, agricultural needs and water for the natural system including the Caloosahatchee and the Everglades.

Regardless of whether deep injection wells are being contemplated as a temporary strategy for emergency situations, this is merely substituting one wasteful water management practice—losing water to tide down the Caloosahatchee and St. Lucie—with another—losing the water by injecting it into the Boulder Zone.

And this is not a quick or cheap proposal to implement. The capacity of the Boulder Zone is not understood, so test wells will need to be drilled and full implementation is estimated at approximately seven years at a cost of approximately $300 million.

So instead of wasting our most valuable resource at taxpayer expense by injecting it underground, let's concentrate on maximizing surface storage throughout our watersheds, and fund and expedite Everglades restoration projects with demonstrated ecological benefits.

These projects will provide hydrologic restoration, cleanse the water and reduce the damaging high-volume discharges to the estuaries, including the Everglades Agricultural Area Reservoir and the Central Everglades project.

No matter how the South Florida Water Management District rebrands it, deep injection wells are not in the best interests of the state of Florida and its residents, today or in the future.

Nicole Johnson is director of environmental policy at the Conservancy of Southwest Florida in Naples. She can be reached at nicolej@conservancy.org.

WELLS

From Page 1

extreme runoff events and were intended to be used in conjunction with existing water management strategies such as reservoirs, stormwater treatment areas, and aquifer storage and recovery wells.

The approved well plan is in addition to, not a substitute for, any other Everglades restoration plan component.

In May, 2018, after several years of testing two pilot ASR wells in the Everglades, the U.S. Army Corps of Engineers formally rejected the use of deep injection wells as an option north of Lake Okeechobee to manage its discharges to coastal estuaries.

Based on that decision by the corps, SFWMD will have to pick up the entire cost for the proposed deep injection wells. Each well is expected to cost between $5 million and $10 million. The total price tag could range from $150 million to $600 million.

Environmental activists are split on the district's decision to use deep wells. Seventy-three environmental and progressive organizations signed a letter opposing deep injection disposal wells submitted by the Sierra Club on Oct. 9, 2017, to outgoing Gov. Rick Scott.

They supported the corps' decision to abandon deep injection wells and criticized the district for the decision that lays the financial burden on Florida taxpayers alone.

"The best solution to significantly reduce, and ultimately eliminate, harmful discharges from Lake Okeechobee to the northern estuaries during extreme weather events is to speed up the long-term restoration of the Everglades ecosystem," they wrote. "We urge you to ensure that public state tax dollars are invested in Everglades restoration projects that are fully vetted, are consistent with CERP, do not jeopardize our public drinking water supply and do not waste the state's precious fresh water resources."

A spokeswoman for Audubon Florida was one of the few with tepid praise for the district board's action.

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The *Florida Specifier* welcomes columns, articles and letters to the editor on any subject or issue pertinent to the environmental, regulatory and technical areas the newspaper covers. We reserve the right to edit all submissions for newspaper style and publish submissions on a space-available basis only. The opinions expressed on this page are those of the authors.

State water managers must cut back on existing groundwater pumping permits

By ROBERT F. KNIGHT, PHD

North Florida is home to a vast underground plumbing system known as the Floridan Aquifer. Comprising more than 100,000 square miles and several thousand feet in thickness, the Floridan Aquifer is like a gigantic, rock-filled bucket.

About six percent of the rain falling over this landscape percolates downward through the soil and into the porous limerock to replenish this hidden reservoir. The water flowing into this bucket eventually flows out through natural holes that are Florida's 1,000+ artesian springs.

Over the past 150 years, the flow through these natural discharge points has diminished due to the installation and use of more than a million wells that extract groundwater from the same finite resource.

Springs operate by gravity. Spring flow is directly related to the difference in height of water in the aquifer compared to the spring pool. Lower aquifer levels result in lower spring flows and vice versa.

If aquifer levels are lower than the spring outlet, then the spring reverts to a non-flowing, water-filled sinkhole. When adjacent surface water levels rise following a rainfall event, water can flow back through the spring opening into the underground aquifer. A spring that reverses flow direction is known as a suckhole or estevelle.

Groundwater extraction wells consist of a metal or plastic casing inserted in a bored hole through limerock. Water supply wells are drilled to a depth that will insure adequate water to meet a specific demand. For example, a residential well may consist of a two- to six-inch well casing drilled to several hundred feet into the top of the Floridan Aquifer.

A well installed to supply a large agricultural center-pivot irrigation system or a public utility like Gainesville Regional Utilities may have a casing diameter up to 12 inches or more, be drilled to more than 500 feet below land surface, and supply more than a million gallons per day.

Water wells are generally fitted with a submersible or centrifugal pump that uses electricity or diesel fuel to pull water up to the ground surface for eventual use.

Springs and wells have similar effects on Floridan Aquifer groundwater levels. When water is removed from the aquifer, groundwater levels fall and spring flows decline. Plentiful rain raises aquifer levels due to increased recharge and less irrigation, causing spring flows to increase.

An examination of spring flows and lake levels during the past two years illustrate these hydrologic truths. Beginning in June 2017, abundant rain returned to North Florida following a moderate drought over the previous few years. By the end of 2017, after three months of high rainfall and capped by Hurricane Irma in early September, a Gainesville rain station reported a near-record annual total. In response to this abundant rainfall, aquifer levels rose, water levels in Paynes Prairie and area lakes rebounded, and spring flows increased.

However, despite two years of above-normal rainfall, long-term aquifer levels are still trending downward and have been declining for the past 50 years. Long-term average flows in North Florida's springs continue to be well below historic rates. For example, flows in the Santa Fe and Ichetucknee rivers and springs remain more than 325 million gallons per day less than historic flows during a similar historic rainfall period. This documented decline is equivalent to the combined loss of four first-magnitude springs.

In 2013, state water managers determined that the Santa Fe and Ichetucknee rivers were already being significantly harmed by a combined flow reduction of about eight percent, or 88 mgd. When recently asked to re-evaluate their data analysis, technical staff at the Suwannee River Water Management District arrived at the same result as the Florida Springs Institute. Over the past 20 years, the combined flow reduction in these rivers is on the order of 26 percent, or 325 mgd, well past the point of significant harm.

When challenged by FSI to turn this alarming trend around, district staff promised another study. In the meantime, the district's governing board continues to issue new groundwater extraction permits.

Despite abundant rainfall, the Santa Fe and Ichetucknee rivers have lost more than one quarter of their life blood due to excessive groundwater pumping. The evidence is mounting that because of these flow reductions, these irreplaceable natural treasures are dying.

Protection and recovery of the Santa Fe and Ichetucknee rivers will only result when the public becomes adamant that state water managers face the facts and cut back on existing groundwater pumping permits.

Robert Knight is the director of the Howard T. Odum Florida Springs Institute in High Springs. He can be reached at bknight@floridaspringsinstitute.org.

Settlement reached on St. Pete sewage spills suit

By PRAKASH GANDHI

The city of St. Petersburg and three environmental groups reached a settlement agreement over the release of hundreds of millions of gallons of untreated sewage into Tampa Bay.

Suncoast Waterkeeper Inc., Our Children's Earth Foundation and the Ecological Rights Foundation filed a Clean Water Act citizen suit in late 2016 urging the city to take more aggressive measures to fix its beleaguered sewage system to prevent the recurring sewage spills into neighborhoods and Tampa Bay area waters.

To settle the suit, the parties agreed that the city would request an amendment to its previous consent order with the Florida Department of Environmental Protection, that the amendment would contain additional work commitments, and that the original consent order and its amendment would be enforceable in federal court.

In addition to the new work commitments, the city agreed to pay $200,000 to the Tampa Bay Estuary Program for projects that benefit local ecosystems.

The settlement, if approved by a judge, will end up costing the city $900,000, and possibly over $1 million if the city has to pay the plaintiff's legal fees. The suit accused St. Pete officials of engaging in "serious and ongoing" violations of the federal Clean Water Act.

State environmental officials issued a consent order in response to the release of up to 200 million gallons of sewage during storms in 2015 and 2016.

The settlement requires upgrades to the sewage collection system, including a massive pump that relocates sewage during major weather events.

In addition, the settlement requires more water qual-

SPILLS

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Calendar

December

DEC. 3 – Course: Wastewater Collection System Cleaning and Maintenance, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 3-4 – Course: Backflow Prevention Recertification, Altamonte Springs, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 3-7 – Course: Landfill Design and Construction, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 4 – Course: Introduction to Lift Station Maintenance, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 4-6 – Course: Respiratory Protection, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 5 – Course: Basic Water and Wastewater Pump Maintenance, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 5-6 – Conference: Florida Remediation Conference, Orlando, FL. Presented by NTCC Inc. and the *Florida Specifier*. Call (407) 671-7777 or visit www.enviro-net.com.

DEC. 5-7 – Course: Backflow Prevention Assembly Repair and Maintenance Training and Certification, Orlando, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 6-7 – Course: Backflow Prevention Recertification, West Palm Beach, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 6 – Course: Unidirectional Flushing Workshop, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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

DEC. 7 – Course: Water Distribution System Pipes and Valves, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 10-11 – Course: Backflow Prevention Recertification, Destin, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 10-11 – Course: Pumping Systems Operation and Maintenance, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 11-14 – Course: Water Class B Certification Review, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

DEC. 12-14 – Course: Water Distribution Systems Operator Level 1, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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

January

JAN. 7-11 – Course: Backflow Prevention Assembly Tester Training and Certification, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 7-11 – Course: Backflow Prevention Assembly Tester Training and Certification, Orlando, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 7-11 – Course: Backflow Prevention Assembly Tester Training and Certification, Pensacola, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 12-13 – Course: Backflow Prevention Recertification, Tampa, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 12-13 – Course: Backflow Prevention Recertification, Bradenton, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 16-17 – Course: SCADA & 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.

JAN. 17 – Course: Hazardous Waste Regulations for Generators, Tampa, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 22-24 – Course: Microbiology of Activate Sludge, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 24-25 – Course: Backflow Prevention Recertification, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 25 – Conference: 28th Annual Southwest Florida Water resources Conference, Fort Myers, FL, Presented by the Florida Chapter of the American Water Resources Association. E-mail awra@awraflorida.org or visit www.awraflorida.org.

JAN. 26-FEB. 3 – Course: Backflow Prevention Assembly Tester Training and Certification, Tampa, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 28-31 – Course: Water Distribution Systems Operator Level 2 & 3 Training, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

JAN. 28-30 – Course: Asbestos: Inspector, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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Thank you!

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ASBESTOS COURSES

Asbestos: Inspector
Jan. 28-30, 2019 | Gainesville, FL | CEUs: 2.1

Asbestos Refresher: Worker
Jan. 30, 2019 | Gainesville, FL | CEUs: 0.75

Asbestos: Management Planner
Jan. 31-Feb. 1, 2019 | Gainesville, FL | CEUs: 1.4

Asbestos Refresher: Inspector
Feb. 19, 2019 | Gainesville, FL | CEUs: 0.4
Apr. 23, 2019 | Gainesville, FL | CEUs: 0.4

Asbestos Refresher: Management Planner
Feb. 19, 2019 | Gainesville, FL | CEUs: 0.4
Apr. 23, 2019 | Gainesville, FL | CEUs: 0.4

Asbestos: Contractor/Supervisor
Mar. 18-22, 2019 | Gainesville, FL | CEUs: 3.5

Asbestos Refresher: Contractor/Supervisor
Feb. 20, 2019 | Gainesville, FL | CEUs: 0.8
Apr. 24, 2019 | Gainesville, FL | CEUs: 0.8

Asbestos: Project Design
Apr. 9-11, 2019 | Gainesville, FL | CEUs: 2.4

WATER & WASTEWATER COURSES

SCADA & Electrical Training: What Utility Staff Need to Know
Jan. 16-17, 2019 | Gainesville, FL | CEUs: 1.6

Microbiology of Activated Sludge
Jan. 22-24, 2019 | Gainesville, FL | CEUs: 2.2

Water Distribution Systems Operator Level 2 & 3
Jan. 28-31, 2019 | Gainesville, FL | CEUs: 3.2

Train the Trainer: How to Design & Deliver Effective Training
Feb. 5-7, 2019 | Gainesville, FL | CEUs: 2.4

DEP SOPs for Water Sampling & Meter Testing
Apr. 16, 2019 | Gainesville, FL | CEUs: 8

Introduction to DEP SOPs for Groundwater
Apr. 17, 2019 | Gainesville, FL | CEUs: 0.4

BACKFLOW PREVENTION COURSES

Backflow Prevention Assembly Tester Training & Certification
Jan. 7-11, 2019 | Gainesville, FL
Jan. 7-11, 2019 | Orlando, FL
Jan. 7-11, 2019 | Pensacola, FL
Jan. 26-Feb. 3, 2019 | Tampa, FL*
Feb. 11-15, 2019 | Destin, FL
Mar. 2-10, 2019 | Tampa, FL*
Mar. 4-8, 2019 | Orlando, FL
Mar. 4-8, 2019 | Pensacola, FL
Mar. 18-22, 2019 | Altamonte Springs, FL
Mar. 25-29, 2019 | Gainesville, FL
Apr. 1-5, 2019 | Orlando, FL
Apr. 6-14, 2019 | Tampa, FL*
Apr. 29- May 3, 2019 | Destin, FL
*Two consecutive Sat. & Sun.
**Two consecutive Fri. & Sat.

Backflow Prevention Assembly Repair and Maintenance Training & Certification
Feb. 6-8, 2019 | Orlando, FL
Apr. 1-3, 2019 | Gainesville, FL

Backflow Prevention Recertification
Jan. 12-13, 2019 | Bradenton, FL
Jan. 12-13, 2019 | Tampa, FL
Jan. 24-25, 2019 | Pensacola, FL
Feb. 4-5, 2019 | Orlando, FL
Feb. 7-8, 2019 | Gainesville, FL
Feb. 16-17, 2019 | Tampa, FL
Feb. 18-19, 2019 | Destin, FL
Mar. 2-3, 2019 | Bradenton, FL
Mar. 4-5, 2019 | Altamonte Springs, FL
Mar. 28-29, 2019 | Pensacola, FL
Mar. 30-31, 2019 | Tampa, FL
Apr. 25-26, 2019 | Pensacola, FL
Apr. 27-28, 2019 | Tampa, FL
May 2-3, 2019 | Gainesville, FL

RCRA Courses

Hazardous Waste Regulations for Generators
Jan. 17, 2019 | Tampa, FL | 0.8 CEUs

Understanding Hazardous Waste in Solid Waste Operations
Feb. 26, 2019 | Orlando, FL | 0.4 CEUs

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reductions and elevated microbial populations were observed. Most interesting, biodegradation processes remained elevated in the initial well, even after the removal of the ISBR. Overall, the results conclusively demonstrated that the ISBR successfully enhanced anaerobic bioremediation throughout the saturated thickness of the monitoring well and indicated that ISBRs can be an effective remediation approach even in a deep, fractured bedrock aquifer.

11:30 Strong Endogenous Decay Contribution During the ERD of TCA DNAPL in Bedrock Groundwater

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

Incidental trichloroethene releases at a former electronics manufacturer impacted shallow bedrock groundwater. Site hydrogeology includes 15 to 20 feet of alluvial silty clay or gravelly sand overlying fractured sandstone, with an estimated 10 foot thick interval of dense, nonaqueous phase liquid trapped in the shallow bedrock. Dissolved TCE was detected at concentrations between 55 and 550 milligrams per liter along with the dechlorination byproduct cis-1,2-dichloroethene at up to 15 mg/L; however, vinyl chloride was not detected above detection limits. A proof-of-concept biostimulation study was initiated utilizing ERDenhanced™, a carbohydrate-based biostimulant formulated with a proprietary blend of inactive yeast and inorganic nutrients to stimulate biotic reductive dechlorination and increase the residence time of its beneficial effect by leveraging endogenous decay. Bioaugmentation was not performed given the baseline detection of ethene. Results from the three-year study demonstrated: 1) an 80-99.9 percent reduction in TCE concentrations relative to baseline concentrations up to approximately 30 percent of TCE's aqueous solubility limit; 2) in two of three performance wells, up to 99 percent reduction in cis-1,2-DCE concentrations, with no change at a third well despite a 99.9 percent reduction in TCE; 3) consistent indicator parameters of a robust biotic dechlorination pathway; 4) increased ethene concentrations following biostimulation demonstrating reaction completion; and 5) the presence of Dehalococcoides mccartyi and the dehalogenase genes tceA, bvcA, and vcrA at biostimulated performance wells indicating dechlorinators are present expressing these beneficial genes facilitating the TCE-to-ethene completion pathway. Following the period of active biostimulation, ongoing monitoring of passive biostimulation by endogenous decay demonstrated a positive effect residence time of at least three years. Importantly, no observed TCE rebound was noted in the well network during the period monitoring endogenous decay, including the well with the baseline concentration of 550 mg/L. In fact, TCE concentrations at that well during this period generally ranged from approximately 0.07 to 2.6 mg/L, with a geometric mean of 0.8 mg/L, which represents a 99.9 percent reduction from baseline concentrations. In addition to the extended effect residence time, while many ERD additives achieve a one order-of magnitude (90 percent) reduction in DNAPL constituents, reductions on the order of two orders of magnitude, as achieved using ERDenhanced™ during this proof-of-concept, are far less common. The authors hypothesize that the up to 99 percent reduction in TCE concentrations observed are the result of combined microbial behaviors and increased biofilm production induced by the additive. A pilot study is now underway at the site to collect predesign data for a full scale enhanced reductive dechlorination remedy.

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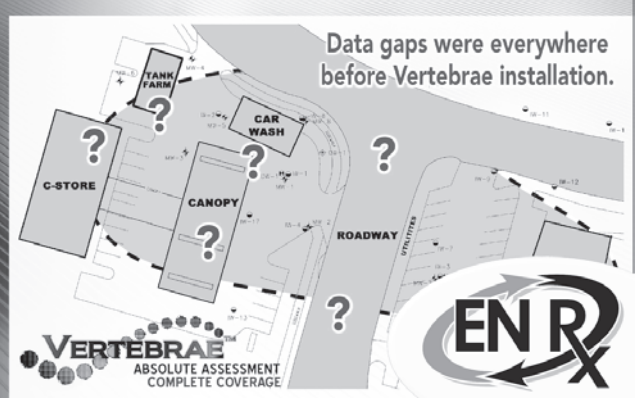

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Concurrent Session 6B: Costing through CSM Enhancements

8:30 Challenges and Solutions for Estimating Intergenerational Cost Estimates

Paul Favara, Client Solution Leader, Jacobs, Gainesville

Site complexities, such as back-diffusion from a low permeability matrix and inability to identify residual sources at complex sites, typically drive cleanup time estimates. Cleanup times for complex sites typically range from several decades to centuries. Industry alternative evaluation processes, used to screen and select alternatives, were not designed with intergenerational remedies in mind. The objective of this talk is to explore the cost-estimating challenges for long-term cleanup projects and provide recommendations for framing these cost estimates. A survey of decision documents for complex sites was completed to assess how costs were framed for long-term cleanup projects. Industry guidance was surveyed to evaluate recommendations for preparing long-term cost estimates. The trend in discount rates, going back nearly 40 years, was evaluated to highlight variability over time. The parameters for estimating present-value cost were evaluated for their impacts on cost estimates. Long-term uncertainties, such as the societal value of cleanup over the life of the project and advances in technology are assessed for their potential impact in how the cost-estimate is qualified. Additionally, a project scenario that explored numerous scenarios based on different cleanup time estimates and discount factors was explored to highlight how different cost-estimating approaches could lead to different conclusions based on life-cycle cost estimate results. Most long-term cleanup decision documents surveyed used a 30-year cost estimate as a basis, even though most sites would require more time to complete; some cleanup time estimates exceeded 100 years. Several important cost-estimating guidance sources were identified, but they do not fully address the challenges of developing long-term cost estimates for cleanup sites. An approach to help decision makers understand the trade-off between costs today and consideration of future generations was developed. The project scenario shows a "tipping-point" in decision making depending on the assumptions used in the cost estimate. Based on these findings, recommendations on how intergenerational cost estimates should be prepared are provided. Additionally, recommendations on integrating adaptive site management attributes (e.g., future advances in technology, changing real costs of completing long-term cleanups) to address future cost uncertainties will also be presented.

8:55 How do 3D Models Reduce the Costs of Environmental Remediation?

Jim Depa, 3D Visual Group Manager, St. John-Mittelhauser & Assoc. Inc., Chicago, IL

The objective of the project was to create a 3D conceptual site model depicting subsurface trichloroethene contamination at a former auto parts manufacturer, and explain how the model reduced the costs of both the subsurface site investigations and the design of the remediation system. In order to create the 3D model, both soil analytical results and geologic boring log data were statistically modeled and visualized using C-Tech's Earth Volumetric Studio. Then, the model was used to communicate data about the subsurface contamination to the client, remediation contractors and governing agency. The 3D conceptual site model was responsible for reducing the costs of the remediation by more than $1.1M. Specifically, the 3D model was able to quickly identify data gaps from previous soil investigations, limit the amount of additional investigative work, help to select electrical resistive heating as the most cost-effective remedial technology, optimize the design of the ERH remediation system and reduce the size of the treatment volume by over 30 percent, and effectively communicate the results of the soil investigations, design of the ERH system and confirmatory sampling plan to the governing agency. In addition, the 3D conceptual site model was produced into a several short animations and uploaded to YouTube. The animations provide a way for anyone with an Internet connection to better understand how and why environmental investigations are performed, how geology effects subsurface contaminant migration, and how ERH remediation operates. The animations also continue to be used as a convenient way to market company services.

9:20 Cost of Remedial System Ownership

Simo Koncalovic, President, Remedial Systems Integrated LLC, Tampa

Recently, the private sector absorbed the responsibility of providing remediation systems, which created a dilemma for professional consultants of whether to purchase or rent systems for their projects. Generally, both options may be used comparably. Yet, practical considerations factor into who bears the risk. The risk/cost balances with the system ownership cost. Thus, a careful analysis begs the question of the actual cost to own and operate a remediation system. In other words, what does it really cost to secure the highest return on investment considering all costs associated with it? The "24/7 unattended" models expose the capital investment to much more potential risks, such as vacancy rate, inadvertent downtime, component failure or a project-specific customization demand. All these factors greatly affect the rate of return, the single deciding

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factor when considering investment into such working capital. This presentation focuses on ownership cost evaluation of remedial systems and collateral costs associated with risks. This presentation covers every aspect from component choices and lead times on malfunctioning components to the shelf life of commonly used components. The review not only analyzes these factors, it presents real life costs to run monthly and quarterly operations. The survey highlights life-span expectations applied to the cash flow horizon before additional investment and offers realistic conclusions. The presentation will cover potential hidden pitfalls and obscure aspects of system ownership and operation often omitted from the rate of return calculation.

9:45 Lowering the Cost of LUST Management Through Scale-Appropriate Data on LNAPL and Soil Permeability

John Sohl, Chief Executive Officer, COLUMBIA Technologies, Rockville, MD

One of the most critical steps in minimizing risk, reducing costs and closing recalcitrant UST and LUST sites with confidence is both the proper assessment of residual hydrocarbons and the impact of soil behavior on petroleum storage or transmissivity. Historically, addressing LNAPL problems at complex sites has been a challenging and expensive proposition. During this presentation, the speaker will present advanced technologies that address these challenges through high-resolution mapping LNAPL and soil permeability to improve the confidence of decision makers. The presentation will provide case studies for interactive discussions with session participants on how the use of remediation-focused direct sensing tools such as optical interface probe, membrane interface probe and the hydraulic profiling tool combined with high-resolution soil sampling to better inform remedial decisions. The new generations of direct sensing technologies combined with targeted soil, water and vapor sampling enable the site decision makers to understand the evolving dynamics of LNAPL mobility and migration. Best practices for achieving site closure at LUST release sites include leveraging small-footprint direct sensing tools to define the horizontal and vertical extent of petroleum contamination, determine accurate depth intervals for remedial activities, measure hydraulic permeability and provide lithological data to target corrective action remedies. High-resolution site characterization approaches are able to provide a 3-10x return on cleanup and closure—cost-effectively remediating these sites while reducing the mass distribution of mobile contaminants at the properties. This presentation will discuss project examples including LNAPL distribution assumptions and how proper data on LNAPL and permeability can be used to develop an effective conceptual site model with advanced real-time characterization tools.

12:00 Day Two Luncheon Sponsored by The Goldstein Environmental Law Firm

Concurrent Session 7A: In-Situ Bioremediation 2

1:40 Design Tool Advancement: Determining Injection Quantities for In-Situ Bioremediation and/or In-Situ Chemical Reduction

Brad Elkins, MS, PG, Technical Sales Manager, EOS Remediation LLC, Raleigh, NC

Publicly available Microsoft Excel-based aquifer remediation calculators such as the ESTCP Emulsion Tool Kit (2008), Substrate Estimating Tool (2010) or Soluble Substrate Design Tool (2012), run design calculations based on a single aquifer cubic volume and associated cross-sectional area for volume and mass flux in the evaluation for the proper electron donor dosage. However, the limitation is each design can only be determined for one location at one vertical interval. If multiple areas and/or two or more water bearing vertical units need treatment, the designer must run several variations in the design tool generating multiple reports that must be checked and tracked during planning and implementation. Conceivable consequences include deficiencies in the performance, over or under estimating substrates and unexpected additional costs. The solution was to develop a design tool that used the formulas and equations of the existing design tools to create a new model that could examine multiple areas at different depth intervals. The new design tool remains Microsoft Excel-based, thus easy to use. Additionally, this design tool can perform a simple cost analysis across eight different categories of substrates or additives. Pricing information would be needed from the vender(s) of choice, or an existing/past order could be used as a reference. This presentation will cover the formulas and equations from existing design tools. It will explore the commonalities in calculating substrates for enhanced bioremediation and/or abiotic reduction. Various substrate loading rates and differentiators will be disseminated. Finally, the new design tool will be presented along with example case studies for demonstration.

2:05 Evaluating the Dechlorination Longevity of a Mixed Lactate and Vegetable Oil Substrate

Michael Sieczkowski, CHMM, Tech. Sales Director, JRW Bioremediation LLC, Lenexa, KS

The practice of using organic substrates to enhance the biological reductive dechlorination of solvent plumes has been commercially demonstrated for over 25 years on hundreds, if not thousands, of sites. Over that time, a myriad of organics have been proposed and applied to reach a goal of finding a cost-effective material that would promote dechlorination for an extended period of time. To measure effective longevity, some practitioners promote tracking analytical parameters such as maintaining specific amounts of total organic carbon or ORP while others take a more empirical approach. A dry cleaner site in Central Colorado has been the subject of a number of remedial approaches since 2009 including chemical oxidation followed by enhanced reductive dechlorination. While success in the form of dramatically reducing the concentrations of chlorinated ethenes was achieved on almost the entire plume, one small up-gradient area continued to see contaminant flux, presumably from a source area that was never adequately treated. A review of over five years of data suggests that biological dechlorination has been occurring for well past the expected longevity of the organic substrates used to promote biological reductive dechlorination. The data also suggests that dechlorination is occurring at ORP conditions and TOC concentrations not normally associated with maintaining anaerobic conditions conducive to biological reductive dechlorination. This set of seemingly contrary information opens the discussion as to how long can one expect to be able to maintain robust reductive dechlorination and what should the practitioner look for to support the premise.

2:30 1,4-Dioxane Bioremediation: The Expanding Tool Box for this Challenging Groundwater Contaminant

Phil Dennis, MASc, Senior Manager, SiREM, Guelph, Ontario, CN

1,4-dioxane is a probable carcinogen commonly detected in groundwater due to its use as a solvent stabilizer. The high solubility of 1,4-D often leads to large dilute plumes with associated remediation challenges. Fortunately, available options for implementing bioremediation in 1,4-D contaminated groundwater are increasing. Aerobic cometabolic bioventing utilizes the addition of oxygen and alkane gases to groundwater and has been tested in the lab and successfully implemented in the field. For example, at a DoD site in Arizona, sequential methane and oxygen gas infusion was used to enhance cometabolic 1,4-D degradation. Delivery of sufficient oxygen identified as a major challenge for in-situ bioremediation of 1,4-D and in some cases may favor ex-situ approaches, such as bioreactors. Bioremediation of 1,4-D by aerobic energy yielding pathways shows growing promise. A major milestone was the discovery of Pseudonocardia dioxanivorans CB1190, a microorganism that uses 1,4-D as an energy source. Molecular tools to quantify CB1190 1,4-D functional genes in groundwater allow assessment of intrinsic bioremediation potential at 1,4-D sites. Where indigenous 1,4-D biodegraders are absent, bioaugmentation is also an option. Bench-scale studies are demonstrating successful bioaugmentation with 1,4-D cultures and help to verify and optimize remediation strategies prior to field testing. Phytoremediation can provide hydraulic control and delivery of oxygen to groundwater and has been deployed at 1,4-D sites in North America and in Europe. Interest in phytoremediation paired with bioaugmentation is growing and the potential for this combined approach for treatment of 1,4-D plumes will be discussed.

Continued on Page 23

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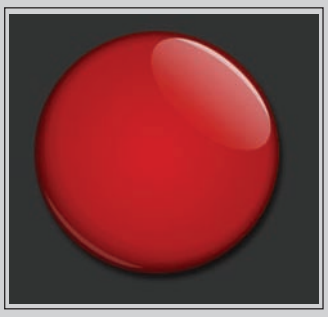

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UF launches institute to better communicate environmental issues to Floridians

By BLANCHE HARDY. PG

The University of Florida created a new institute to communicate environmental issues to Floridians.

The Thompson Institute for Earth Systems' mission is to advance public understanding of current research discoveries about the earth's natural systems in Florida and beyond. The mission is intended to better inform all Floridians, including the next generation of its decision makers.

Fort Myers couple Jon and Beverly Thompson provided a $10 million gift to the university to fund the institute. UF's Office of Research and the Florida Museum of Natural History provided additional funding for TIES.

The Thompson gift is the cornerstone of the $35.7 million initiative to promote research-based information and responses to worldwide issues such as rising oceans, eroding coastlines, saltwater intrusion into freshwater supplies, "sunny day" flooding in seaside cities, disappearing wetlands and lingering droughts.

Bruce MacFadden, PhD, director of TIES and distinguished professor and vertebrate paleontology curator at the Florida Museum of Natural History, said the institute's outreach on Florida environmental issues is important "so that the people of Florida better understand the environmental challenges facing our state."

TIES will be based at the Florida Museum of Natural History. The institute's team will collect and share research from more than 50 UF departments, colleges, centers and institutes.

"We hope that TIES will better inform Floridians about current research so that they can act accordingly and make responsible decisions about our environment," MacFadden said.

The TIES team will compile research discoveries from faculty and students at UF that will help influence legislation and foster new research with global implications.

The information will be made available to K-12 educators, community scientists and various interested public and private stakeholders through the use of innovative communication and technology.

To begin the process, three UF researchers were named TIES faculty fellows: Pasha Antonenko, PhD, from the College of Education; Andrea Dutton, PhD, from the Department of Geological Sciences; and Andrea Lucky, PhD, from the Department of Entomology and Nematology.

They are part of a core team that will help shape and advance the institute.

Undergraduate students will have the opportunity select general education courses in Florida's natural systems and related topics that will prepare them to graduate from the university empowered to make decisions that directly affect the future of Florida's environment.

In the fall of 2018, TIES will award grants for outreach projects led by UF students and postdoctoral researchers that share discoveries about the earth's systems with the institute's target audiences.

"Why should someone living in Miami care that the Arctic ice cap is melting?" MacFadden asked in a Florida Museum introductory article on TIES. "The reason is that, from thousands of miles away, the melting ice cap is driving sunny-day flooding on our coasts.

"Only by understanding the interactions between earth's systems will we be poised to respond to these threats," she said. "I believe the way to make a strategic impact that would positively impact our state is better education of the next generation, our future decision-makers."

The initiative's early priorities will be legislative outreach, information sharing with media and communities, curriculum enhancement for children in kindergarten through high school, and engagement with the general public.

In addition, the university seeks to create an earth systems center to serve as a resource for Floridians, UF students and faculty, policymakers, scientists and educational institutions throughout the state, nation and world.

FEDFILE

From Page 2

Offshore oil drilling. In an effort to expand offshore drilling, the Trump administration announced that it would expand drilling areas into waters where it is currently banned.

And to further encourage drilling, the U.S. Department of the Interior also proposed to scrap an Obama-era policy to protect oceans and the Great Lakes. In its place, policies are being proposed that emphasize economic growth.

The rules were issued by the Interior Department's Bureau of Safety and Environmental Enforcement.

A statement issued by an industry advocate said that incorporation of modern technological advances makes prior rules obsolete.

So great is their faith in this new technology that the proposed rule drops the requirement for third-party inspections of offshore drilling safety equipment.

The need for such inspections was one of the Obama administration's most aggressively promoted improvements following the Deepwater Horizon oil well blowout.

In place of inspections, BSEE noted that it is maintaining "multiple layers of review to ensure safety and environmental protection," including a requirement that most types of safety and pollution prevention equipment be designed and tested to meet detailed testing criteria and that equipment be made under a quality assurance program so that it meets standards established by the agency.

However, without inspections, there's no enforcement.

Methane emission rule rollbacks. The EPA proposed to roll back rules instituted to reduce atmospheric methane emissions from oil and natural gas infrastructure.

Specifically, the agency proposed to decrease the frequency of leak inspections from the current twice-a-year requirement to just once a year. In addition, the proposed annual inspection of methane vent systems would not need to be completed by professional engineers, as is currently required.

Environmental activists opposed the measure noting that if methane emissions from oil and gas infrastructure return to even 2014 emission levels, hundreds of thousands of tons of methane could be released to the atmosphere.

Andrew Wheeler, acting EPA administrator and a former energy industry lobbyist, said that the change could save oil and gas company $75 million a year annually.

The EPA acknowledged that the U.S. would forgo $54 million in economic benefits obtained by reducing the impact of climate change, as methane is a potent greenhouse gas.

Other critics of the proposed policy noted that major oil and gas companies are already on board with controlling methane emissions, so methane emissions are not likely to return to earlier levels.

This policy would help only the worst run companies in the industry at the expense of Americans' health and welfare, they believe.

UF gets grant for water research. The University of Florida will receive more than $4.8 million in research funding from the U.S. Department of Agri-culture's National Institute of Food and Agriculture.

The institute provides these research awards through its Water for Food Productivity Systems Challenge Area.

UF researchers intend to develop innovative software and hardware solutions for on-farm water management useful to small-scale farmers who do not have access to a nearby analytical lab service that meets regulatory requirements.

Water treatment systems will be coupled with sensing systems for measuring physical, chemical and biological constituents including temperature, pH, salinity (ions), dissolved oxygen, nitrate and phosphate, indicator organisms, and pathogenic bacteria using a coupled deep learning-participatory monitoring strategic platform.

The planned system will provide water quality analysis results within eight hours of sampling.

Professor E.S. McLamore, associate professor of biological engineering at UF, is the principal investigator. He will be assisted by 20 other researchers.

Florida utilities win EPA awards. The EPA recognized the Broward Water Partnership and Citrus County Utilities in its 2018 Annual Water Sense Partners Award.

The Broward partnership received an award, its first Partner of the Year award, for its toilet rebate program and for its series of YouTube videos that promote water conservation.

Citrus County Utilities earned its third Partner of the Year award. Its water conservation program worked with county students to identify more than 90 system leaks.

In addition, the utility provided free irrigation audits and hundreds of free Water-Sense rated showerheads and faucet aerators to homeowners.

Nationwide, the EPA gave Partner of the Year awards to 18 other WaterSense Partners.

The other winners came from among the ranks of utilities, manufacturers, builders and organizations that work to achieve the water conservation goals of the EPA's WaterSense Program.

The EPA estimates that since 2006, WaterSense conservation efforts have saved 2.7 trillion gallons of water amounting to $63.8 billion of avoided costs on utility bills.

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Continued from Page 21

Concurrent Session 7B: Combined Remedies to Closure

1:40 Pilot to Closure: Combined Remedies for a High Concentration Chlorinated Solvents Mixture

Brendan Brown, PWS, Environmental Scientist, CDM Smith Inc., Maitland

CDM Smith designed and constructed an enhanced anaerobic bioremediation system at a former industrial manufacturing facility in Orlando. The site was characterized by high a concentration (>100,000 µg/L) mixture of chlorinated solvents (1,1-DCE, vinyl chloride, 1,1,1-TCA, 1,1-DCA, and methylene chloride) in the surficial aquifer with concentrations of 2,000,000 µg/L in one well. Source zone contamination was remediated using EAB with potassium lactate and groundwater circulation to biostimulate indigenous Dehalococcoides spp. bacteria. The EAB system consisted of three 100-foot horizontal extraction wells, a vertical injection well network and a groundwater treatment plant. Groundwater was circulated between horizontal wells and injection well networks. As concentrations began to approach groundwater cleanup target levels, CDM Smith used both zero-valent iron and in-situ chemical oxidation via sodium persulfate injections to polish zones of contamination outside the EAB treatment area. Within the first 33 months of operation, total VOC mass was reduced from an estimated 2,800 pounds to less than 30 pounds with molar concentrations of all VOCs decreasing steadily. Concentrations in the source area decreased from >100,000 µg/L to <10 µg/L at multiple locations. ISCO injections further reduced concentrations outside the EAB treatment area. Post-active remediation monitoring has shown concentrations at or below applicable GCTLs. Currently, a no further action proposal has been approved in principle by the Florida Department of Environmental Protection to close the site with institutional controls with final closure pending recording of the restrictive covenant.

2:00 System Optimization and Utilization of Alternate Cleanup Criteria to Expedite Cleanup Objectives

Joseph Bartlett, PE, Environmental Engineer, Geosyntec Consultants, Titusville

Historic releases of petroleum product due to overfilling of above ground storage tanks resulted in both soil and groundwater impacts at an active marina facility located in Merritt Island. Soil impacts were immediately delineated and excavated from the site by others. Geosyntec completed groundwater site assessment activities, and preparation and implementation of an air sparge/soil vapor extraction remedial action plan. The remediation system was comprised of an AS/SVE system that provided air flow to 16 air sparge wells and vapor recovery from four vapor extraction wells. Monthly operation and maintenance events provided an opportunity to implement optimization strategies that included modifying operational configurations (i.e. changed air flow rates or operational wells) in order to avoid static conditions and to distribute air, as needed, based upon site-specific monitoring data. The system was further enhanced based on evaluation of performance monitoring sampling results, which included the installation of an additional air sparge well at a location where recalcitrant impacts remained. The AS/SVE system operated for approximately 1.5 years and was successful in reducing groundwater impacts to below target levels. In order to further expedite cleanup timeframes, 2017 changes to Chapter 62-780 FAC were leveraged. In particular, changes regarding alternate cleanup target limits pertaining to sites not eligible for state-funded site rehabilitation were utilized, which subjected the site to less stringent cleanup target limits for certain organoleptic constituents thereby, reducing the cleanup timeframe. Four quarters of post-active remediation monitoring has been completed at the site and a site rehabilitation completion order with no further action via risk management option is anticipated by the end of 2018.

2:20 Combined and Phased Remediation of a Petroleum and Chlorinated Solvent Plume Using Soil Vapor Extraction, Air Sparge, Multi-Phase Extraction, Groundwater Pump and Treat, and Bioremediation at a Florida Drycleaner Solvent Cleanup Program and Petroleum Restoration Program Site

Brian Moore, PE, Principal, GHD Services Inc., Tampa

Lori Anderson, PG, Professional Geologist, GHD Services Inc., Tampa

The McNatts drycleaning facility operates in Tampa and has been the subject of ongoing assessment and remediation through the Florida Drycleaning Solvent Cleanup Program since the late 1990s. The initial assessment identified highly concentrated soil and groundwater tetrachloroethene impacts beneath and in close proximity to the drycleaning equipment. The site is underlain by shallow sands that transition to clay just above the water table, which is situated approximately 15 feet below land surface. This presentation provides an overview of the assessment results and details the positive outcomes realized as a result of the combined and phased remedial approach to site cleanup. The combined remedy portion of the cleanup involved soil vapor extraction for shallow soils, multiphase extraction for treatment of the deeper clayey soils and groundwater recovery for plume control. A phased portion involved the simultaneous use of air sparge/soil vapor extraction to treat commingled petroleum impacts. The final phase of the remedy involved a transition to enhanced bioremediation to polish remaining chlorinated solvent groundwater impacts. The case study will emphasize the benefits and cost savings associated with the use of the combined and phased approach.

2:40 Case History: American Celcure, A Brownfields Redevelopment Story

Sean Rome, Florida Operations Manager, TRC Environmental Corp., St. Augustine

Since the mid-1980s, the former American Celcure wood treatment site located in Jacksonville has undergone more than 17 site assessments and multiple interim remedial actions by six different federal and state agencies. This case history presents the positive outcome on what can happen when a determined owner teams with a group of engaged state regulators. This presentation will explain how to deal with multi-media contamination, discuss how separating contamination zones and media may benefit closure, review the helpful role that your local regulators, specifically DEP, may offer, and provide further understanding of the brownfields redevelopment process and financial tools, beyond grants, that may be available.

3:15 Session 8: Annual Regulatory Session

Session moderator:
- Joe Applegate, Sr. Principal Hydrogeologist Geosyntec Consultants Inc.

Speakers:
- Teresa Booeshaghi, Program Administrator, Waste Cleanup, DEP
- Austin Hofmeister, Prgm. Administrator, Petroleum Restoration Program DEP
- Brian Dougherty, PhD, Environmental Administrator, DEP, Tallahassee
- Wilbur Mayorga, PE, Division Chief, Miami-Dade County RER DERM, Miami

5:00 FRC 2018 Conference adjourns
See you next year!

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Clewiston wastewater plant discharge permit violations add to Lake O's woes

Staff report

A major polluter in the Lake Okeechobee basin has routinely violated its discharge permit limits for years, according to an enforcement complaint filed by Florida Public Employees for Environmental Responsibility.

The nutrient pollutants flowing into and out of Lake Okeechobee are the same pollutants that the major drivers of the state's current water crisis of red tides and blue-green algal blooms.

The complaint concerns the municipal wastewater treatment plant for the city of Clewiston in Hendry County.

The facility has a state permit to discharge nearly 1.5 million gallons a day of wastewater effluent into Sugarland Drainage District Canal Number 3. But Clewiston has a long history of seriously exceeding those permit limits.

The U.S. Environmental Protection Agency lists the site as being in noncompliance for each of the past 12 quarters. Most of the violations are for excess effluent releases.

According to the EPA's effluent exceedances report, Clewiston has had at least 7,300 days with exceedances during that period, many for total phosphorus limit exceedances.

The flow exceedances may be underestimates because much of Clewiston's equipment for measuring flow, sampling and chlorination was not properly calibrated.

For much of 2016, the facility operated without a valid permit at all.

"Unfortunately, while noncompliance at Clewiston is extreme, it is not atypical in Florida," said Florida PEER Director Jerry Phillips, a former state Department of Environmental Protection enforcement attorney, noting that discharge reports show Clewiston's daily wastewater flow averaged a quarter of a million gallons per day above permit limits.

State records also showed the facility to be out of compliance in each of the last three inspections. In two of those inspections, it was deemed to be in significant noncompliance.

DEP took no enforcement in response to the multiple permit violations found in the 2014, 2015 and 2016 inspections.

Clewiston's latest permit removed the limit on mercury discharges, despite prior violations for exceeding effluent limits for mercury, as well as for dissolved oxygen and fecal coliform violations.

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SPILLS

From Page 18

ity testing, especially in problem areas, and prompt disclosure of water quality issues to the public.

The city must also develop an ordinance requiring property owners to repair damaged sewage lines from homes and businesses.

The environmental groups said in a statement that the needed infrastructure improvements are urgent and the ecological impacts of the spills will take a long time to heal.

The groups noted that the public's confidence has been shaken by the city's failure to notify the public of the spills.

"St. Petersburg has acknowledged failures and pledged to address needed sewage system improvements, which is a positive and welcome step," the groups noted.

"But St. Pete does not have a good record of addressing the root causes of the ongoing sewage system problems.

"In addition to pursuing long overdue maintenance and upgrades to the sewage system, we want the city to fund environmental mitigation projects to offset some of the damage done by the discharges."

The city has spent over $700,000 on legal fees fighting the case.

If the city fails to follow the terms of the settlement, the environmental groups could take more legal action.

St. Pete officials did not return calls for comment.

RECLAIM

From Page 11

claimed system.

Currently, the city provides reclaimed water to Camp Weed and the Suwannee Parts and Recreation Department, with the remaining water being disposed of at the city's sprayfield.

The project cost just under $130,000 with about $125,000 paid by the water management district and about $5,000 paid by the city.

The project supports year-round water conservation and water shortage ordinances that the city adopted in 2012.

Construction began in April and the new irrigation line went live this summer.

Since 2005, the Suwannee River Water Management District has provided over $21 million for reuse projects and partnered with Live Oak and other cities to provide funding help for established reclaimed water programs for local utilities.

District officials said that reuse is an integral part of meeting the state's existing and future water supply needs while sustaining natural systems.

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will enhance natural resources and provide more recreational activities for Floridians."

In addition to securing valuable ecological systems, the land will serve as a buffer for training missions and operations at Naval Air Station Whiting Field.

People news. Erdman Anthony hired Justin Ashey, EI, as a project engineer in the West Palm Beach office's transportation core business. Ashey has 10 years of experience in highway design and a bachelor of science degree in civil engineering from Florida Institute of Technology.

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