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September 2015

Volume 37, Number 9

EPA on fracking 5

The U.S. Environmental Protection Agency released a report on hydraulic fracturing, characterizing several mechanisms whereby fracking could affect drinking water resources.

MFLs in Suwannee district 8

DEP set minimum flows and levels for the Lower Santa Fe and Ichetucknee rivers in the Suwannee River Water Management District—the first and only time that DEP developed such a rule, a job typically left to the water management districts.

DEP drone 10

DEP recently completed an assessment of Nassau Sound using both a tethered undersea robot and a commercial aerial drone, marking the first time that the agency used a drone in a study.

Small-boat robot 13

An FAU engineering team will spend the next year developing the first generation of small-boat robots outfitted with sonar, visual sensors and semi-autonomous locomotion capability that enables them to inspect bridges.

Lax on enforcement? 15

State environmental officials are under fire again from Public Employees for Environmental Responsibility for being lax on polluters who violate Florida's environmental laws. DEP refutes the claim.

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Got a story lead?

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

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SJRWMD approves CUP mods for Sleepy Creek Lands

By **BLANCHE HARDY, PG**

After years of pleas for denial by environmental activists, the St. Johns River Water Management District Governing Board unanimously approved controversial consumptive use permit modifications for Sleepy Creek Lands. The property, formerly known as Adena Springs, is in Marion County.

The district subsequently received word of appeal on their decision in early August. The 5th District Court of Appeals in Daytona Beach is expected to announce soon whether it will order mediation in the case.

The cattle ranch lies in close proximity to Silver Springs.

Advocates for denial oppose the permit for its potential for groundwater quality degradation due to the intensity and size of the cattle ranch's operation and the increased water withdrawals above those already impacting Silver

RANCH
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Veolia Field Supervisor John Morris checks the vacuum level in the AIRVAC system as part of a scheduled maintenance program in Crystal River. See story on Page 9.

Reformed DEP Petroleum Restoration Program gathers momentum

By **ROY LAUGHLIN**

Significant program reforms and capped budget levels have led to chaotic times for the Florida Department of Environmental Protection's Petroleum Restoration Program over the past couple of years.

It has been difficult for program administration and staff, as well as contractors who continue to pursue soil and groundwater cleanup work with the program. But the tide may finally be turning on the petroleum cleanup program.

Diane Pickett, PG, who became PRP administrator in January this year and has been involved with the cleanup program since the late 1980s, recently spoke with us about improvements made and issues resolved.

Her comments ran the gamut from

efforts to increase the pace of cleanups and put new information technology in place to streamlining operating procedures that will benefit both state contractors and program staffers.

About two years ago, the Florida Legislature tasked DEP administrators with "reforming" Florida's petroleum cleanup program to end alleged contractor abuses. Industry insiders consistently claimed that any alleged abuses were instigated by only a few individuals at a few firms. Those allegations, though widely held, did not lead to legal action of any kind by the state against the alleged wrongdoers.

The Legislature also wanted to see more sites cleaned up and removed from the list that was growing by the multiple hundreds each year. In addition, property owners participating in

the program were also anxious to see their properties cleaned up, formally released from the program and readied for redevelopment or sale.

Before the Legislature demanded reform, funding was cut significantly due to dramatically declining gasoline consumption and legislative reprogramming of funds during the recession.

Mike Ashley, then the program's administrator, expertly oversaw a soft landing to the substantially lower funding levels. But the reforms demanded that would have been difficult to implement in fatter times were completely bound up by substantially reduced funding and the inability to hire additional program staff during the transition.

Administrators quickly shifted work to the MyFloridaMarketPlace portal, the state's e-procurement and accounting system—an integral tool for contractor eligibility, bidding, contract management and invoicing.

For many contractors, MFMP's novelty and complexity was initially a major hurdle. The result was a major decrease of over 200 contractors formerly involved with PRP projects. As of July, 2015, the program had only 66 agency term contractors on board and purchase orders issued for a total of about \$50 million since January.

PRP's leap to MFMP, expected to produce efficiencies, has so far fallen short of expectations. Change orders, a routine project requirement, were not easy to implement at first because, as Pickett noted, MFMP "was not designed for when you're out in the field and you need to change something quickly," she said. "And the process doubled work for PRP staff. Occasionally we experienced bottlenecks."

She noted that last summer some of

Steverson confirmed by Florida Cabinet as DEP secretary, finally

By **PRAKASH GANDHI**

The wait is over. Eight months after he was chosen to lead Florida's top environmental agency, Jon Steverson was confirmed by the Florida Cabinet as secretary of the state's Department of Environmental Protection.

Steverson was appointed as interim secretary in December but had not been confirmed by the Cabinet, which received more than 300 letters urging its members not to appoint him. Most of the opposition was generated by a new group, Florida Parks in Peril, that is concerned about increased cattle leasing and timber harvesting in state parks.

Steverson said in interviews that he has the best interests of Florida at heart and wants to make the department run

as efficiently as possible while continuing to safeguard Florida's natural resources.

But critics expressed concerns about his goal of trying to make Florida's nationally award-winning state parks systems more financially self-sustaining. Letters to Cabinet members said the park service was created to acquire and conserve natural areas "for all time."

Still, his appointment received the full backing of Gov. Rick Scott, who said in a statement that Steverson had done a great job as interim secretary after having spent his entire career protecting Florida's natural resources.

Steverson is yet to be confirmed by the Florida Senate, as required. But in

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PRP
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Florida smokestack power plants catch break on level of sulfur, nitrogen emissions

Staff report

Under the U.S. Environmental Protection Agency's Cross-State Air Pollution Rule, the agency regulates smokestack sulfur and nitrogen emissions in an effort to reduce air pollution on a regional basis.

In July, the U.S. Court of Appeals for the District of Columbia ordered the agency to modify air standards that were finalized in 2011. The ruling affects 13 states including Florida.

Florida in particular will see relaxed standards for either sulfur dioxide or nitrogen oxide. Two states, Texas and South Carolina, will see relaxed limits for both air pollutants.

This court challenge was one of several against the cross-state rule. The controversial rule established standards to ensure that downwind states—where air masses converge—are able to meet federal air quality standards.

In 2014, the Supreme Court upheld the EPA's authority under the Clean Air Act to enforce the rule. The Supreme Court also found that the EPA is not required under the CAA to precisely define contaminant levels crossing borders to downwind states.

Under the precise determination sce-

nario, the rule could require upwind states to lower emissions and end all downwind contributions to adjacent states. That provided some wiggle room for the appeals court to order the EPA to modify its nitrogen and sulfur oxide standards.

The decision of the appeals court tweaks the rule's standards a bit, but clearly rejected plaintiffs' arguments that the standards were overly burdensome.

Air quality advocates scoffed at the circuit court's findings, noting that the standards were developed using 1990s data. Many advocate stricter standards, not more lenient ones. The EPA will now go through the process of determining new standards.

Power plant water contaminants. A new report by a coalition of environmental activists urged the EPA to quickly formulate rules to protect public health from water contaminants released by power plants.

The report is a prequel to an EPA pro-

posed rule expected out in September, Effluent Limitations Guidelines for the Steam Electric Industry, or ELG.

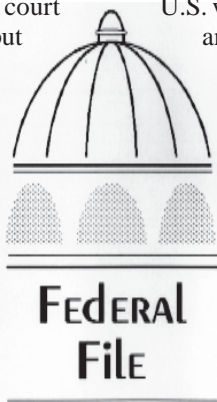
The report, "Selling our Health Down the River," estimated that power plants release 5.5 billion pounds of pollutants into

U.S. waterways annually. Those pollutants contaminate more than 23,000 river miles and 185 waterbodies, resulting in fish too toxic to eat.

The report also said that the EPA underestimated the benefits of reducing water contaminants from electrical generation plants. The agency estimated \$14-\$20 million worth of benefits annually, but the new report claimed more than \$300 million in benefits annually.

The report noted that drinking water utilities and their customers must now pick up the tab to treat contaminated water, and said that burden should be shifted to the electricity-generating companies.

The ELG rule proposal includes a list of options that the EPA is considering to



reduce river, lake and bay contamination. The report's authors encouraged the EPA to choose the strongest possible protections to restrict contamination from electrical generation plants—Options #4 and #5 in the EPA's proposal. Both eliminate almost all heavy metal water pollution from this industry.

The report's authors include Barbara Gottlieb, Physicians for Social Responsibility; Abel Russ, Environmental Integrity Project; Casey Roberts, Sierra Club; Lisa Evans and Thomas Cmar, Earthjustice; and Jennifer Peters, Clean Water Action.

Report on the Environment. The EPA recently updated its online database, Report on the Environment, with environmental and public health indicators to show the current and historical condition of the nation's environment and human health.

The database provides users with 85 separate indicators of air, water, land, human exposure, human health and ecological conditions.

The indicators use up-to-date information from the EPA, other federal agencies, state agencies and nongovernmental organizations. The data are peer-reviewed and meet high standards for accuracy, representativeness and reliability, according to the EPA.

Report on the Environment is available for public use and viewing. Users may generate interactive graphs, tables and maps and can download data for each indicator for more extensive analysis.

In its press release describing recent updates, EPA noted that ambient air concentrations of six criteria pollutants—carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter and sulfur dioxide—decreased considerably between 1990 and 2011.

Total U.S. greenhouse gas emissions increased six percent between 1990 and 2013. But they have since decreased nine percent from their 2005 levels.

In addition, between 2005 and 2012, the percentage of food with detectable pesticide residues decreased and, between 1998 and 2012, pesticide exposure incidents declined by about half.

The report is available at <http://cfpub.epa.gov/roe/>.

Commitment to environmental justice questioned. Public Employees for Environmental Responsibility recently criticized the EPA's proposed Environmental Justice 2020 Action Agenda Framework.

The advocacy group claimed that it contains "precious little action and continues to marginalize disadvantaged communities beset by disproportionate pollution burdens."

In a press release, PEER further explained that "divorce of environmental justice from its underlying basis in the Civil Rights Act of 1964 reduces environmental justice (at the EPA) to a largely voluntary program."

They point out that the framework proposal includes no enforceable regulations or proposals for enforcement. They also criticize the absence of any guidance for state and local recipients of EPA funds, leaving the agency's environmental justice program "as an intellectual exercise for EPA staff with little practical consequence."

PEER made a point of criticizing the EPA because it is charged with coordinating environmental justice efforts among all federal agencies.

The 1964 Civil Rights Act is the foundation on which to build environmental justice activities, and yet, according to PEER, the agency has not yet issued any guidance to implement that act in hundreds of state and local programs that provide funds—even to communities where pollution affects public health.

In its comments, PEER criticized "fragmented and conflicted cross-currents within the EPA that have caused various



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FEDFILE
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FPL seeks approval to buy, shut down Jax power plant

Staff report

Florida Power & Light officials are seeking approval from state regulators to spend \$520.5 million of ratepayers' money to buy a coal-fired power plant in Jacksonville, and then close the plant down within two years.

Environmental advocates applaud the deal, saying it would help reduce greenhouse gas emissions. The proposed sale has received support from Audubon Florida, The Nature Conservancy and the Natural Resources Defense Council, among others.

But a group representing large energy users balked at the sale, arguing before the Florida Public Service Commission that FPL is offering too much money from ratepayer pockets for the plant.

FPL estimated that the deal will lead to \$70 million in savings down the road, but the Florida Industrial Power Users Group disputed that figure.

The energy group also intends to file an objection to an agreement involving the Office of Public Counsel, a state agency that represents consumers on utility issues.

The Juno Beach-based utility currently pays \$120 million a year for power from the Cedar Bay Generating Plant, now owned by CBAS Power Holdings LLC, under a long-term contract to purchase power.

The buy-then-close deal is aimed at phasing out coal-fired power from the plant and replacing it with electricity produced with cheaper natural gas. FPL intends to operate the plant until a third natural gas pipeline is built to the state.

FPL would run the plant at about 10 percent capacity for the next year and a half, which would reduce carbon dioxide emission by an estimated million tons a year.

Raytheon property sells. St. Louis-based Commercial Development Company, specialists in redeveloping contaminated property, acquired the controversial 29-acre Raytheon property in the Azalea neighborhood of St. Pete.

When Raytheon bought the 1950s era manufacturing plant in 1995, they inherited a site heavily contaminated with a toxic soup containing lead, toluene, vinyl chloride, 1,4-dioxane and trichloroethylene that had seeped into the soil and groundwater below.

After a massive cleanup effort that included dig-and-haul for the contaminated soil and pump-and-treat for the contaminated groundwater, Raytheon continues to monitor groundwater wells in the area.

CDC officials met with residents concerned about groundwater pollution from the property migrating off site.

They plan to continue meeting with neighbors and government officials as they try to determine the best future uses for the site.

CDC specializes in redeveloping brownfields and environmentally damaged properties, with a portfolio of more than 175 sites in the U.S. and 130 in Canada.

Renewable energy in St. Lucie. Bio-Power Operations Corp. announced that its wholly-owned subsidiary Green3Power Operations Inc. won an award to build a \$175 million renewable energy plant at the St. Lucie County Solid Waste Management Facility.

The facility will convert waste into ultra-low sulfur synthetic green No. 2 diesel fuel using G3P's exclusively licensed gasification technology and the Fischer-Tropsch coal-to-liquids process that turns gas into fuel.

The facility will extend the life of the county landfill while reducing environmentally harmful greenhouse gas emissions.

G3P has been working with joint venture partner Vanderweil Engineering to convert approximately 1,000 tons per day of municipal solid waste, construction and demolition debris, used tires and yard waste into synthetic diesel fuel.

No-frack zone. Officials in the city Bonita Springs approved an ordinance that prohibits the practice of hydraulic fracturing within city limits.

Environmental advocates and citizens from Bonita Springs and other communities in Southwest Florida made a strong case for banning the oil-drilling technique.

The controversial technique injects a high pressure mixture of water, sand and chemicals into the subsurface, allowing for the recovery of oil difficult to reach by traditional means. It has been criticized by many as environmentally unsafe.

Many fracking opponents believe that fracking practices will expose the groundwater in the Bonita Springs area to potential environmental harm.

People news. Jerry Oshesky, PE, joined consulting engineering firm Stanley Consultants. As a project principal based in the firm's Tampa office, he will be responsible for business development, client relations and project oversight for public and private clients throughout Florida.

Vicki Lehr, PE, a former South Florida Water Management District executive, has

joined Florida-based Jones Edmunds as the new manager of operations for the firm's South Florida office in Lake Worth. She has more than 30 years of strategic planning and project management experience in the engineering and environmental construction industry.

David Toffaletti has joined Golder Associates Inc. as the new Florida marketing coordinator in their Jacksonville office.

In this new role, he will be managing the marketing efforts for Golder's three Florida offices.

Hector Sanchez was promoted to senior vice president of operations at Clean Earth Inc. He has over 28 years of experience in the environmental industry and brings a wealth of knowledge

in the management and business development of RCRA Part B hazardous waste facilities, services and field operations safety.

In addition, Cheryl Coffee was promoted to director of environmental compliance at Clean Earth. She has over 20 years of experience in environmental compliance, permitting and waste management.

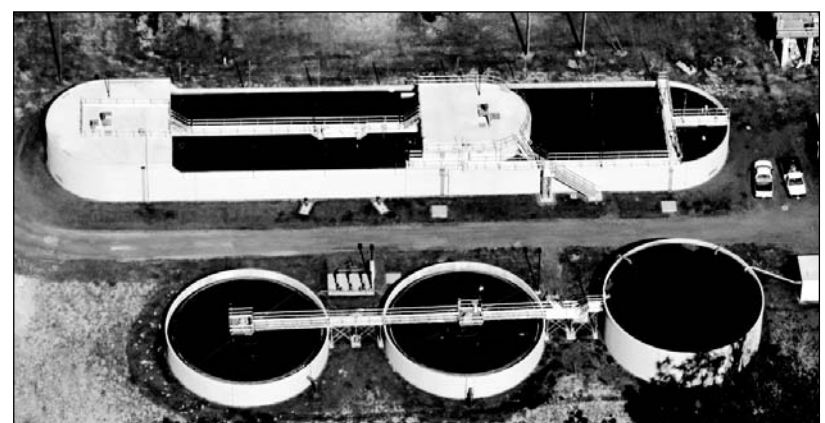
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New study describes how rain, storm surge contribute to urban flooding

Staff report

Flooding in New Orleans caused by Hurricane Katrina in 2005 served as a grim reminder that coastal cities still face the ancient risk.

A recent study, "Increasing Risk of Compound Flooding from Storm Surge and Rainfall for Major U.S. Cities," showed that sea level rise is the underlying cause of flood risk in coastal cities.

But in the Southeast U.S. when storms

produce high surge and high rainfall concomitantly, urban flood threats can increase dramatically to dangerous levels.

High precipitation results in direct stormwater runoff, pluvial flooding and increased river discharges, contributing to substantial urban flooding that's made worse if a substantial storm surge occurs simultaneously.

The research team identified three compound flooding mechanisms: elevated estuarine water levels due to sea level rise,

heavy rainfall contributions to storm surge flooding and moderate storm surge that blocks or slows drainage. The local setting, according to the investigators' characterizations, will determine the depth in areal extent of flooding in affected urban areas.

The research included first-time analyses of 17 U.S. port cities with populations of more than one million residents, and for which compound flooding risk has not been previously evaluated.

The report also included two case studies—one for New York City and one for the flooding resulting from Hurricane Sandy.

In New York City, urban flooding is increasing primarily due to more frequent compound flooding events.

Hurricane Sandy flooding was due primarily to storm surge. Rainfall contributed a small amount to that storm's flooding, based on historical comparisons.

The study's results are a general assessment of urban flooding. The authors noted that research using complex, integrated modeling of both surge and rainfall flooding will be needed to predict flooding impacts at local levels.

The study was a collaborative effort between scientists at the University of South Florida, the University of Maine and the University of Siegen, Germany.

Lake Hancock dam completion. The Southwest Florida Water Management District has completed replacement of a water control structure that will raise Lake Hancock's water level about 1.25 feet.

The additional water in Lake Hancock and the ability to control its flow are key components of a larger effort to meet minimum flows and levels in the Peace River during dry periods of the year.

The project included expenditures of \$130 million to buy land for flowage easements on land to accommodate the increased water level around Lake Hancock and along Saddle Creek north of the lake.

SWFWMD is also working with Polk County officials to build a recreational trail around the east side of the lake, primarily to build bridges over areas affected by flooding due to water level rise.

With this project's completion, the district will resume formal rulemaking to establish MFL standards for the Peace River at Bartow, Fort Meade and Zolfo Springs.

MFL rulemaking began in 2006, but was suspended pending the completion of the Lake Hancock water control structure. Rulemaking for Upper Peace River MFLs should conclude in December this year.

Drinking water utilities withdraw large quantities of Peace River water as source. For much of the time over the past 30 years, the river's flow has been well below desired rates. In drier years, the Upper Peace River has been known to dry up completely.

Upper Peace River MFLs, once set, will influence how much water the Peace River Manasota Regional Water Supply Authority may withdraw. It will also set limits for Polk County Utilities, should it decide to tap the Peace River in the future as a drinking water source.

The new water control structure is expected to allow water managers to meet MFLs in the Peace River 89 percent of the time. The district is also conducting monitoring studies to determine if additional projects to control water flow from the Peace River into riverbed portals to the aquifer are necessary.

By reducing water inflow to those sinks during low water periods, the district could improve MFL compliance to 95 percent of the time.

Tarpon Spring's RO. In late July, the city of Tarpon Springs' new reverse osmosis water treatment facility came online, increasing drinking water production capacity from 3.2 to 5 million gallons a day.

The increased capacity is expected to meet the city's drinking water needs through the next 20 years.

Until its new RO facility opened, Tarpon Springs obtained some of its water from its well field and purchased additional water from Pinellas County and regional provider Tampa Bay Water.

Tarpon Springs officials said that with this new RO plant, the city will have much

greater water supply independence that will allow more local control over costs, water quality and planning for future needs.

The planning process to increase Tarpon Springs' water supply capacity began in 2002 and included local voter approval in 2006. Construction began in 2013.

Silver Springs septic. Within about a year, septic tanks at Silver Springs' State Park will be a thing of the past, replaced by connections to the municipal sewer system.

The change will affect park facilities for day visitors, 59 campsites and 10 cabins. The Florida Department of Environmental Protection is footing the bill, expected to be about \$1.1 million, as part of its Springs Initiative.

The park service estimated that 2,372 pounds of nitrogen annually leaches from septic tanks to groundwater in Silver Springs State Park, and then into the Silver Spring system.

Resulting eutrophication in the spring and spring run is highly undesirable. The springs are one of Florida's largest and best-known first magnitude springs, and have been the poster child for poor nutrient input management in Florida.

SJRWMD cost share grants. In the coming year, the St. Johns River Water Management District's Agricultural Cost Share Program will fund 22 agricultural projects. The projects are expected to offset 259 million gallons of water use per year.

In addition, the projects could reduce nitrogen and phosphorus loading to surface waters in the region by more than 200,000 pounds per year.

The SJRWMD Governing Board approved funding at its July meeting for projects in nine counties across the district. The projects include irrigation retrofits, tail water recovery and reuse, rainwater harvesting, soil mapping, variable rate fertilizer spreaders, and soil moisture sensors and telemetry systems.

The types of agricultural operations include citrus, blueberry, vegetable row crops, peanuts, aquaculture, hydroponic vegetables, and forage and sod operations.

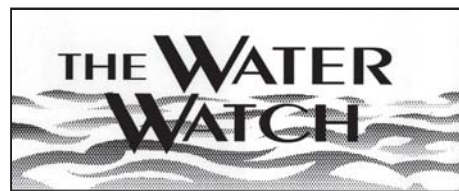
Ann Shortelle, executive director of the district, said that the funding is for projects to be implemented within the next few months, providing benefits almost immediately.

Lake Alfred/IFAS land swap. A land swap between the city of Lake Alfred and the University of Florida's Institute for Food and Agricultural Sciences will ultimately lead to more land for the city's wastewater sprayfield and a stable water supply for the university's crop research efforts.

The city gave IFAS an 80-acre orange grove, used by its utilities department as a wastewater sprayfield. In return, IFAS gave Lake Alfred property occupied by two buildings in Lake Alfred, the Buchanan Building and the Seminole Warehouse.

City officials said they expect to raze the Buchanan building and sell its lot. The Seminole Warehouse will be used by the city's Parks and Rec Department.

IFAS plans to use the 80-acre grove for crop research. The city will provide treated



WATCH
Continued on Page 5

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EPA: Fracking risks to groundwater real but technique has good track record

By ROY LAUGHLIN

There is no doubt that hydraulic fracturing—fracking—has been a boon to the U.S. economy. But the possibility that it could contaminate drinking water sources remains a persistent concern.

In a recently released report entitled “Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources,” the U.S. Environmental Protection Agency characterized several potential mechanisms whereby fracking could affect drinking water.

The agency stated, however, that “we did not find evidence that these mechanisms have led to widespread systemic impacts on drinking water resources in the United States.”

Possible human exposure risk through water contaminated by fracking is nonexistent in about half the states in the country where fracking has not been used. Elsewhere, fracking has a real possibility of affecting drinking water supplies.

Today, about 9.4 million people live within one mile of a frack well. About 6,800 sources of drinking water for public water systems serving about 8.6 million people are located within one mile of a frack well.

Within states where fracking has been done, the risk is focused on geological formations that hold extractable deposits. For the most part, this includes relatively distinct areas.

About half of the country’s 25,000-30,000 fracked wells are in Texas. In Colorado, second on the list for number of wells, 85 percent of the fracking occurred in only two counties. Pennsylvania and North Dakota rank third and fourth, respectively, and wells were widely distributed. Oklahoma is rapidly moving up the list.

EPA investigators looked at five activities groups associated with fracking: water acquisition, chemical mixing of hydraulic fracturing fluid, well injection, flowback in produced water and wastewater

treatment, and waste disposal.

They did not look at fracking-associated activities further from the well, for example rail transport of oil, gas or hydraulic fracturing fluids, infrastructure development, or site closure and reclamation.

Petroleum-bearing geological formations, such as those in North Dakota, are extremely deep and separated from the base of drinking water aquifers by a mile of impermeable geological formations. Risks of groundwater contamination are minimal there, limited primarily to poor casings around wells or spills of produced water, the water that flows back out of a well after fracking.

But in areas such as Louisiana and Pennsylvania, fracking occurs at shallower depths and the possibility of contaminating drinking water sources is greater.

Where potable water sources are scarce, competition for the resource rather than its level of contamination is the bigger risk to drinking water supplies.

Water comprises at least 90 percent of hydraulic fracturing fluids. The median water volume nationwide used to frack a well is 1.5 million gallons, according to the report, with wide variation depending on the type of well drilled and its location. In places such as Arkansas, Louisiana and West Virginia, the median water volume can reach five million gallons per well.

Where water is readily available from surface sources, limiting competition between drinking water and fracking is hardly a problem. In Pennsylvania, for example, about 60 percent of the fracking water is reused. In Texas, where potable water is scarce, just under half of the water used in fracking comes from surface water sources, with a similar amount from groundwater. Only five percent is reused.

Produced water, typically briny water high in dissolved solids, is disposed of in underground injection control wells.

According to the agency, most examples of ground or surface water contamination by fracking operations come from two activities: the mixing and use of

fracking fluids and produced water.

A master list of chemicals used in fracking fluids over the past 13 years includes 1,000 chemicals. At any given well, fracking fluid formulation contains four to 28 specific chemicals, in addition to water and sodium chloride. Only 32 of the 1,000 master list chemicals are used in 10 percent or more of the wells.

For many of the chemicals on the list, there is insufficient information about human health effects. The EPA had reports of only 151 fracking fluid spills. Those spills contaminated soil, but the chemicals tended to bind tightly to soil and did not

reach groundwater. The report found no evidence of groundwater contamination due to fracking fluid spills.

Produced water is the highest volume category of water from fracking operations. It includes chemicals added to fracking fluid, petroleum, water from the formation fracked and typically high levels of dissolved solids.

Treatment in wastewater treatment or chemical treatment plants is a third alternative disposal path for produced water

FRACKING
Continued on Page 15

WATCH From Page 4

wastewater to IFAS for irrigation.

Because the grove is a research site for citrus greening, its fruit will not be sent to grocery stores. The sprayfield water, which cannot be used for food crops, will still be useful for IFAS’ research.

Lake Alfred officials retained 60 acres of the orange grove property, about what it currently needs for its wastewater sprayfield.

The city council appropriated \$80,000 to convert the 60 acres to a new sprayfield by installing 6,000 feet of pipe.

If necessary in the future, the city could expand its sprayfield use to some of the 80 acres it just swapped with IFAS.

As a result of the transaction, both Lake Alfred and IFAS appear to have gained something valuable with no cash out of pocket.

SRWMD cooperative grants. The Suwannee River Water Management District is accepting applications for up to \$1.5 million in cooperative cost share funding with the district’s county governments, municipalities, water supply authorities or other government entities.

The cooperative funding program, the Regional Initiative Valuing Environmental Resources, or RIVER, is intended to protect water supply, improve water quality, restore natural systems and provide flood protection.

The district has scheduled appointments with interested local government and agency representatives during the final week of August and first week of September. The application submittal deadline is Oct. 30.

Funding for projects selected will be dependent on approval of the district’s proposed budget by its governing board. Contacts at the district are Vanessa Fultz and Patrick Webster. Both can be reached at (386) 362-1001.

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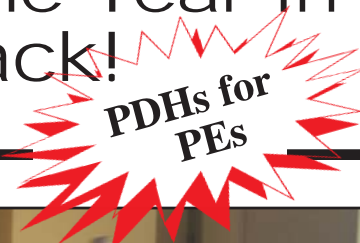
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Thursday, October 8, 2015

9:00: Keynote Address from the Conference Chair
Nick Albergo, PE, DEE, Senior Engineer
GHD, Tampa

9:30: Contamination Discharge Reporting Obligations: Technical, Legal and Ethical Requirements and Implications for the Environmental Professional

Michael Goldstein, Esq., Principal
The Goldstein Environmental Law Firm PA, Miami

Environmental consultants can be challenged when asked to advise clients on whether a contamination reporting obligation exists and, if so, by whom, to whom and when. These questions, which can involve not only a scientific analysis but a legal analysis, become especially complicated in the context of a real estate deal when the consultant may be representing a buyer who may or may not elect to close and may or may not have obligated itself to share the results of a Phase II investigation with a seller. This discussion will carefully and methodically walk through the contamination reporting obligations under Florida law, as well as certain county ordinances where a local pollution control program has created its own enforcement process, such as Broward, Miami-Dade and Hillsborough counties. We'll address the contamination reporting obligations that apply to owners and operators, buyers, lenders and sellers. Special emphasis will be placed on real estate transactions to help the environmental professional understand what reporting obligations are triggered for the buyer and the seller when the discharge has been discovered by the buyer, if any, which is the typical fact pattern giving rise to these questions. We'll also discuss what contamination disclosure obligations a professional engineer or professional geologist may have by licensure—as opposed to statute—that could create an unanticipated dynamic for the professional and a conflict with whatever confidentiality provisions have been included in the underlying service agreement with the client or even the transaction document itself. We'll also discuss the mechanics of how disclosure must be made, and pursuant to what timeframes, depending on the type of contamination and whether the contamination has migrated off-site or remains completely off-site.

10:00: Break in Exhibit Hall

Session 2: Assessment Tools

10:30 Session 2A: Multi-Component NAPL Investigation of MGP Waste With Focus on TarGOST® Technology

Terry Griffin, PG, Senior Project Geologist
Engineering & Environmental Services Division, Cardno, Clearwater



A comprehensive nonaqueous phase liquid investigation was conducted at a site with documented manufactured gas plant free product with a primary focus on the use of Tar-Specific Green Optical Screening Tool, TarGOST®, assessment technology. TarGOST is a laser-induced fluorescence screening tool that is specifically designed to detect NAPL in the subsurface. It responds almost exclusively to the NAPL found at former MGP and creosote/pentachlorophenol sites. It does this by sensing the fluorescence of polycyclic aromatic hydrocarbons found in MGP and creosote NAPL. A preliminary phase of site and NAPL characterization was performed to determine the likely efficacy of using TarGOST technology and to optimize the subsequent TarGOST investigation. The initial assessment phase utilized Flute Liner™ in conjunction with rotasonic drilling and sample screening with Sudan IV dye. The TarGOST system was used in conjunction with Geoprobe™ direct push technology wherein fiber optic cable was run down the DPT drill rods, connecting a sapphire-windowed probe on the downhole drill rods to an above-ground spectrometer. Filters in the instrument allow certain ranges of light to be detected with the fluorescence signal providing immediate information regarding the quantity and nature of the NAPL encountered. The TarGOST investigation included advancement of 64 TarGOST/DPT borings throughout an approximately 3.5-acre study area. Based on this investigation, free product was typically present where the maximum fluorescence signal exceeded 100 percent RE response. Based on this relationship, the area and precise interval of MGP NAPL was fully characterized and delineated, and a total of approximately 35,000 gallons of free product was estimated in the subsurface.

11:00 Session 2B: Reducing the Cost of Meeting Business Goals for Fuel Release Remediation Using Real-Time Web-Based Analysis of High Resolution Site Characterization Data

Roger Lamb, Principal Geologist
COLUMBIA Technologies, Columbia, MD
John Sohl, Chief Executive Officer
COLUMBIA Technologies, Columbia, MD

To reduce the cost of meeting business goals for a fuel release into the environment, real-time analysis of high resolution site characterization data is invaluable. The use of high resolution tools such as the uVost/LIF®, hydraulic profiling tools, membrane interface probes and mobile laboratories to perform site characterization work for chemical release assessment is becoming common practice in the industry. Integrated analysis of these HRSC data sets by all the project stakeholders—regulators, potentially responsible parties and consultants—in real-time is not commonly performed but is critical to ensuring the HRSC program achieves the project business goals at the lowest possible cost. COLUMBIA Technologies has developed a web-based tool that performs this function—Smart Data Solutions®. Smart Data Solutions has been used on 170 projects as of July 2015 including a 400-acre oil refinery, multiple TCE health risk assessment projects, multiple gasoline release remediation designs, railroad yard diesel recovery projects and chlorinated solvent ISCO remediation designs projects. This presentation will provide a project case study on how real-time analysis of uVost/LIF and HPT data via Smart Data Solutions was used by the consultant and regulators to ensure a high resolution LNAPL conceptual site model was developed to aid in determining the feasibility of remediation design and path toward site closure.

11:30 Session 2B: High Resolution Site Characterization of 1,4 Dioxane Sites Using a New On-site, Real-time Analysis

William Davis, PhD, President
Triad Environmental Solutions Inc., Durham, NC

1,4 dioxane was a widely used stabilizer in chlorinated solvents that is highly soluble and commonly found in large dissolved phase plumes. The U.S. Environmental Protection Agency designated 1,4 dioxane as a potential human carcinogen. Many states are now regulating 1,4 dioxane in drinking water, making it an emerging contaminant of concern for groundwater investigations. Current laboratory methods for 1,4 dioxane use either purge and trap methods (EPA Methods 524.2 or 8260b) or solid phase extraction (EPA Method 522). Due to the high water solubility of 1,4 dioxane, purging methods show high limits of detection and require special method adjustments including heating the sample and/or the addition of salt. Solid phase extraction methods are time consuming with multiple steps including concentration of the final extract to obtain the desired sensitivity. These factors make the use of these methods impractical for rapid, on-site analysis of 1,4 dioxane. The method described here is a new 1,4 dioxane analysis method based on solid phase micro-extraction followed by mass spectrometric analysis using the direct sampling ion trap mass spectrometer. This method has been demonstrated to provide quantitative analysis of 1,4 dioxane to limits of detection of 1-2 ug/L for groundwater and 5-8 ug/kg for soil samples. Due to the extremely simple nature of the SPME extraction and the rapid DSITMS analysis—five minutes—an analyst operating a single DSITMS can provide up to 50 on-site analyses per day. The method has been applied to provide high resolution site characterization at a number of sites. The real-time analysis for 1,4 dioxane allowed project managers to take advantage of Triad Approach site characterization to ensure sampling and analysis results managed site heterogeneity. Case studies will be presented to demonstrate the value of using this new method in the field to provide data densities that have not been possible due to off-site analytical costs.

12:00 Day One Luncheon

Sponsored by Advanced Environmental Labs



North American Shale Development and the Impacts on Energy & Petrochemical Markets

Chuck Whisman, PE, Vice President, Global Energy Market Leader, CH2M, Philadelphia, PA

This luncheon talk explores how oil and gas development in the U.S. and Canada is creating significant business opportunities worldwide, while also bringing our scientific community together to develop best practices, minimize risks and lead research initiatives. North American crude, natural gas and natural gas liquid markets will be discussed, as well as their impact in the U.S and globally including recent pricing impacts. For example, U.S. NGL production is changing the landscape of the international petrochemical industry, providing a new low-cost feedstock in the U.S. The presentation provides an overview of natural gas liquids, processing and petrochemical markets, as well as current and future initiatives. We will explore the impact on processing, manufacturing, pipelines, rail and exporting and how it impacts the U.S. as well as the world petrochemical industry. Similar impacts of North American crude and natural gas production will also be discussed, including their impacts on U.S. refineries and LNG exporting projects. The presentation will also explore some research and development initiatives in the U.S. related to developing improved best practices, reducing risks and providing enhanced regulatory compliance programs. Examples of research projects will be shared, in addition to information on how stakeholders are working together to share research and best practices.

Session 3: Enhanced Remediation Technologies

1:30 Session 3A: In-Situ Microcosms for Evaluation of Sulfate-Enhanced Bioremediation

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

This presentation summarizes the field implementation and results of a field treatability study performed to evaluate the anaerobic bioremediation of petroleum hydrocarbons at a site located in the Southeast U.S. Enhanced aerobic bioremediation technologies such as air sparging, oxygen injection, oxygen diffusion or the use of oxygen releasing compounds are commonly used to accelerate naturally occurring degradation of petroleum hydrocarbons and recalcitrant fuel oxygenates such as MTBE and TBA by indigenous microorganisms in the subsurface. However, these indigenous microorganisms do not function well in the high contaminant concentrations of the source area. Therefore, oxygen addition technologies have to overcome the anaerobic conditions first by meeting chemical and oxygen demand of the source area. An evolution in the remediation of petroleum hydrocarbons has occurred that employs a sulfate-enhanced in-situ remediation strategy. Sulfate reduction and methanogenic conditions appear to dominate natural degradation processes at most sites. These processes will cease in the presence of added oxygen. On the other hand, rejuvenating depleted sulfate, anaerobic groundwater bacteria may continue to use PHCs, MTBE and TBA for carbon and energy and thus mineralize them to carbon dioxide and water. This talk summarizes the field implementation and results of a field treatability study performed to evaluate sulfate enhanced bioremediation PHCs using modern molecular technologies. The objective is to compare three approaches for the remediation of PHCs under anaerobic conditions: monitored natural attenuation, sulfate addition and sulfate/nutrient addition. The use of modern molecular technologies allows for the direct monitoring of a site's indigenous microbial population. These techniques can be used to provide a significant insight into current bioremediation activities and provide strong direction in regards to electron acceptor selection and proposed remediation activities at a site. These insights can result in more efficient and effective remediation activities, greater



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bioremediation success and an overall reduction in project lifecycle costs. The presentation provides the results of molecular testing and presents an evaluation of the effectiveness of anaerobic bioremediation of PHCs.

2:00 Session 3B: **Creosote Remediation with Surfactant-Enhanced Product Recovery and In-Situ Chemical Oxidation Technologies**
Dan Socci, Chief Executive Officer
EthicalChem, South Windsor, CT

A pilot test was implemented using surfactant-enhanced product recovery and surfactant-enhanced in-situ chemical oxidation at a former wood treatment facility in Delaware at which creosote waste and condensate water had been released into an unlined lagoon. Site investigations revealed extensive DNAPL impacts throughout the soil matrix, with only minimal product accumulation in monitoring wells—evidence of the limited mobility of the highly viscous creosote oil. During this pilot test, the SEPR chemical formulation was customized to enhance its effectiveness at emulsifying and thereby breaking apart the creosote oil into easily extractable globules. In addition, the pilot trial examined the relationship of SEPR to the subsequent S-ISCO® polishing phase, to determine the most efficient and effective treatment sequence. VeruSOL®, a customized mixture of plant-based surfactants and co-solvents, is simultaneously injected with low concentrations of peroxide during SEPR implementation to desorb and emulsify DNAPL free product for subsequent extraction. SEPR can be used as a cost-effective measure to enhance the performance of site recovery systems and as a pretreatment for S-ISCO remediation, a treatment that involves injections of VeruSOL to emulsify NAPL into aqueous phase for oxidative destruction by simultaneously injected oxidants. The case study of this pilot is presented, including an overview of the treatment chemicals and the innovative design of the injection and extraction system. Data will also be presented about the relationship between SEPR and S-ISCO and its effectiveness for treatment of sites with extensive DNAPL free product, particularly related to creosote and No. 6 fuel oil.

2:30 Session 3C: **NAPL Source Area to Chic Mixed Use High Rise: Remediation for Redevelopment in Downtown Tampa**
Rachel Klinger, PE, Project Environmental Engineer
Geosyntec Consultants, Jacksonville

Over 100 years ago, on the outskirts of Ybor City in Tampa, FL, the Tampa Electric Company operated a manufactured gas plant. MGP operations were ceased in 1960 when the property use was modified for natural gas distribution. But the legacy of MGP operations remained in the form of free phase light and dense nonaqueous phase liquids and a stable dissolved benzene and naphthalene groundwater plume. To address remedial activities and position the property for future redevelopment, a Brownfield Site Rehabilitation Agreement with the Florida Department of Environmental Protection was obtained. Due to a recent pending real estate transaction, this project grew exponentially into a \$1.5 million plus, high-profile project that required the expedited design of a 100-gallon-per-minute multi-phase extraction system to recover mobile LNAPL and DNAPL. To maximize mobile NAPL recovery, the MPE system design included modular and flexible design elements to allow for continuous optimization. Design enhancement and optimization strategies included adjustable drop pipe elevations, a zoned manifold design, operation of select MPE wells across the treatment area, reinjection of treated groundwater, a flexible well head design to allow for conversion of injection wells to extraction wells, the ability to control retention times in various treatment components, and multiple discharge points for treated groundwater effluent. This presentation focuses on the MPE system design, implementation, operation and the lessons learned with a focus on design elements and field optimization activities completed to enhance and maximize the mobile NAPL recovery and ultimately position the site for the construction of two 29-story towers.

3:00: Break in Exhibit Hall

Session 4: New Remedial Approaches

3:30 Session 4A: **New Developments in the Chemical Fixation of Priority Heavy Metals Using MetaFix™ Reagents**
Fayaz Lakhala, PhD
Technology Applications Manager
PeroxyChem LLC, Philadelphia, PA

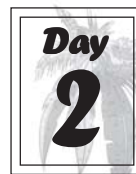
High concentrations of heavy metals are found in many soil and sediment environments. At very high concentrations, heavy metals are known to create toxicity to microorganisms. Treatment approaches that rely on microbial process may not function well in an acutely toxic matrix because important processes such as carbon fermentation, oxygen consumption and biological sulfate reduction can be significantly slowed or completely inhibited. The understanding of many metals removal mechanisms operative in soil and groundwater has advanced significantly over the past decade and we are now in a better position to develop a new platform of effective metal remediation products. In toxic environments, treatment reagents that do not depend entirely on microbial activity but rather combine reduction with adsorption and precipitation of heavy metals are advantageous. MetaFix™ reagents represent an entirely new family of products for treatment of soil, sediment, industrial wastes and groundwater contaminated with heavy metals. Treatment mechanisms based on iron, iron sulfides and other iron-bearing minerals have significant advantages due to lower solubility and greater stability of iron-bearing mineral precipitates formed with heavy metals. The new reagents enrich the aquifer with a mixture of reducing agents—ZVI, iron sulfides—and processed reactive minerals—iron oxides and iron oxyhydroxides. This new approach is insensitive to toxicity and can perform well even in environments that have high metals concentrations, high concentrations of organic contaminants such as solvents, high salt content, or high or low pH levels that would inhibit carbon fermentation and sulfate reduction. The approach used is to create an effective blend of reducing agents, reactive minerals, mineral activators, catalysts, pH modifiers and adsorbents for either ex-situ or in-situ applications. Dredge spoils containing high levels of TCLP/SPLP metals can be quickly treated and stabilized before final disposal. In-situ reactive zones can be constructed to prevent migration of heavy metals into sediments or surface water. MetaFix reagents can also be directly delivered into sediments for in-situ stabilization of heavy metals and thereby reduce exposure to aquatic life. Laboratory results showing reduction in TCLP and SPLP of key metals will be presented. Concepts on full-scale application of MetaFix to soil, sediment and groundwater environments will be discussed.

4:00 Session 4B: **The Biogeochemical Reductive Dehalogenation Groundwater Treatment Process: Commercialization Status at Bench, Pilot and Full Scale**
James E. Studer, MS, PE, Principal
InfraSUR LLC, Albuquerque, NM

Interest in biogeochemical groundwater treatment, a new in-situ treatment category combining biological and abiotic processes, has accelerated with the commercialization of the patented BiRD engineering process. Biogeochemical reductive dehalogenation, or BiRD, is aimed at generating in-situ, amorphous and crystalline forms of iron sulfide, referred to here as FexSy. FexSy can dehalogenate compounds such as PCE, TCE and other chlorinated aliphatics at significant rates. The FexSy reactive zone is created rapidly and can treat passing groundwater over a relatively long period of time. The process can be applied by use of direct injection or trenching techniques using inexpensive nontoxic reactants that are readily available in either liquid or solid form. Both permeable reactive barrier and area-wide treatment can be pursued. Benefits of BiRD include: 1) rapid degradation of a wide range of halogenated compounds; 2) little or no accumulation of undesirable transformation products such as cis-1, 2 DCE and vinyl chloride from PCE and TCE; 3) reduced requirement for labile organic matter and less conversion of that which is applied to methane; 4) implementation using low-cost treatment materials with trench-based or direct injection construction techniques; and 5) compatibility with enhanced bioremediation and ZVI. This biogeochemical technology is currently being tested and implemented at commercial scale as an economically effective alternative to other methods of groundwater treatment. For fractured bedrock or relatively low permeability unconsolidated porous media sites the option to use soluble reactants to create the FexSy reactive zone is attractive in the face of large subsurface coverage requirements and back diffusion potential. Results from several bench scale treatability studies and several field pilot tests are presented. A high percentage of the BiRD projects at bench or pilot level are proceeding to full scale and an update on those projects will be presented.

4:30 Session 4C: **A Technology Platform to Harness Speed, Certainty in Groundwater Remediation**
Rick Gillespie, Vice President
Regenesys, San Clemente, CA

This presentation focuses on utilizing a technology platform based on combined remedial approaches to maximize speed and certainty to achieve groundwater remediation objectives. The platform has a dual function; it sorbs contaminants quickly removing them from the mobile phase and provides a high surface area matrix favorable for microbial colonization and growth. Contaminant availability within a risk pathway is therefore reduced, while at the same time contaminant destruction is accelerated. A detailed discussion regarding the use of conventional technologies like groundwater extraction, soil excavation and in-situ bioremediation will show how combined technologies can significantly improve remediation efficiency. Data from full-scale field applications with long-term performance monitoring—greater than 18 months—on mixed plumes with chlorinated solvents and petroleum hydrocarbons will be highlighted. The presentation includes a case study featuring a manufacturing facility in the Midwest that utilized the liquid activated carbon solution coupled with a slow release electron donor to control migration of a TCA and TCE plume off-site. Long-term performance data showing up to a 99 percent reduction in contaminant concentrations was observed and will be discussed. In addition, a brownfield redevelopment project in downtown Chicago will be presented. The urban site was planned for redevelopment and future use as a convention center and sports arena. With groundwater contamination as the primary concern and time/cost-sensitive deadlines rapidly approaching, a fast and permanent remediation strategy was required. Performance data and results of the redevelopment will be outlined. The talk will also include representative data from three legacy sites in California in support of the in-situ bio process. The legacy sites to be discussed had been stuck in a monitoring-only phase for several years, but transitioned to a combined approach with in-situ bio and sorption to rapidly reduce contaminant concentrations below regulatory standards. Lessons learned on how to successfully navigate the regulatory process to closure will be presented.



Friday, October 9, 2015

Session 5: Assessment Tools for Multiple Release Sources

9:00 Session 5A: **Multiple Source Forensic Assessment Using 13C and 37Cl at a Site Impacted with Tetrachloroethene and Trichloroethene**
Aaron Peacock, PhD, Senior Scientist/General Manager, Pace EMD, Pittsburgh, PA

Vapor intrusion issues are now being found to be more of a hazard than previously realized. In many cases, it becomes paramount to understand site forensics and to answer questions regarding the possibility of multiple sources. At one such property, multiple industrial uses resulted in impacts of chlorinated ethenes to the groundwater, and vapor intrusion issues. The subsurface at the site was characterized by complex, three-dimensional structure, with separate lower and upper units in some areas but no such separations in adjoining locations. The forensic study produced two separate lines of evidence: chemical composition and isotopic ratio as one line and a study of the site hydrology and transport as another independent

Conference agenda continued on Page 12

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Governor signs off on unique MFL rule for Lower Santa Fe, Ichetucknee rivers

By ROY LAUGHLIN

This summer, Gov. Rick Scott signed off on a Florida Department of Environmental Protection rule setting minimum flows and levels for the Lower Santa Fe and Ichetucknee rivers in the Suwannee River Water Management District.

That capped a half-decade-long effort that began with historic data analysis, rule development by DEP and a couple of courtroom challenges by a local resident who felt that existing permit holders should

be asked to reduce their water consumption.

The new rule establishes minimum flows of 11 million gallons per day near Fort White for the Lower Santa Fe River and two million gallons per day in the Ichetucknee River at the Highway 27 bridge.

These MFL values will be used immediately in decisions to grant new or renewed permits within both the SRWMD

and the St. Johns River Water Management District.

This MFL rule development was unusual. Janet Llewellyn, policy administrator in the Office of Water Policy at DEP, said that it is the first and only time that DEP stepped in to develop a rule, an activity usually left to the water management districts.

DEP got involved because water withdrawal in the SJRWMD significantly affects groundwater levels and thus MFLs in the two rivers.

"The region where the MFL was set is an area of broad groundwater drawdown," she said. "The issue is that when a water management district makes a rule, it is only binding on actions in their district."

"Here, we have MFLs that are affected by withdrawals from more than one district. If DEP passes a rule, it applies to all water management districts."

Both districts could have initiated simultaneous rule development but would have had no assurance that final rule language would emerge without revisions in each district.

Llewellyn said it was more efficient for DEP to go through the rulemaking process that resulted in an MFL that's binding on both districts.

Even though DEP orchestrated rule development, Llewellyn stressed that the Suwannee district was very much in the rulemaking loop.

"Suwannee had done all the technical work. They functioned as our technical staff," she said. "The Suwannee district has been doing a pretty good job of setting MFLs (in their other streams and rivers). They have made setting MFLs a priority."

The proposed rule became controversial because it allows existing permittees to continue withdrawing water without ad-

ditional restrictions to their permits until 2019, when a new groundwater model will be available to more accurately establish withdrawal volumes that will meet the new MFL.

Authorities granted the "grandfather clause" under threat of a lawsuit from a group of water utilities.

When the grandfathering period ends, as many as 68 agricultural users will have to offset about 14 million gallons of water per day of groundwater withdrawals, according to a district estimate that may be further refined by 2019.

Over the past decade, dairy, corn and peanut farms have replaced forestry operations in the Suwannee district and the continued growth of dairy and crop agricultural operations is likely.

Many of these operations have relocated from other parts of Florida as development and agricultural practice restrictions made relocation necessary, or at least more appealing.

Although DEP passed this rule, consumptive water use permits will still be received, evaluated and granted—or denied—by either SRWMD or SJRWMD, depending on the petitioner's location.

Under Florida law, water management districts are responsible for permitting within their boundaries and the rule discussed here does not change that. In this case, both districts will apply the DEP's rule for permitting. Permittees seeking new or renewed permits will apply to their districts as usual.

When asked if DEP is likely to step into MFL rulemaking elsewhere in the future, Llewellyn said that we'll just have to wait and see.

"I think we could see it again," she said. "As these water use issues increase, it will become more important" when and where broad regional groundwater drawdowns are occurring.

agricultural concerns, spoke in favor of allocating withdrawals for farming and ranching, and for the creation of associated jobs.

Approval of the permit modification was initially recommended by district staff in 2014. In June of that year, the district received petitions challenging the proposed CUP modification and environmental resource permit.

The petitions were forwarded to the Florida Division of Administrative Hearings. The hearing that resulted in a recommendation for approval was held in August.

The recommendation of an administrative law judge for permit approval appears to have been the key to the governing board's decision.

"Our board carefully reviewed the recommendation from the administrative law judge before concluding that the district should approve the CUP permit modification," said SJRWMD Board Chairman John Miklos.

The approved permit modification expires in 20 years and does not increase the volume of groundwater allocated for irrigation of sod in the previous permits.

The existing wells are located on property known as the East Tract. The new permit allows the allocations to be combined and the withdrawal location to be moved from the East Tract to property known as the North Tract, 2.7 miles further away and a total 12.2 miles from Silver Springs. Subsequent withdrawal of groundwater from the East Tract is now limited to 0.5 mgd.

District analysis indicated that the additional distance will result in some benefit to modeled spring flows.

Among supporting criteria noted by district staff is the ERP requiring additional measures and authorizing construction of a stormwater management system to address water quality issues.

While recommending approval of the current CUP modification, district staff recommended denial of a requested CUP for a new allocation of 1.12 mgd of groundwater from the North Tract property on Sleepy Creek Lands.

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Crystal River works to protect manatees, boost local economy

By STEVE GIBBS

Crystal River, FL, is the self-proclaimed "Home of the Manatee." An estimated 300,000 tourists visit the city each year, many to experience the graceful manatees, the giant herbivores often referred to as sea cows.

For a city with a population of only 3,100, such an influx of people represents an important economic boon for the area.

Apparently, manatees love Crystal River too. The geography and ecology of the region is perfect for these lovable creatures, which often weigh up to 1,300 pounds. Because of their low metabolic rate, they can't tolerate water temperatures below 60 degrees Fahrenheit, so as the gulf waters cool in autumn, the manatees migrate to warmer environments.

The city is located on Kings Bay and connected to the Gulf of Mexico by Crystal River. In 1983, Crystal River/Kings Bay was designated by the state as a "Outstanding Florida Water."

Kings Bay, about five miles inland, is fed by numerous small and large springs and maintains a year-round temperature of near 72 degrees, perfect for both manatees and tourists.

The estimated winter count of manatees in Kings Bay is about 700. That's more than 13 percent of the Florida manatee population, according to recent studies.

The iconic manatees, pleasant climate, scenic beauty and recreational fishing afforded in Crystal River make it a haven for outdoor enthusiasts and snowbirds. It is an economy built around nature and tourism.

When it became apparent that the local ecosystem was being threatened by pollution, community leaders acted decisively to literally cleanup their act and reverse the tide of degradation.

They took a thorough approach to address several problems that were polluting their waterways. Today the bays, springs and rivers in the area are on the mend, the manatees are content and the tourists keep coming.

An issue of algae

The story of Crystal River's environmental awakening began more than 10 years ago and involved a number of related initiatives.

Not long after the turn of the millennium, the Florida Department of Environmental Protection discovered that Kings Bay was becoming nitrogen impaired. The abundance of nitrogen in the water was causing abnormal algae blooms.

The particular type of algae in Kings Bay is Lyngbya, a filamentous cyanobacterium that threatens the natural habitat of the manatee and other aquatic life.

"The algae growing in Kings Bay floats at the surface for a few days then settles to the bottom to form a mat that contains high concentrations of nitrogen," said David Burnell, Crystal River's city manager. "This mat, which can be six inches to four feet thick, prevents the normal growth of seagrass and other vegetation that manatees like to eat. It destroys their natural habitat and will eventually cause the manatees to die off. It's also harmful to other forms of aquatic life."

Biologists have known for some time that high levels of nitrogen in surface water is often the result of human waste, sometimes caused by an overabundance of septic tanks or leaking sewer pipes. Other major contributing factors include animal waste and fertilizer runoff.

If you eliminate these sources of nitrogen, the water will likely, in time, stabilize and algae growth will subside.

"We're a waterfront community blessed with natural environmental beauty. We have fresh springs, manatees and fishing," said Burnell. "We have to solve our environmental problems to remain economically viable."

"To solve a problem like we had, you have to do a number of things. We didn't just address the septic tank issue, we also changed fertilizer ordinances, we repaired gravity sewers to prevent leaks, and we partnered with Duke Energy to use re-

claimed water at their plant to help protect the local aquifer. For a small community, we spent a lot of money. And now we are seeing positive results."

An alternative to septic tanks

An important step in the restoration process was a two-phase vacuum sewer installation. The goal of the project was to rid the area of nearly 600 aging septic tanks that were contaminating groundwater and contributing to nitrogen buildup in the bay. Many of these tanks were located outside the borders of the city in Citrus County, so a great deal of cooperation between city and county governments was required.

"The vacuum sewer projects were actually in the county," said Burnell. "But the city had the ability to receive a grant that was unavailable to the county. The city was eager to do this project because a septic tank abatement program would affect the water quality in Crystal River. It was mutually beneficial."

Burnell said about 85 percent of the construction work was funded by grants; the remaining 15 percent was covered by a 10-year assessment of county residents. The assessment was met with mixed reviews when first presented to property owners.

"We had a number of town hall meetings and most of the public's concerns were addressed," said Alan Garri, PE, an engineer with Greenman-Pederson Inc. in Ocala. GPI was hired to complete the design and manage construction of the vacuum sewer project.

"We explained what we wanted to do and why, and how it would benefit property owners and property values," said Garri. "Most people went from being opposed (to the project) to supportive. A lot of folks were dealing with septic systems that were in disrepair, so they understood the benefit of having a new sewer system. For the most part, the initiative was well received."

The value of vacuum

While the need for a new sewer system was generally acknowledged, the concept of installing vacuum sewer technology was met with some reluctance by taxpayers as well as local officials.

"I didn't know what a vacuum sewer was when I got here in 2010," Burnell admitted. "In topography like ours, it makes a lot of sense. If I were developing infrastructure for our entire city from scratch, I would likely choose vacuum sewers."

In Crystal River, as in many coastal communities, the water table is high and the terrain very flat. Gravity sewers require sufficient grade or multiple lift stations to move wastewater. This can mean digging deep trenches, dewatering and lots of disruption for home and business owners.

The cost of installing a gravity sewer to serve the citizens with septic tanks was prohibitive, so engineers began looking for alternatives.

"The original engineers for this project looked at low-pressure systems (grinder pumps), gravity sewers and vacuum sewer technology. They chose vacuum sewers because it was more cost effective," said Garri. "Vacuum technology allows you to lay the sewer collection lines in shallower trenches. Plus, we can operate the entire system with only two vacuum stations. We would have needed multiple lift stations for a gravity sewer, so the operations and maintenance costs would have been higher."

There was some reluctance to vacuum sewer systems simply because the technology had not been used in this region of the state before. The engineers and public works personnel turned to AIRVAC, the world's leading provider of vacuum sewers, for advice and support.

"AIRVAC has been great to work with," said Burnell. "They provided instruction and testing during the installation and excellent training on how to operate and maintain the system."

A new experience

Garri worked with AIRVAC personnel to fine tune the system's design prior to construction, which was completed in two phases. It was his first experience with

vacuum sewers.

"One of the interesting things I learned about vacuum sewers is that they are gravity-assisted," Garri noted. "The collection lines have a saw tooth profile. Vacuum pressure in the lines assists gravity to help move sewage slugs along to the treatment plant."

"This type of design allows for the vacuum sewer mains to be installed at a much shallower depth than gravity sewers. The saw tooth profile also allows for the vacuum pumps to operate more effi-

ciently than traditional force main or grinder pumps, due to gravity assistance. These characteristics really reduce maintenance costs in the long run."

Vacuum sewers also presented another significant benefit—they don't leak. The collection lines maintain constant vacuum pressure, so there is no infiltration or exfiltration. No sewage escapes into the environment and no groundwater enters

CRYSTAL RIVER
Continued on Page 10




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DEP completes assessment of Nassau Sound with undersea robot, drone

By **BLANCHE HARDY, PG**

The Florida Department of Environmental Protection recently completed an assessment of the coastal waters of northeastern Florida's Nassau Sound.

They partnered with Gainesville-based Roveal Underwater Robotics and Aviation Systems Engineering Co. Inc. in June to survey the area using a tethered undersea robot, or ROV, and commercial aerial drone to capture high definition video of both surface and subsurface conditions. It marked the first time that DEP has used a drone in its studies.

"The drone performed as a 'spotter.' When the sun angle and water allowed, its HD video camera with a polarized lens could peer into the water to a depth of one to four feet," said Brent Klavon, program manager for ASEC. "In the spotter role, the drone crew communicated directly with the underway ROV, coordinating airborne searches in locations of interest and identifying any unusual sightings for further exploration.

"The birds-eye perspective provided by the drone was invaluable in helping identify currents, and possible undersea fresh water sources that would generate disturbances of surface water and increase sedi-

ment flow. In less turbid water with greater water clarity, the drone would be able to see essentially whatever the human eye could see wearing polarized sun glasses."

Data collected included information on native grass beds, oyster beds, vertebrate marine life, water column temperature readings, the presence of halocline and channel depth soundings. The accumulated information established a baseline for future analysis of the area.

Given the success of DEP's Nassau Sound assessment, Klavon was upbeat about the potential for using drones for additional environmental applications.

"A battery-powered drone is very safe, especially when compared to a manned helicopter, and certainly less obtrusive as it doesn't produce the prop wash down beat or noise associated with a manned aircraft," he said. "As a result, a small drone can approach marine life or animals, getting closer to observe behaviors or collect visual information."

Marine and open water aquatic applications are just the start. Today's commercially available drones can carry thermal and multi-spectral sensors.

"With these adaptations, a drone flying with a sensor that is observing a different spectrum of light can identify stressed agriculture and water temperature

changes, and support firefighting wildfire suppression to name a few (applications)," he said. "Backpacking into a swamp to collect pictures of a native plant species, or obtain population counts of migratory birds is made simpler by launching a five-pound drone to fly over the swamp to collect HD quality video, improving the effectiveness and safety of the research team."

The drone used for the Nassau Sound assessment was a professionally operated commercial device compliant with Federal Aviation Administration regulations.

Klavon said that compliance with FAA standards is the most significant and least understood area of drone-related projects.

FAA approval and certification are required before conducting commercial op-

CRYSTAL RIVER From Page 9

the collection system.

If a leak does occur, it can be quickly located and isolated. And because the lines are in shallow trenches, repairs can be made more quickly with no need for large excavation equipment.

No more apprehension

The installation of the vacuum sewers began with the construction of two vacuum stations in residential areas. The stations emit no odors and were designed to blend

erations. But the actual project set up is surprisingly quick. The Nassau Sound drone took less than fifteen minutes to unpack and get into the air.

"Drones do have limitations. For example, one battery typically lasts for 15-20 minutes of flight time," he said. "Also, the FAA requires drones to remain within the pilot's visual line of sight, and to fly during the day."

Additional concerns include the National Parks Service's ban on drones and surveillance laws such as Florida's Freedom from Unwarranted Surveillance Act.

But despite these limitations, the Nassau Sound project was considered a big success and may pave the way for similar projects in the future.

in architecturally with the surrounding homes. "When you drive up to them, they look very much like houses," said Garri.

Two collection lines proceed outward from each vacuum station. The installation crews were experienced in vacuum sewer technology, so the work progressed quickly.

The lines were tested each night to ensure that they would maintain vacuum pressure, and AIRVAC sent engineers periodically to answer questions and help solve minor installation problems. Shallow trenches dug by small excavators allowed the crews to work with little disruption to the neighborhoods.

The first of two phases went on line about three years ago. Much of Phase Two went into service 18 months ago.

Veolia Water Technologies Inc. maintains the city's wastewater system and was tasked with maintaining the new vacuum sewer.

"I was a little apprehensive at first," said John Morris, Veolia's field supervisor in Citrus County. "I had experience with gravity sewers and low-pressure grinder systems, but vacuum sewers were totally new to me."

AIRVAC provided training at the company's headquarters as well as some on-site training in Crystal River. Now, after three years of comparison, Morris said vacuum technology is his preferred sewer conveyance system.

"If I had one choice for sewers, I'd choose vacuum sewers," he said. "It gives me the least amount of problems of the three sewer systems I work on. Vacuum sewers are easy to maintain and AIRVAC supports us well."

Morris said his daily vacuum sewer routine typically begins with about 15 minutes at each of the two vacuum stations. A quick check of the gauges and routine maintenance is all it takes.

If vacuum pressure is lost anywhere in the system, it typically shows up at the vacuum station.

Morris appreciates the fact that with vacuum sewers he never comes into contact with raw sewage. He also likes the fact that the vacuum pumps are easily accessible and there are no confined space issues to deal with.

He said that both vacuum stations have emergency generators that kick in when power is lost, so there is never a disruption in service. There are only eight emergency generators to serve the city's 67 lift stations, so power outages cause significant disruption to service for both the gravity and low-pressure systems.

On the mend

Today, it's clear that Kings Bay is on the mend. "We are now trending in a positive way with regard to nitrogen," said Burnell. "Our waters are now close to dropping below the nitrogen impairment level."

No single solution led to this improvement. Removing hundreds of septic tanks helped, as did relining much of the city's leaky sewer system and instituting new regulations on fertilizers.

The combined effect has been to significantly reduce the amount of nitrogen entering the local waterways and groundwater. That's excellent news for the local residents, the manatees and the entire economy of Crystal River.



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SEPT. 9-11 – Conference: Waste 360 Recycling Summit, Chicago, IL. Presented by Penton Business Media. Call 1-800-559-0620 or visit www.waste360recyclingsummit.com.

SEPT. 10 – Course: 8-Hour OSHA HazWoper Annual Refresher, Gainesville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

SEPT. 10 – Conference: 8th Annual Southwest Florida Water & Wastewater Exposition, Fort Myers, FL. Presented by FWEA Southwest Chapter, AWWA Region V and FWPCA Region 8. Call 407-957-8448 or visit www.fsawwa.org.

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

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SEPT. 17 – Meeting: September Technical Meeting of the Florida Section of the American Water Resources Association, Apalachicola, FL. Visit www.awraflorida.org.

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SEPT. 26-30 – Conference: WEFTEC 2015, the 88th Water Environment Federation Technical Exhibition

& Conference, Chicago, IL. Visit www.weftec.com.

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October

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OCT. 8 – Course: U.S. DOT Hazardous Materials/Waste Transportation-St. Petersburg, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

OCT. 8-9 – Conference: 2015 Florida Remediation Conference, Orlando, FL. Presented by National Technical Communications Co. Inc., publishers of *Florida Specifier*. Call (407) 671-7777 or visit www.enviro-net.com.

OCT. 9-10 – Course: Backflow Prevention Recertification-Venice, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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This presentation focuses on the chemical composition and isotopic analysis. The site was impacted with PCE and TCE and was mostly oxic. Though it had been monitored regularly, there had been only sporadic observations of low concentrations of cis-dichloroethene. More than thirty samples of groundwater were collected in locations ranging from presumed sources to distal locations where impacts of PCE and TCE were minimal. Of the 30 samples analyzed, 23 contained enough PCE and 19 contained enough TCE to yield reliable 37Cl and 13C data. Results showed most of the TCE was directly released, and was not a product of the dechlorination of PCE. The ratio of PCE to TCE suggested five sources: two of those sources were represented by only one well each and three others represented by multiple wells. The compound-specific isotope analysis data confirmed a separate source to one of the single wells, showed the other to be impacted both by an independent source and one of the other groups, and helped resolve the three groups into five separate groups that better explained the concentration ratios.

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9:30 Session 5B: **An Alternate and Multiuse Method to High Resolution Site Characterization that Allows Multi-Technology Treatments**
Lance Robinson, PE, Principal Research and Design Engineer
EN Rx Inc., Flower Mound, TX
Eric Arenberg, PG, Principal Geologist
AMEC Foster Wheeler, Jacksonville

High resolution sampling is a key to optimizing all remedial technologies. Increased sampling sets horizontally and vertically via HRSC methods are leading to reduced life cycle costs and more accurate planning and remediation from consultants. High resolution tools, such as membrane interface probes, are also improving the understanding of contaminant distribution at sites. One shortcoming of most of the hi-res assessment tools being used today is that they only provide a snapshot and do not have any treatment use. EN Rx Inc. has developed a method of collecting abundant samples through the use of multi-screen horizontal wells known as Vertebrae™. These Vertebrae wells have the inherent flexibility that allows for any preferred level of discreteness in design. The wells can be used with a variety of technologies and sampled periodically in time to provide additional understanding as site conditions change or as remediation occurs. The horizontal nature of the technology also allows increased sampling frequency in locations inaccessible or where increased disruption limits horizontal sample sets. One site to use this technology is a site in Southeast Florida. As with most sites, a standard assessment was conducted. Due to site conditions, specifically a large active building with limited access, an accurate location and quantity of contamination was not determined and characterization was provided by only one well inside the building. AMEC Foster Wheeler chose to utilize Vertebrae wells for treatment purposes, installing 26 well segments in four horizontal bores. However, the real multipurpose benefit was noticed when the wells were sampled providing a much clearer characterization of the site. This information has led to a more surgical approach and remedy optimization that one would expect after a HRSC tool was used, and should reduce cleanup time and costs.

10:00 Session 5C: **CSIA Forensics for 1,4-Dioxane**
Yi Wang, PhD, Director, Senior Environmental Geochemist
Pace CSIA Center of Excellence, Pittsburgh, PA

Compound-specific isotope analysis forensics has recently been developed for 1,4-dioxane to supplement chlorinated solvents release site investigations. Obtaining stable isotopic signatures of dioxane along with those for chlorinated solvents helps distinguish between multiple release sources. 1,4-dioxane, often simply called dioxane because the 1,2 and 1,3 isomers of dioxane are rare, is a heterocyclic organic compound. Dioxane is irritating to the eyes and respiratory tract. Exposure may cause damage to the central nervous system, liver and kidneys. Accidental worker exposure to dioxane has resulted in several deaths. The U.S. Environmental Protection Agency classifies dioxane as a probable human carcinogen. Until the end of 1995, dioxane was used primarily as a stabilizer in chlorinated solvents, particularly 1,1,1-trichloroethane. Approximately 90 percent of former production of dioxane was used in this application. Dioxane was typically used at a concentration of about 3.5 percent in chlorinated solvents. Dioxane has also been reported to be used in the production processes of the following product categories: pharmaceuticals/pesticides, magnetic tape and adhesives. Dioxane is completely miscible in water, therefore if released—unlike chlorinated solvents—it can readily migrate away from its source of release in groundwater. When more than one plume exists at a site, it is often difficult for the site managers to identify who contributed dioxane to the specific monitoring wells. The CSIA forensic approach, however, may be able to assist in such cases because stable isotope fingerprints of dioxane are basically controlled by (1) the source material being used during the commercial production of dioxane. (In the U.S., it is in a closed system by acid catalyzed conversion of diethylene glycol via dehydration and ring closure by two manufacturers: Dow Chemical, Freeport, TX and Ferro Corp., Baton Rouge, LA); (2) the operating condition temperature range of 130 to 200 °C and the pressure range from a partial vacuum to slight pressure; and (3) any weathering effects like degradation. Microbial degradation of dioxane has been reported ineffective in most cases, which somehow helps preserve CSIA fingerprints. CSIA for dioxane has been technically challenging, due to its high solubility in water. During this presentation, after a brief introduction on the development of CSIA method, a case study is presented to demonstrate how the obtained CSIA fingerprints for dioxane in water from different locations helped distinguish an additional source. Potential contaminant sources could be from a variety of historic industrial activities at the site.

10:30: Break in Exhibit Hall

11:00 Session 6: **Panel Discussion: Debunking the Myths of Sustainability**

Moderator/Speaker: Liza Grudin, PE, Principal
NovelEolutions Inc., Tampa

Panelists: Qiong Zhang, PhD, Associate Professor
University of South Florida, Tampa
Jessica Gattenby, Project Environmental Engineer
Arcadis US Inc., Tampa

Green, Sustainable, Resilient: This is the nomenclature of our profession. Common perception holds that sustainable design decreases performance or safety—and even that such efforts may increase cost. In actuality, system integration, life cycle analysis and stakeholder engagement increase cost effectiveness, decrease timelines and lead to better solutions. Energy reduction and end-of-life options are a key part of meeting a client's criteria and exceeding their expectations. Part of the solution is to move beyond the conceptual blocks of our experience and look at multi-disciplinary approaches and alternatives. One should not assume that sustainability enters the design at the end but, in execution, green principles should be optimized at the project's initiation. As consultants and engineers, let's veer away from traditional linear thinking to leverage the power of interdisciplinary input and out-of-the-box solutions. This can seem daunting at first. But aren't our most fruitful experiences normally the ones that challenge us the most? As stewards of the environment, we work to reduce our carbon footprint, water footprint and ecological footprint in our daily lives and can apply these same concepts to design and management principles in our workplace. Please join us for an open discussion of possibilities, evolution and synthesis in the application of sustainable principles and green engineering design.

12:00 Day Two Luncheon
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1:30 Session 7: **Regulatory Panel Discussion**

Moderator/Speaker: Glenn MacGraw, PG, Principal
Clean Asset Environmental LLC, Tallahassee

Panelists: Diane Pickett, PG, Administrator, Petroleum Restoration Program
Florida Department of Environmental Protection, Tallahassee
Keith Tolson, PhD, Principal Environmental Scientist
Geosyntec Consultants, Tampa
Other Panelists -- TBD

3:00 Break Pre-Function Registration Area

3:30 Session 8: **The Use of ZVI in Chlorinated Solvent Remediation**

4:30 Session 8A: **Synergistic Remediation using EZVI, Carbon Sources and KB-1 to Promote Risk-Based Cleanup of Chlorinated Ethenes at a Historical Train Derailment Site**
Bradley Droy, PhD, President and Chief Executive Officer
TEA Inc., Santa Rosa Beach, FL

A soil and groundwater remediation design using multiple concepts was effectively developed and implemented at a historical train derailment site in the Southeast U.S. contaminated with chlorinated ethenes. Contaminants of concern included tetrachloroethene, trichloroethene, cis-1,2-dichloroethene and vinyl chloride. Site investigation revealed groundwater contamination was primarily located in the shallow aquifer and underlying clays. In addition, the existence and persistence of dense nonaqueous phase liquids was also indicated in shallow aquifer sediments. A synergistic remediation approach was designed to create a result that exceeded the anticipated "sum of its parts." The approach involved engineering an existing pump and treat remediation system with multiple technologies to achieve a timely, risk-based site closure. EZVI, vegetable oil, lactate, and KB-1® bacteria culture were injected as remediation amendments to enhance the biogeochemistry of the subsurface and accelerate the reductive dechlorination reactions. EZVI was injected to treat the residual DNAPL source in the subsurface, KB-1 bacteria culture was injected to bioaugment the existing dechlorinating bacteria, and vegetable oil and lactate were injected to provide additional carbon for the microbial populations. A detailed soil and groundwater monitoring system was used to assess the effectiveness of the corrective action activities in reducing the concentrations of site COC to health protective levels. Soil and groundwater monitoring results indicate that the concentrations of the site COC have been remediated to levels that are below the cleanup objectives and pose no threat to human health or the environment. Risk assessment, in-situ chemical reduction and the knowledge of the existing remediation system were synergistically combined to expedite site cleanup in a manner that eliminated years of pump and treat operation and maintenance. Based on these results, regulatory approval has been given to develop a site closure plan.

4:00 Session 8B: **Comparison of Biological Dechlorination to In-Situ Chemical Reduction at Concord Naval Weapons Station**
Eliot Cooper, National Director Remediation Support Services
Vironex Technical Services, Golden, CO
Dan Leigh, Technology Applications Manager
PeroxyChem, Walnut Creek, CA

A trichloroethene plume at the Concord Naval Weapons Station extends approximately 700 feet down gradient from the source area and up to 100 feet below ground surface. The aquifer consists of unconsolidated silt, sands and clays. Groundwater in the treatment area is highly aerobic. An enhanced anaerobic bioremediation pilot test conducted by CB&I demonstrated complete degradation of the TCE concentration from approximately 5,000 microgram per liter to less than 1 µg/L in approximately 500 days. The U.S. Navy wanted to evaluate a more aggressive approach to achieve site cleanup. CB&I conducted a second pilot test to evaluate enhancement of the biological approach by in-situ chemical reduction. This process was selected to aggressively treat the TCE, reduce the potential for generation of toxic degradation products and provide long lasting substrates to reduce the potential for rebound of the contaminants. ISCR applied abiotic processes by distribution of zero valent iron to provide a long lasting substrate that degrades TCE while minimizing the generation of daughter products. The test incorporated biological degradation processes by amending the ZVI with long lasting organic substrates, Emulsified Lecithin Substrate® from PeroxyChem. Lactate was added to the amendment water to create reducing conditions prior to injection and to help establish the bioaugmentation culture in the aerobic aquifer. Bioaugmentation was conducted using SDC-9™. Substrate distribution was conducted using direct push technology. At each interval, the aquifer was first primed by fracturing the aquifer with the injection solution. Following confirmation of fracture development, ZVI in guar was injected into the interval followed immediately by the remaining injection solution. The EAB and ISCR pilot test data were compared to evaluate effectiveness. The injection process distributed substrates a minimum of 15 feet from the injection point. The ISCR process also degraded

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trichloroethene, dichloroethene and vinyl chloride to below MCLs within 220 days—less than half the time required for biotic only approach. TCE degradation appears to be biologically mediated in both approaches. The reduced treatment time in the ISCR approach is attributed to beta-elimination of DCE compared to the hydrogenolysis pathway in the EAB approach. Notably, the ISCR process did not generate arsenic in excess of the MCL as did the EAB process. Based on the successful ISCR pilot test, this approach has been applied for full-scale treatment of the trichloroethene plume.

4:30 Session 8C: Large Diameter Auger Remediation at Wilson Corners on Kennedy Space Center
Robert Kline, PE, Environmental Control Technician
NASA/Kennedy Space Center

The Wilson Corners site at Kennedy Space Center was used as a rocket engine component cleaning facility and laboratory in support of the Apollo program in the 1960s and 70s. Trichloroethene was used in the laboratory and in an outside cleaning facility. TCE was discharged to a septic system and directly to the ground via direct spills. The first site assessment activities conducted in the 1980s confirmed the presence of TCE and breakdown products in groundwater throughout the site. Since that time, several phases of investigation and cleanup have been conducted, removing approximately 20,000 pounds of chlorinated volatile organic contaminants. Unfortunately, several areas of high concentration CVOCs still remain. Between September 2014 and February 2015, NASA implemented an interim measure, or IM, to treat one of the remaining high concentration areas with the objective of reducing contaminant concentrations to natural attenuation default criteria values or lower. The large diameter auger IM consisted of the following major elements: soil mixing, hot air/steam generation and delivery, vapor extraction and conditioning, off-gas vapor treatment, recovered-liquid treatment and discharge, and zero valent iron mixing and delivery. The treatment system includes a monitoring system for real-time data evaluation that assists in controlling the process parameters to maximize CVOC removal and supports decision making for operation of the LDA and injection systems. Real-time data monitoring is an integral part of the treatment technology because it is utilized to enhance the efficiency of treatment and maximize the results. The effectiveness of the LDA IM will be evaluated through the comparison of pretreatment and posttreatment discrete groundwater samples. Due to the expected elevated subsurface temperatures following the IM, performance monitoring is expected to begin six months after completion. Initially, samples will be collected through direct push technology sampling with monitoring wells to follow once subsurface temperatures subside. The first round of data is expected to be collected in August, 2015.

5:00: Conference adjourns

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FAU engineering team developing marine bridge inspection vehicle

By ROY LAUGHLIN

Florida Atlantic University Engineering Professor Karl von Ellenrieder, PhD, leads a team that will spend the next year developing the first generation of small-boat robots outfitted with sonar, visual sensors and semi-autonomous locomotion capability that enables them to inspect bridges.

Von Ellenrieder is a professor in the Department of Ocean and Mechanical Engineering and associate director of the SeaTech Institute for Ocean Systems Engineering at FAU.

In Florida, the number of bridges and the diversity of habitats in which they are built make bridge inspection a substantial effort for Florida transportation officials.

An FAU student engineering team already finished one of the major components: a robotically controlled inflatable catamaran that won the second place award at the 8th Annual International RoboBoat Competition in Virginia Beach.

That craft, with enhancements for positioning based on GPS and "sliding autonomy," forms the platform.

"For our initial work, we will use real-time imaging sonar," wrote von Ellenrieder, describing one of the two inspection methods selected for the first prototype.

He noted that sonar will reveal large cracks and parts of the bridge intended to be buried but have been exposed by scouring. The sonar can also see through soft biofouling organisms such as algae and can discriminate in some cases between discoloration and structural damage.

Sonar might not detect defects underneath calcareous biofouling organisms like barnacles, oysters or mussels, and it is not powerful enough to image below sediments. But additional instrumentation that could be added later may expand the prototype's capabilities.

The prototype's sensors will operate within a range of two to 15 meters—far

enough away from pilings and other parts of the bridge to allow the robot catamaran to do useful inspections without being so close that a substantial boat wake or current could push the robot against the bridge or any sharp-edged biofouling organisms.

"We will also be deploying a video camera aboard the catamaran. The platform's capability of obtaining both underwater and at-surface information is an advantage," he explained.

When it is complete, the robot vehicle will use both visual inspection capabilities similar to humans' and sonar-sensing capabilities unique to machines for bridge inspections.

During inspection operations, the intent is to use an approach called sliding autonomy, where a human supervisor can monitor the progress of inspection from a remote ground station and intervene through either direct teleoperation or by updating the boat's assigned tasks when necessary.

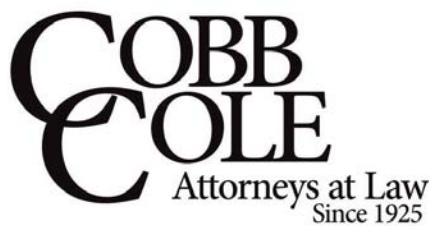
He explained further that the cybernetic control requires a high level of decision-making, task planning and trajectory planning capabilities, and much of that will have to be done by a computer on board.

"System localization and mapping ... will help the robot simultaneously build a map of features found in the survey, and then use the map in decision-making to determine what it should scan as the inspection proceeds," he said.

In the initial prototype, GPS will be the robot's primary navigation system. Its waypoints, programmed by operators, will determine routes and stations. Initially, communication will be through wi-fi and a human operator will monitor communications and incoming data.

Operators will have the capability of initiating more thorough scans if desired. Data can be saved on board the robotic vessel, and downloaded at a later time for

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Continued on Page 16



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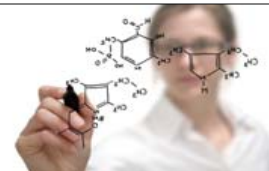
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the change orders required as many as three weeks to complete. Currently, staff has cleared most of the backlog of change orders and it routinely takes less than a week. In addition, a "field change order" process was created that allows for rapid approval of changes while contractors are in the field.

The time and cost of paperwork and form entry into MyFloridaMarketPlace has shifted substantially to the bidder and contractor over the past two years. Some long-time PRP contractors complain that MFMP's e-quote system is more expensive than prior procedures while providing no additional efficiencies.

But with respect to contractor costs overall, Pickett said that exactly the opposite is true. The average cost for a remedial action cleanup is \$150,000, she noted. "There is a steady stream of (contracts) over \$325,000 that goes out for e-quotes. For bids above \$325,000 there are great cost savings to the state. We've proved that."

PRP has addressed complaints about the time involved when using the new IT

tools. At the lowest levels, PRP initiated a policy allowing contractors assigned a site for assessment to propose and continue cleanup through a remediation plan and cleanup—as long as their performance in each phase is satisfactory and the price of the next stage of work does not exceed the \$325,000 threshold.

The policy intends to streamline work flow and relieve contractors of new rounds of contracting effort at each phase of work.

Establishment of the \$325,000 cost threshold for bidding was a direct effort to comply with the Legislature's demand that DEP implement competitive procurement procedures in order to provide the best value to the state. Incremental "cost creep" had allowed some contractors to dramatically increase contract cost, and perhaps in some cases, had resulted in opportunities for abuse.

Pickett said that PRP adopted a second approach to control cost creep: it took on an important task formerly done by consultants—the preparation of detailed proposals (now called the scopes of work) for the various phases of work in the program.

"When the program changed, the duty of being the consultants fell into the hands of our program staff who wrote the scope of work," she said. "We had to write a scope that was so detailed that no one could low bid" and then add additional work that could dramatically increase project costs.

Pickett said that over the nine-month period while the program prepared for agency term contracts to be put into place, her staff created 42 generic scopes of work, in some cases "an unbelievable set of very specific scopes." PRP's templates for scopes of work have been in use for over a year and a half now.

It may have been expensive to develop them for initial use but the implication is that, over time, they will be substantial cost savers. Pickett's comments made it clear that the program's administration intends to continue their use, making improvements as needed.

Other IT issues have vexed contractors as they completed remediation contracts. The required use of the ADaPT proprietary database software to submit both site data and chemical analysis data as part of the invoice submission was a novelty to almost all contractors.

"The main problem was the field EDD (electronic data deliverable)," she said. "It was a new concept to most of the consultants." PRP-sponsored training and more familiarity have reduced ADaPT errors by 75 percent during the past year.

Invoicing was another area that experienced growing pains. In June 2014, the invoice return rate was 85 percent. Since then, the program has processed 7,079 invoices with a return rate now of only about 30 percent.

"The rate has significantly improved as contractors became more familiar with new program requirements," according to a DEP spokesperson. Last September, PRP provided an invoice instructional webinar for contractors, which increased their successful submission rates.

Last fall, PRP staff assumed responsibility for obtaining site access agreements, a necessary prelude to increasing the rate of cleanups. Unfortunately, locating property owners and responsible parties, and then soliciting access agreements, slowed work down dramatically in the spring until the access agreements were returned.

Pickett noted that during June and July this year, PRP issued \$15 and \$12 million, respectively, in contracts—well above the \$10 million target—partly because the site access agreements that the department had been waiting for came in.

The Legislature's demand for reform included a shift away from property owners being able to select their cleanup consultants. That process was allegedly ripe with the potential for "shenanigans," as one regulator frequently called it.

Last fall, PRP introduced a multi-exponential algorithm, the Relative Capacity Index, to help select contractors. PRP has tweaked the algorithm a few times since its introduction.

Although its use is somewhat unpopular among the contracting community, Pickett defended it but implied the possibility of changes in the future.

She said that its use helped expand the range of contractors selected and gave access to property owners eager to get work done. For contractors who had developed a client portfolio—and most had done so over many years of cleanup activity—the PRP's new reliance on the RCI made their satisfied client list virtually worthless as a tool for obtaining additional work funded through the state program.

At some point, the selection process may rely more heavily on contractor performance, as the first big round of contracting is over. Pickett said contractor performance evaluations have been done since March last year and should have an influence on future contractor selection.

In another significant move, PRP has shifted from standards-based cleanup criteria to risk-based criteria. Critics among the contracting community have said that property owners may not be getting the cleanup they expect as a result.

But Pickett defended the concept of risk management and said it has always

been a part of the program. She said that questioning risk-based criteria "ignores the elephant in the room" because owners must agree to conditional closures and are not "forced" to close sites with conditions as some have incorrectly said. Balancing such risk-based decisions as active versus passive (natural attenuation) remediation is a case-by-case decision, with owners of low cap or ineligible sites preferring the most cost-effective method.

From her perspective, owners complain more that it's taking too much time to get to their site, particularly for sites with a score below 30. For the sites with a low score, low cap or technically infeasible cleanup, new options are available to help owners manage risk and get sites closed. These include the Low-Scored Site Initiative that allows owners a rapid site assessment and closure if minimal contamination exists, and a path to include DOT right-of-way property as a tool to a risk-based closure.

In any case, there is a balance between a more expensive cleanup that may involve the owner's financial contribution and some new closure options, and the potentially cheaper but slower choice of natural attenuation.

Her response leaves no doubt that the program's use of risk management criteria is not shortchanging property owners and may deliver more quickly what they expect.

PRP's Advance Cleanup program is an effort to cleanup bundled sites, or sites with particular challenges. PRP allotted \$10 million for last spring's site selection process but cut contracts for only about \$4.5 million of work.

Pickett said that to qualify, property owners must submit a limited contamination assessment report that involves more costs and effort, which may have limited the level of interest so soon after the Special Session. The next round of funding is scheduled for December with up to \$10 million available.

In June, the Legislature appropriated \$5 million for a new Innovative Technology Acceptance Program to be awarded through competitive grants, either through bidding or requests for proposals.

Pickett said that interested submitters should look at Chapter 62-780, FAC, for the definition of "innovative technology" for this program. The language states that "innovative technology" means a process that has been tested and used as a treatment for contamination, but lacks an established history of full-scale use and information about its cost and how well it works sufficient to support prediction of its performance under a variety of operating conditions.

"An innovative technology is one that is undergoing pilot-scale traceability studies, that (are usually) performed in the field or the laboratory and require installation of the technology, and that provides performance, cost and design objectives for the technology prior to full-scale use."

Over the past two years, inconsistent contracting rates and significant unexpected problems using new systems and procedures gave the impression to some critics that PRP was wallowing, with contractors and their subs bearing the brunt of the burden.

Pickett noted that PRP had anticipated that creating the new term contracts and template protocols, establishing a lower priority funding score to allow cleanup of more sites, obtaining site access agreements and reviewing work change agreements could slow PRP's progress.

But she said the anticipated issues have been mostly resolved and praised her staff for their long hours and dedication to the work over the past few years.

Many expect this to be the year PRP finally gathers some cleanup momentum following the start of its reformation.

Pickett pointed to the dramatic increase in funded contracts in June and July and predicted that contracting rates going forward should consistently be \$10 million per month or more.

"It was a rough two years," she said. "But between January and May, we streamlined. Now we are set and stable."

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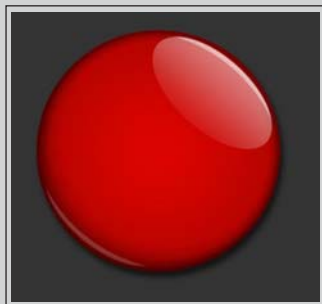
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PEER blasts DEP again, this time for lack of enforcement, laissez faire attitude

By PRAKASH GANDHI

State environmental officials have come under fire once more from an environmental advocacy group for being lax on polluters who violate Florida's environmental laws.

Public Employees for Environmental Responsibility fired its latest missile at the Florida Department of Environmental Protection, claiming that enforcement by the state's top pollution watchdog has nosedived in recent years.

"By virtually every measure, enforcement levels are so low that it is hard to even get a pulse," said Florida PEER Director Jerry Phillips, a former DEP enforcement attorney who compiled the figures in a new report that presents a scorecard of the state's environmental record under Gov. Rick Scott.

PEER's claims were rejected outright by DEP officials. DEP Press Secretary Lori Elliott said their regulatory programs have maintained a 96 percent significant compliance rate for two consecutive years.

"Compliance is DEP's objective and resolving noncompliance quickly and informally is preferable when violations are minor and when recurrence can be eliminated," she said. "DEP remains committed to protecting the environment through education, outreach and inspections."

The latest figures compiled by PEER show there was a slight increase in enforcement activity in 2014 from the prior year. But the group said the overall numbers for cases filed and penalties assessed and collected remain at all-time low levels.

"It is what it is," Phillips said. "There is practically no enforcement and there is no serious indication that things are turning around."

"DEP keeps saying that compliance is

at an all-time high, but there is no data to back that up. So that tells me that if you believe what they are saying, they are only doing enforcement against the worst offenders. Frankly, I think a number of people don't believe them."

PEER said there has been a dramatic drop in enforcement for every pollutant type at every one of the six regional DEP districts across the state.

There has been an especially significant decline over the past two years. During that time, there has been an 85 percent drop in the number of enforcement cases brought. In 2014, there were only 234 enforcement cases opened, whereas in 2010—the year before Scott was elected—there were 1,587.

Of the 234 cases opened, DEP assessed penalties in only 144 of them, a rate of 62 percent. Four years earlier, penalties were assessed in 1,318 of 1,587 cases opened, a rate of 83 percent.

The group said the dollar value of assessments also declined from the "disastrous" levels in 2013. In terms of money collected, total collections reached an all-time low.

"Let us take DEP at their word," Phillips said. "If they are taking enforce-

ment action and if it is against the worst of the worst, you would expect to see higher penalties in each case. But that's simply not happening."

In fact, Phillips said, penalties that have been levied in major programs like hazardous waste have dropped by 60 percent over the past five years, Phillips said.

Penalties levied on potable water violations have fallen 77 percent over the same period of time. In solid waste, they have dropped by 28 percent and, in stormwater discharge cases, by 70 percent.

In South Florida, the numbers are especially disturbing, PEER said. In 2014, the department cracked open new files on 28 enforcement cases in the Southeast District. In 2013, it tallied 18. Compare that with 2010, when the Southeast District opened 206 enforcement cases.

The only bright spot in the numbers was for civil penalties. The department did assess more civil penalties in 2014 than in 2013. But the latest numbers still represent an 88 percent drop from the dollar value of penalties assessed in 2013.

Blame for the lax enforcement starts at the top, Phillips said. He took aim at Gov. Scott for his laissez faire attitude toward environmental rules and regulations.

"It all starts at the top," he said. "Gov. Scott is only going to pick people leading the agency that agree with his philosophy. He doesn't want to go hard on the big polluters. And senior managers within the department are simply following his policy."

"Employees know that if they want to remain with the department, they had better toe the company line."

PEER noted that one manager was promoted after the penalty assessments in her division declined to zero for two years running. "You have some good people working there, but a lot of people have left because they saw the writing on the wall," Phillips said.

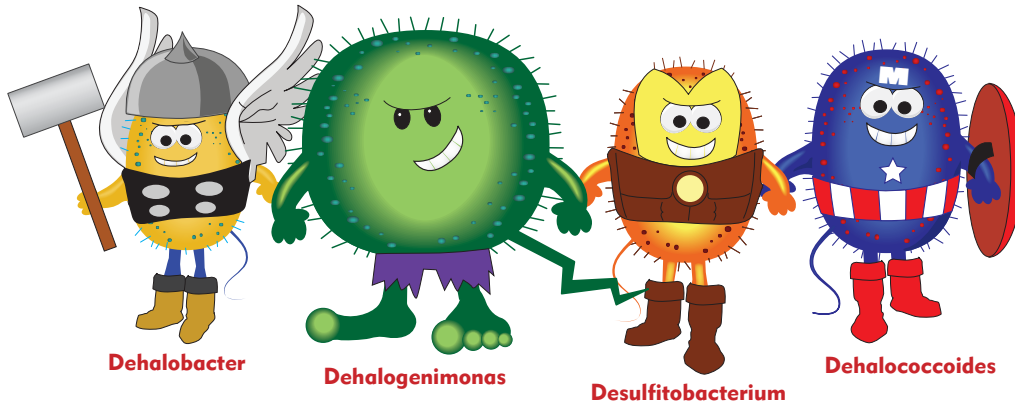
"Environmental enforcement in Florida now resembles that of a corrupt Third World nation," he said. "Consequently, little is being done to clean up our air and our water, while Scott's administration continues to hand out what amounts to welfare for corporations across the state."

But DEP's Elliott said the agency's focus remains on taking a proactive approach to Florida's environment.

"However, when enforcement is necessary, the department takes corrective action and uses every tool at its disposal to hold offenders accountable," she said.

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FRACKING

From Page 5

that is not reused or injected into wells. Both types of treatment plants have had problems reducing total dissolved solids before releasing the water to streams and rivers.

Some states have enacted rules to reduce treatment plant disposal of high TDS water from frack wells. Presumably, this will shift disposal towards UIC wells, a practice increasingly used in Oklahoma, and attributed in a recent U.S. Geological Survey report to causing earthquakes when the wells move water into fault zones, where it promotes slippage along fault lines.

The biggest risk of fracking operations to drinking water occurs where wells intersect geological strata in which fracking is performed. Risk is also high where fracking wells pass through drinking water-bearing aquifers. The risk can be reduced by up to a factor of 1,000 by using well casings and cement to properly isolate fracking wells.

But as fracking wells age, the possibility of failure increases. This can be managed by plugging wells with concrete after their useful production life ends.

The report noted multiple specific examples of contamination of drinking water. If this report makes any tacit endorsement, it might be that existing safety and best management practices used in conventional oil drilling have also been effective in reducing contamination risks due to fracking operations.

The EPA pointed out that characterizations and narrative in the report do not constitute a risk assessment. Significant data gaps exist that preclude a valid risk assessment for some of the chemicals used in fracking fluids and the substances in produced water.

Though the report concludes that fracking is far from safe, it has a good track record during its first 15 years and, with a little luck and continued incremental improvement in technology and safety practices, its clean record may just continue.

Editor's note: This EPA report in draft form is now under review by the agency's scientific advisory board. The final report is expected out later this year.

STEVERSON

From Page 1

early August, the Florida Cabinet confirmed him as the agency head.

Before being appointed to the position of interim secretary, Steverson served as the executive director of the Northwest Florida Water Management District, where he oversaw a restructuring of the agency and its budget.

Before that, he served at DEP from 2011 to 2012 as special counsel on policy and legislative affairs, and acting deputy secretary for water policy and ecosystem restoration.

He also served in the Executive Office of the Governor from 2005 to 2009 in mul-

iple roles including environmental policy coordinator.

That experience endeared him to some of Florida's top environmental experts.

"Jon Steverson is one of the best qualified people for this job," said Eric Draper, executive director of Audubon Florida. "He has extensive experience and history with the agency and with government.

"His values are probably more conservative than some environmental advocates, but he has the heart for the job and there was no reason in my mind why he would not be confirmed."

Bill Preston, a veteran environmental attorney in Tallahassee, said Steverson has all the credentials for the job. "He has the

experience working for the department previously and as executive director of the Northwest Florida Water Management District," said Preston. "His training, education and experience give him the ability to manage the department."

Preston said Steverson knows the importance of handing down responsibilities

BRIDGE

From Page 13

post-inspection processing for data enhancement.

In response to a question about the need for such a robotic inspection capability, von Ellenrieder noted that the machine is intended primarily for Level 1 inspections, which detect substantial damage or degradation.

Human divers would then perform any further critical evaluation of damage or indicating features found by the robot.

The robot may reveal underwater hazards before divers encountered them. Wildlife risks are among those that Level 1 robotic inspection could spare humans.

Von Ellenrieder explained that the reference is to wildlife that tend to the shelter under bridges and can be hazardous or aggressive, such as snakes, alligators, etc.

FEDFILE

From Page 2

internal reform efforts to be stillborn."

It also noted the agency's history of civil rights complaints from its own employees. The group suggested that the inability of the EPA to address civil rights issues within its own work force ill-equips the agency to successfully promote environmental justice throughout the country.

FSU receives EPA funding. Florida State University was one of nine institutions nationwide to receive funding to research the influence of climate change on indoor air quality and resulting health effects.

The research project, "Indoor Environmental and Emergency Response Health Outcomes," will study the interaction between indoor and outdoor temperature and humidity and the built environment.

The research will examine the link between indoor air temperature, humidity and extreme conditions of heat and cold. The goal is to understand the possible results of climate change including future extreme heat disease burdens or influenza risk related to climatic and demographic changes.

Results of the study could improve the health status of vulnerable populations and improve adaptation strategies for climate change.

The EPA is focusing on indoor air quality because Americans spend most of their time indoors. There they may be exposed

to other agency officials.

"From what I understand, he is a very good delegator and that is a key component of somebody heading this agency," Preston said. "He has assembled a strong supporting cast of employees including deputy secretaries and division directors to provide him with the expertise that's needed."

The research will be supported through a \$187,000 grant from the Florida Department of Transportation. The contract calls for pilot tests on three different bridges.

Nationwide, about 25 percent of bridges may have problems at or below the water level that need to be inspected and evaluated before they can be repaired. Florida's highway transportation system is one of the most bridge-dependent of any state.

Commercialization of FAU's proposed inspection robot is one ultimate goal.

"All the technical elements needed to implement the first cut of such a system already exist" said von Ellenrieder. "Assuming that the societal need of the system is felt to be sufficiently strong so that adequate development funds are available, I think there could be something commercially available within five years."

to air contaminants including radon, mold, secondhand smoke, indoor wood smoke and environmental asthma triggers.


Less well understood is how climate change will influence indoor air quality and human exposure to it.

The study seeks to identify both worsening conditions and novel indoor air quality degradation as a result of climate change. Variables such as changes in temperature extremes, changes in infiltration and ventilation, changes in outdoor and indoor allergen levels, and pesticide levels could influence indoor air quality as a result of climate change.

The EPA hopes the research will help avoid potential negative impacts of climate change through promoting healthy indoor environments.

Florida State University, the only school in the Southeast U.S. to receive funding, was awarded \$500,000 of the total \$8 million in grants provided by the EPA.

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