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Water 2070 report 7

If current population growth and water consumption trends continue until 2070, Central and South Florida will run short of water for combined potable water supplies, landscape irrigation and agriculture, according to a new report, Water 2070. The report was produced by 1000 Friends of Florida, the University of Florida GeoPlan Center and the Florida Department of Agriculture and Consumer Affairs.

UCF solar 9

The University of Central Florida is taking a large step forward in implementing its Climate Action Plan by proposing to install a solar array on campus. Once complete, the array will be the largest non-utility solar facility in the state, and is expected to cut their \$10 million plus annual utility bill by \$2 million.

Proposed EPA budget 10

The Trump administration's proposed 2018 budget for the U.S. Environmental Protection Agency reflects a 30 percent cut in program funding as well as substantial reductions in personnel. The agency budget would drop from \$8.2 billion in FY 2017 to \$5.7 billion, down \$2.5 billion.

Stormwater project funding 16

The Florida Department of Environmental Protection awarded nearly \$3 million for six stormwater projects across the state. Funded through appropriations from the Florida Legislature, the total maximum daily load grants support projects designed to improve water quality in impaired springs, rivers, lakes and estuaries.

Departments

Calendar	11
Federal File	2
Florida Notes	3
Water Watch	4

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 or email meast@enviro-net.com.

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Photo courtesy of St. Johns River Water Management District

Volunteers build an oyster reef living shoreline in the Indian River Lagoon. The St. Johns River Water Management District provided cost-share funds for the Brevard County project, which included construction of oyster reefs at three different lagoon locations. The reefs help reduce shoreline erosion, nutrient pollution, algal blooms and turbidity.

Corps considers alternatives to deep wells for stormwater north of Lake O

By ROY LAUGHLIN

The U.S. Army Corps of Engineers is in its plan formulation phase for the Lake Okeechobee Watershed Project.

But even in this early stage of planning, corps project managers have abandoned the idea of using deep injection disposal wells for stormwater management north of Lake Okeechobee.

The project will eventually develop infrastructure to provide alternatives to draining Kissimmee River water into Lake Okeechobee, particularly during high rainfall events.

When those events occur, the primary way of controlling Lake Okeechobee's water level is to drain the water east through the St. Lucie River to the Atlantic Ocean or west through the Caloosahatchee River to Gulf of Mexico.

According to John Campbell, a spokesperson for the corps' Jacksonville District, project planners are cur-

rently developing water management scenarios that will be the subject of technical and modeling studies in the coming year.

The studies will flesh out alternatives that might include reservoirs in the Kissimmee River watershed, or other means of storing water before it reaches Lake Okeechobee.

Deep disposal wells were initially

under consideration. The plan was to dispose of flooding stormwater by pumping it deep into the Floridan Aquifer—to depths of as much as 3,000 feet.

According to Campbell, the corps hopes to have its Lake Okeechobee Watershed Project proposal completed later this year or in early 2018, and open it to public meetings and public comment.

WM exploring viability of leachate injection at Jackson County landfill

By BLANCHE HARDY, PG

Waste Management is seeking approval to construct a Class V exploratory deep well to gauge the potential of disposing of nonhazardous landfill leachate 3,500 feet below ground at their Springhill Regional Landfill in Jackson County.

But Jackson County Commissioners, local residents and community ad-

vocates are concerned that the use of a deep well for subsurface disposal of leachate may adversely impact local groundwater supplies.

Waste Management's proposal is not unique.

"Underground injection control wells are one of a variety of wastewater disposal or reuse methods used in Florida," said Dee Ann Miller, deputy press secretary with the Florida Department of Environmental Protection. "UIC wells are used for a variety of purposes including fluid storage, disposal and reuse, or to prevent saltwater intrusion."

Miller noted that there are landfill leachate wells now operating in Texas, Louisiana, Ohio, Kansas, Indiana, as well as in Florida.

"The UIC well permitting process is very extensive," she said. "For this proposed project, there are three separate permitting phases that must be completed by the applicant before the well would be operational."

The UIC permitting process include an exploratory phase, an operational testing phase, and then the full operation phase. The entire permitting process can take more than four years to complete.

The currently proposed permit

Construction of Leesburg stormwater project uncovers contamination

By PRAKASH GANDHI

Officials in the Central Florida city of Leesburg are taking steps to clean up contamination discovered during the construction of a Lake Griffin stormwater management improvement project.

City officials said the contamination poses no direct threat to residents, but they want to allay citizens' fears by cleaning it up as quickly as possible.

"We took the high road, and went above and beyond what we were supposed to do," said Derek Hudson, public information officer with the city.

The city's stormwater capital improvement program has \$335,000 in funding for the stormwater project.

The project will provide treatment

for a 42-acre watershed that drains northward from East Main Street through a detention pond before flowing into Lake Griffin.

The construction cost is \$440,120.

While excavating the detention pond, the contractor uncovered construction debris and possible contaminated soil.

"We did some soil sampling and everything looked good," Hudson said. "But as the contractors started doing some additional excavation work, they found some contamination."

The city asked Universal Engineering Sciences to determine the limits and severity of the contamination and to de-

LEESBURG
Continued on Page 16

INJECTION
Continued on Page 15

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EPA formally declines petition to revise Florida's water quality criteria

Staff report

In late May, the U.S. Environmental Protection Agency formally declined to act on an eight-year-old petition from environmental groups asking the agency to require Florida to update state water quality standards.

In 2009, the Florida Clean Water Network, a consortium of 300 environmental organizations and individual advocates for clean water, petitioned the agency to require state regulators to update their standards for water contaminants in drinking water sources and surface water.

The issue in 2009 was that EPA regu-

lations required triennial reviews for updating chemical contaminants in water. In 2009, the Florida Department of Environmental Protection had not once revised water quality standards that were initially established in 1992.

The situation has changed since then. In July, 2016, DEP completed a four-year quantitative risk analysis for 78 chemicals in drinking water sources and surface water.

The new standards were controversial because DEP used a probabilistic risk assessment approach that led to slightly higher standards for some chemicals—standards that some environmental advocates thought should be tightened.

Activists opposed to the new standards also criticized its approval by the state Environmental Regulation Commission because Gov. Rick Scott had failed to fill two ERC vacancies on the board in a timely manner.

One of those vacancies was designated for an environmental advocate and the other for a member of the general public.

The ERC approved the rule by a 3 to 2

vote. Opponents of that decision felt the new standards would have likely failed if a fully appointed ERC had been in place.

Superfund prioritization. In mid-May, EPA Administrator Scott Pruitt issued a directive that prioritized the cleanup of some Superfund sites.

As part of the new scenario, Pruitt will make decisions regarding future Superfund site cleanups with costs greater than \$50 million or will delegate decisions to a deputy administrator.

Pruitt noted that he will take on the authority previously delegated to the assistant administrator for the Office of Land and Emergency Management and the regional administrators.

Pruitt's delegation of authority does not affect any ongoing oversight or implementation of remedies. They will remain the responsibility of EPA's regional offices.

In addition, Pruitt's memo does not affect decisions to add new sites to the National Priorities List.

Pruitt's primary goals, according to an agency press release, are to clean up Superfund sites more quickly and to restore Superfund cleanup "to its rightful place at the center of the U.S. Environmental Protection Agency's core mission."

Landfill rules delayed. In late May, the EPA announced a 90-day administrative stay on two Obama administration rules intended to reduce methane emissions from landfills.

The first is Standards of Performance for Municipal Solid Waste Landfills. The second is Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills.

The EPA issued its final rules in late August, 2016.

The delays are in response to stakeholder petitions. The National Waste and Recycling Association and the Solid Waste Association of North America petitioned the agency to reconsider the two rules in October, 2016.

The agency arranged an administrative reconsideration proceeding to determine whether six aspects of the rules should be subject to reconsideration.

Those aspects included Tier 4 surface emission monitoring, annual liquids reporting, corrective action timeline procedure, overlapping act applicability with other rules, the definition of cover penetration and design plan approval.

The primary purpose of the two rules is to reduce methane emissions from landfills that were built before July 17, 2014, and to develop separate standards for newer landfills.

Affected landfills were required to submit emission guideline compliance plans by May 30, 2017. The administrative delay moved that deadline to the end of August.

Methane from all sources comprises about 10 percent of all U.S. greenhouse gas emissions. Methane from landfills alone accounts for about 1.8 percent of all such emissions.

While seemingly small in terms of total mass, methane is about 25 times more effective than CO₂ at trapping radiant solar energy and transferring it as heat to the atmosphere.

Reducing a little bit of methane goes a lot further than reducing a lot of CO₂ when it comes to limiting greenhouse gas associated with global warming.

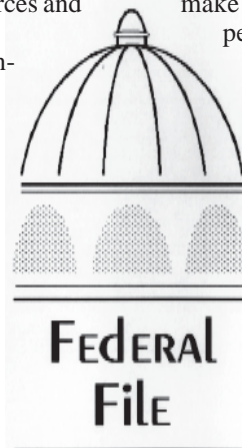
Steam electric power plant effluent rule delay. In late May, EPA Administrator Scott Pruitt issued a proposed rule to delay compliance dates for the Effluent Limitations Guidelines and Standards for Steam Electric Power Plants Rule.

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Continued on Page 12

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DEP orders more testing for Palmetto development

Staff report

Florida Department of Environmental Protection officials ordered another round of testing at a planned 142-unit residential development in Palmetto.

Almost two years ago, Lakeland-based Highland Homes petitioned Manatee County commissioners to rezone the 58 acres on both sides of 28th Avenue West from suburban agriculture to residential use.

The proposed development is the site of a former golf course closed in 2015 after more than 50 years of operation.

Residents of a nearby community are concerned about the decades-long use of chemicals associated with operating a golf course including insecticides, herbicides and fungicides, among other chemicals.

DEP initially launched an investigation last summer when concerns about potential contamination went public. The department ordered the developer's environmental team to conduct further testing over the past year.

In March, more intensive testing showed that certain areas of the course contained a level of arsenic that exceeds allowable residential levels.

Of the 20 sites tested on the property, 12 of them showed higher levels of arsenic than is acceptable for residential development.

More trouble for composter. State environmental officials said that B.S. Ranch & Farm may have committed dozens of violations at its Lakeland-based recycling facility.

DEP said the violations range from failing to provide a human waste storage plan to not processing compost material within the required 48-hour period.

Earlier this year, nearby neighbors and business owners complained about odors coming from the company that recycles human waste, out-of-date food and landscape waste into a soil amendment sold to growers.

DEP has cited the facility five times in the past for odor issues and is now scheduling another meeting with staff from the facility to discuss the issues.

Violations could include failing to treat and manage human waste, failing to provide an updated facility operations plan for expanding operations, failing to provide copies of the monthly stormwater inspections, failing to provide discharge monitoring reports and failing to immediately address off-site odors coming from the facility.

A special magistrate ruled in favor of the facility in an earlier county code case. It had sought a \$15,000 penalty for two odor violations for each day the ranch had been in violation and a \$1,000-per-day penalty for the three alleged compliance violations for failing to obtain a development review.

Port Everglades expansion. Port Everglades received unanimous approval from the Broward County Board of County Commissioners for a \$438 million project to add new berths and install new crane rails.

The project is the most expensive capital improvement agreement awarded in the port's history.

Officials said the port, which has become Florida's leader for containerized cargo volumes, needs additional dock space for cargo ships.

The project will lengthen the existing deepwater turnaround area for cargo ships from about 900 feet to 2,400 feet, allowing room for up to five new cargo berths.

A critical part of the expansion includes replacing nine acres of an existing mangrove conservation easement with 16 new acres of mangrove and wetland habitat, a project that is now complete.

Port officials worked closely with port users, the environmental community and the DEP to develop the plan for the new habitat.

FPL solar. Construction has started on all eight of Florida Power & Light Co.'s planned solar power plants, one of the largest solar expansions ever in the eastern U.S.

The new plants are expected to be complete by early next year and will contribute enough low-emissions energy to the FPL grid to power nearly 120,000 homes.

FPL officials said the plants will result in net savings for FPL customers over and above the construction costs.

About 500 people are now employed on the eight solar sites. That number is expected to grow to 1,500 this summer.

Four of the eight plants are scheduled to be online by the end of this year including Horizon Solar Energy Center in Alachua and Putnam counties, Coral Farms Solar Energy Center in Putnam County, Indian River Solar Energy Center in Indian River County and the Wildflower Solar Energy Center in DeSoto County.

From 2017 through 2023, FPL plans to add nearly 2,100 megawatts of solar power including the 600 megawatts now under construction.

People news. Universal Engineering Sciences Inc. promoted Melisse James to environmental department manager in their Orlando branch. She has over 13 years of experience in the environmental industry, starting her career in the soils testing laboratory at Universal. In this new role, James will provide managerial and consulting services for the environmental department.

Adam Swaney, PE, LEED AP, was named as a shareholder with the Engenuity Group Inc. in West Palm Beach. He has been with the firm since 2012 and most recently served as its director of engineering. Swaney is responsible for managing projects in the engineering department including roadway, water distribution systems, sanitary sewer and stormwater design and modeling, various agency permitting and construction administration.

Darren Bishop, PWS, has joined the firm of Cardno Inc. as a senior consultant in the company's Tampa office. He has more than 15 years of experience managing and implementing science-based studies and offering planning, permitting, technical report preparation, and construction support skills on complex projects.

Florida Notes



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St. Johns River Water Management District seeks agricultural cost-share program applicants

Staff report

The St. Johns River Water Management District is accepting applications for its agricultural cost-share program.

The program promotes practices to expand water conservation, reduce nutrient runoff, improve surface water quality and protect natural systems.

Eligible projects may include irrigation system retrofits, soil moisture and climate sensor telemetry, rainwater harvesting, sub-irrigation drain tiles, tail water recovery and reuse, soil mapping with variable rate fertilizer application or expanded wash

storage.

The district is accepting applications through July 28.

They will be evaluated based on location, water conservation benefit, water quality benefit, cost/benefit effectiveness and timeline.

The cooperative funding may cover up to up to 75 percent of the selected projects. The district's governing board will vote on funding from the list of recommended projects at its October, 2017, governing board meeting.

Additional information is available online at www.sjrwmd.com/agriculture/costshare.html.

Longwood stormwater. By the end of the summer, officials with the city of Longwood expect to complete the Florida Central Commerce Park Stormwater Pond.

The project will expand an existing stormwater pond to create additional capacity.

To make space for the expanded pond, the former Aqua Utilities wastewater treatment plant will be razed.

The city now owns the mothballed plant and the land it occupies.

The retention pond will also serve as a supply source for irrigation water to the park and a nearby hospital.

Before use in landscape irrigation, the water will be piped to a stormwater treatment facility where suspended solids will be filtered out and microorganisms removed.

In addition to providing irrigation water to the two Longwood facilities, substituting runoff for irrigation water currently pumped from the ground will benefit the Floridan Aquifer and local springs dependent upon it.

Detaining and treating the stormwater runoff will also improve water quality within the Wekiva Springs watershed.

The total project cost is \$583,840. The funding is being made available through a cooperative agreement, with the city paying \$269,420.

The Florida Department of Environmental Protection and the St. Johns River Water Management District will each pay \$134,710.

Construction began in April, with completion expected at the end of the summer.

Aquifer recharge in Manatee. The Southwest Florida Water Management District's Governing Board approved funding for the construction and testing of an aquifer recharge well and three monitoring wells in Manatee County.

In the first phase of the project, water will be pumped from the Flatford Swamp into the Upper Floridan Aquifer.

During this phase, monitoring wells will be drilled and data collected to determine the effects of the pumping on the adjacent water table.

SWFWMD scientists said that pumping water from swamp will benefit it ecologically because high water levels have caused extensive tree die-back since the 1980s.

A healthy swamp is an important component in the overall plan because its natural environmental housekeeping processes remove contaminants from the water before it is pumped into the aquifer.

During the test phase, district staff will pump up to two million gallons a day into the aquifer. The operational goal is to pump up to 10 million gallons per day to recharge the Upper Floridan.

Water pumped into the aquifer is expected to help reduce saltwater intrusion in Manatee County.

The area where the well is planned is the most impacted of eight designated areas in the district's Southern Water Use Caution Area. All eight received that designation due to significantly-lowered Floridan Aquifer levels.

In addition to installing and testing the recharge well, subsequent stages of the work include evaluating water quality and computer modeling of aquifer characteristics to indicate if the aquifer is capable of accepting the desired 10 million gallons per day injection.

Well construction is expected to begin by the end of 2017. Drilling and testing will occur during the subsequent three years.

SJRWMD conservation awards. The St. Johns River Water Management District announced six Florida Water Star awards to acknowledge water conservation achievements by five of the program's partners.

On Top of the World in Ocala received the Private Builder Award. Florida Home Partnership in Ruskin won the Nonprofit Builder Award. Kurt Thompson and Associates in Orlando received the Training Partner Award.

Nathan Ritter with Green Built Solutions in Orlando won the Program Certifier Award. Florida Green Building Coalition in Tallahassee won the Certification Program Partner Award and the Florida Nursery, Growers and Landscape Association in Orlando won the Program Partner Award.

The district developed its Florida Water Star water conservation program along the lines of the EPA's Energy Star program. The program provides guidance for building practices and other aspects of water conservation.

Businesses and other organizations join as partners. The annual awards recognize notable achievement or participation in designated categories.

Cape Coral RO plant upgrade. In May, the Cape Coral City Council approved a contract for nearly \$900,000 plus contingency to replace and upgrade four electrical busways at its North Reverse Osmosis Water Plant.

A fire at the water treatment plant in October, 2014, was the motivating factor leading to the decision to replace the electrical cables and busways.

The fire, which occurred when the plant was just four years old, destroyed one of the four electrical busways. The one damaged by fire was quickly repaired and has been in use since.

All four busways and their cables are on the exterior of structures and elevated above ground.

The cause of the fire was never conclusively determined. Initially, excessive heat from exposure to the sun was suspected.

It is also possible that rainwater, which drained slowly and incompletely from the elevated buses, could have been a contributing factor. Simple malfunction of the electrical equipment was not ruled out.

Utility officials were concerned that doing nothing might lead to another incident causing more significant or complete electrical system failure.

The construction project will move cables and busways to underground conduits encased in concrete to protect them from the elements. All new equipment will be installed.

Utility department officials were able to reduce costs by about 20 percent by making engineering changes and burying the replacement electrical components.

Cogburn Brothers of Jacksonville was the only responsible bidder.

The city council awarded them a construction service contract to modify the power distribution system for \$898,500 plus a 10 percent contingency of \$89,850.

Construction began in late May and is expected to be complete by the end of the summer.

Citrus County water reclamation. Construction has begun on Citrus County's Southwest Regional Water Reclamation Facility.

It will replace the former Sugar Mill Woods plant with double the wastewater treatment capacity. Part of that expanded capacity will provide future service to more than 5,000 homes currently on septic tanks.

The new plant will rely on a rapid in-



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WATCH
Continued on Page 5

Report: Southeast states have a long way to go with advancing clean energy

By **BLANCHE HARDY, PG**

West Coast clean energy watchdogs Clean Edge recently published the eighth edition of their U.S. Clean Tech Leadership Index.

Florida ranked first among all states in one area: reducing emissions among existing buildings. Unfortunately, Florida ranked 41st out of the 50 states overall.

And most of Florida's Southeast U.S. neighbors fared no better.

Clean Edge's state leadership score ranked all but one of the 12 Southeast states in the bottom half of the index. Georgia earned a better score than Florida at

34th, and Alabama scored one place lower than Florida at 42nd.

Clean Edge began publishing the report eight years ago to measure annual state-by-state progress in advancing solar, wind and other generation sources of clean energy, energy storage installations, green building deployment, energy efficiency expenditures, venture capital investments and clean-energy patents issued.

This latest edition considered the status of 70 indicators in three main categories: technology, policy and capital.

The index tracks and ranks the activities of the 50 largest metro areas in the U.S. in addition to all 50 states. Criteria assessed

included the use and facilitation of electric vehicles and renewables to the adoption of clean technology policies and investment activity.

"The declining cost of solar and wind is the key driver fueling renewables' rise," said Clean Edge Managing Director Ron Pernick. "In many regions around the nation, utility-scale onshore wind and solar, even without subsidies, now beat coal, nuclear and even combined-cycle natural gas on cost for new generation assets."

Florida ranked third for the total number of clean energy jobs, about 170,000, with a concentration in advanced materials and insulation, and Energy Star and

efficient lighting.

However Florida clean-energy policy and regulatory mandates only advanced in eight of 19 categories from last year and incentives grants for renewable energy efficiency rebates were only available in three of 19 categories.

At 27th, the city of Orlando scored the highest of Florida's cities in the 50 City Metro Index Leadership Score matrix. Miami followed at 42nd, Tampa at 44th and Jacksonville at 49th.

Orlando scored in the top half of metro areas at 24th for green buildings and at 25th for climate and carbon management.

Although the current federal climate for positive advancements in clean energy technology is questionable at best, the eighth edition of the index indicated that states and cities remain committed to the expansion of clean energy, transportation and energy efficiency.

Among the highlights in this year's U.S. Clean Tech Leadership Index, wind and solar power represented 61 percent of all new electricity generating capacity installed in the U.S. in 2016.

In addition, utility-scale wind and solar now beat coal, nuclear and combined-cycle natural gas on cost for new generation assets with or without subsidies, and clean energy now supports a total of 2.4 million jobs nationwide.

WATCH From Page 4

filtration basin system in place of the existing sprayfield.

The benefits include a new source of high-quality irrigation water available for public access areas.

The new facility will provide advanced wastewater treatment to reduce nitrogen loading to the Chassahowitzka Springs and River. The new plant will also reduce the need for groundwater withdrawals.

The plant's total cost is estimated to be \$19.5 million. The Florida Department of Environmental Protection provided \$4 million through a legislative appropriation grant and an additional \$12.4 million low interest loan from Florida's Clean Water State Revolving Fund.

Citrus County will pay the remaining construction costs.

The project is expected to be complete by the summer of 2020.

Port Orange stormwater, sewer projects. In May, the city of Port Orange celebrated the completion of a combined stormwater and septic-to-sewer conversion project in White Acres.

Stormwater improvements included converting more than 3,600 linear feet of ditches to an underground drainage system. Thirty-three new drainage structures were installed.

Stormwater will be treated before being released into Spruce Creek.

The conversion of formerly open swales to underground stormwater conveyance also reduces potential mosquito breeding areas.

The septic-to-sewer conversion included installation of more than 2,600 linear feet of gravity sewer lines. This will eliminate 52 septic tanks on 51 residential properties.

Some residents have already attached to the new sewer line and the remaining residents have a year to connect.

Both projects will protect and improve water quality in Spruce Creek, designated as an Outstanding Florida Water. Abandoning septic tanks will also improve aquifer water quality along with benefitting Spruce Creek.

Total construction actual costs were \$1,153,413. The Florida Department of Environmental Protection contributed the lion's share, \$605,177, followed by the St. Johns River Water Management District, 351,746.

A community development block grant paid the balance of \$196,490. The completed project was more than \$430,000 below expected cost.

SWFWMD withdraws Rainbow River MFLs. In late May, the Southwest Florida Water Management District Governing Board approved the Rainbow River system's minimum flows and levels.

Shortly thereafter, a local environmental advocacy group, Rainbow River Conservation Inc., and six residents who live near or on the river asked for an administrative hearing. Administrative Law Judge Bram Canter was set to hear the challenge in late June.

In response to the scheduled hearing, the district announced in early June that it would withdraw its proposed MFL rule.

The petitioners documented the fact that Rainbow Springs water flow and wa-

ter quality has declined over recent decades as shown by noxious algae proliferation and water clarity reductions.

They claimed that in the now withdrawn rule, the district based its MFL standard on flawed computer models.

The petitioners said that there was no justification to conclude that reduced spring flows are normal or that additional groundwater pumping would not cause significant harm.

The withdrawn rule stated that the minimum flow for the Rainbow River system is 95 percent of the natural flow as measured at a designated gauge. Natural

flow was described as the flow that would exist in the absence of water withdrawal impacts.

In their complaint, the petitioners said that the rule's wording was vague.

By withdrawing the rule, the water management district has the opportunity to formulate a new rule that describes how compliance with the MFL will be determined and reformulate the rule in more understandable language.

Other environmental groups including the Florida Springs Council issued statements strongly supporting Rainbow River Conservation and the six residents.

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- Innovative/creative site assessment strategies; technologies to develop effective conceptual site models
- Addressing the complex site challenge—assessment through remediation
- Combined and/or Phased Remedial Strategies
- Chlorinated solvents, NAPLs
- Emerging contaminants (1,4-dioxane, PFCs, pharmaceutical personal care products, etc.)
- Remedial system optimization
- PRP case studies: Assessment and remediation within the state PRP—tools and techniques for ATC success
- Assessment and remediation within the Florida Drycleaner Solvent Cleanup Program
- Vapor intrusion
- Vendor-focused technologies and products (anticipated to be a session with "speed talks")
- Regulatory policy and initiatives
- Cleanup case studies of sites and surface water contaminated with petroleum, PCBs, DNAPLs and LNAPLs, chlorinated solvents, arsenic and heavy metals, pesticides, nitrates/nitrites and other contaminants.

In addition, we are considering presenting several sessions featuring open forum discussion on technologies, site assessment techniques and regulatory subjects. If you have a suggestion for an open forum subject, chime in.

Please submit abstract of approximately 250 words by Aug. 15, 2017.

Presentations will range from five minutes to an anticipated maximum of 20 minutes in length. Please indicate the topic area your abstract is being submitted for (or provide your own) and your recommendation regarding length of the talk.

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Book review: Nathaniel Reed's new work provides some needed inspiration

By ROY LAUGHLIN

The name Nathaniel P. Reed is familiar to anyone connected to Florida's environmental movement.

In his recently published book, *Travels on the Green Highway: An Environmentalist's Journey*, Reed recounts how he and his colleagues, the vanguard of mid-20th century environmental activists, strove to create the foundations of our contemporary environmental ethic and practice.

Their results are evident in today's conservation and environmental resource protection policies, and the state and federal agencies that implement them.

The legacy of the years 1969-1973 has served both the state of Florida and the U.S. for the last half-century.

But why would readers want to take the time to read the memoirs of a former special counsel to Florida Gov. Claude Kirk and later an assistant secretary of the interior for Fish, Wildlife and National Parks during the Nixon administration?

The facts are clear in *Travels on the Green Highway* that elected politicians in those days had little interest in the envi-

ronment.

Gov. Kirk had confidence in Reed's political savvy to defuse environmental issues that the governor did not understand, leaving Reed and his allies with broad latitude to include conservation and resource protection in recommended solutions.

Some of Reed's accounts of the role of sympathetic senior presidential and congressional staff may surprise some readers familiar with other writings that credit President Richard Nixon for the environmental bills he signed, giving credit where none is due.

For example, Reed spotlights Nixon Domestic Affairs Advisor John Erlichman's integral role during Nixon's presidency.

"I think John was particularly inter-

ested in having a legacy," said Reed. On the other hand, "Nixon showed no further interest in an environmental legacy after our interview (Reed's interview with Nixon after Senate confirmation as assistant secretary of the interior)."

This is one of Erlichman's few recommendations for positive legacy on a resume otherwise besmirched by Vietnam War escalation and the Watergate cover-up.

This example is one of many in *Travels on the Green Highway*.

Reed's book is a treasure trove of first-hand information about the issues, the places, the politicians and the environmental advocates and scientists who joined in a

non-partisan effort to establish the early policies, laws and agencies that have protected natural resources, habitat acquisi-

tion, preservation, species protection and the management of natural resources for the past half century.

Leaders of few other countries can point to a similar record of environmental accomplishment.

Reed's book consists of 44 essays that cover the time period from when he was special counsel to Kirk through his work with the Nixon and Ford administrations.

The essays can be broadly grouped into those describing conservation and preservation (Reed's special interest), environmental quality and pollution abatement, national park management, the architectural heritage of Washington, DC, and a few chapters on environmental organizations and their transformative leadership.

The essays are largely self-contained within a topic area and can be read individually and in any order.

The link between chapters is largely the mention of broader interactions between people in environmental groups and the government, both federal and state, who were involved as proponents or opponents of the essential series of federal environmental initiatives undertaken during the early 1970s.

Reed's accounts of his visits to many of the nation's most beloved parks and national monuments before they were acquired in the 1970s is another distinctive contribution of his book.

These span North America from the Okefenokee Swamp to the California Redwoods to Alaska's wilderness.

In Florida, the Big Cypress Swamp, Fakahatchee Strand, Lignumvitae Key and the Ocklawaha River are legacies of his conservation efforts.

Reed's narratives are enthusiastic accounts of obtaining the background and pertinent facts for testimony and planning efforts that resulted in federal or state acquisition.

His essays have a substantial inclusion of narrative quotes. As he explained in an interview, the quotes were taken from notes and transcriptions taken by secretaries and assistants at formal meetings and phone calls during his service. They are augmented by notes he kept in his personal daily journal.

One of the book's most notable insights is how much comity characterized the relationship between the "interactors" in Congress, non-governmental advocates and members of the executive branch involved in negotiating environmental issues. It binds most of the book's narratives.

Needless to say, the bipartisanship in those early days of environmental decision-making is a distant relic of the past as Congressional Republicans and the Trump administration today take aim on the country's environmental legacy.

When asked if he understood how this change could have happened and who is responsible for it, Reed replied, "I'm just as amazed as you are."

Anyone interested in the origins and early years of 20th century conservation and environmental quality activism will find the book a good read. Many of its facts are available only here or in documents on file at the Library of Congress.

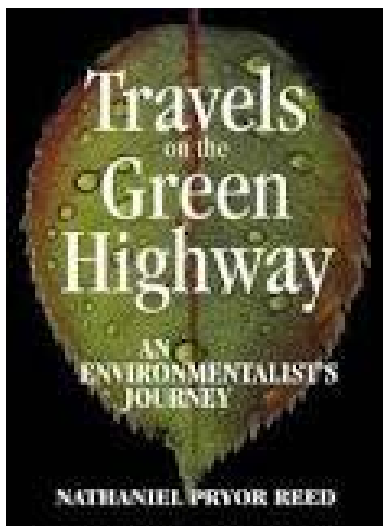
It is an authoritative, robust and well vetted historical account of that time for inquiring minds that need facts, along with some nicely quotable lines.

Travels on the Green Highway is inherently about our nation's environmental legacy as well as Reed's personal journey.

His accounts remind us that the struggle to protect the environment in the 1970s was only the first part of the journey. They are far more than green highway road-side attractions ahead.

The road through the next few years may have a steep grade that requires no small amount of inspiration to continue. Readers may find some of that inspiration in *Travels on the Green Highway*.

Editor's note: Travels on the Green Highway: An Environmentalist's Journey, 2016, by Nathaniel Pryor Reed, Reed Publishing Company, is available from Amazon Books.



Nathaniel Reed's new book recounts how he and his colleagues strove to create the foundations of our contemporary environmental ethic and practice.

Florida Specifier

2017 Environmental Lab Directory

Each August, we turn our attention to the environmental laboratory business in Florida. As part of this special annual issue of the *Florida Specifier*, we include a directory of environmental labs providing analytical services in the state.

You're invited to complete the form below, providing details about your lab and its analytical capabilities. **There is a fee of \$200 to list your lab this year.** (Fee waived for *Specifier* advertisers, and 2016 FRC exhibitors.) In addition to your listing in the directory, **your lab will also be included in a special lab listing on our Enviro-Net website.**

Please type or LEGIBLY print the information requested and return as soon as possible to Mike Eastman via fax at (321) 972-8937, e-mail mreast@enviro-net.com or mail to P.O. Box 2175, Goldenrod, FL 32733. You can reach us at (407) 671-7777. The deadline for submissions to the August Lab Directory is **Friday, July 14, 2017.**

Note: If you were listed last year, we will be in touch. Do not complete this form.

Please include only lab operations, capabilities and personnel in Florida.

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What single issue has most affected labs in Florida over the past year? _____

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Water 2070 report: Current water consumption trends not sustainable

By ROY LAUGHLIN

If current population growth and water consumption trends continue until 2070, Central and South Florida will run short of water for combined potable water supplies, landscape irrigation and agriculture.

It's that simple, according to a recently released study, Water 2070. The collaborative report from 1000 Friends of Florida, the University of Florida GeoPlan Center, and the Florida Department of Agriculture and Consumer Affairs, used big data-GIS analysis to develop potential scenarios of water consumption over the next 50 years.

The data represented county-based population, density and land use, and water consumption.

The analysis developed four regional water consumption patterns with different scenarios of water consumption that are plausible based on 2010 per capita and demographic trends by county.

The analysis methods and the structure of the results are consistent with a companion report characterizing population growth across Florida released late last year.

The water report predicts consumption based on a 2010 baseline. The baseline study led the researchers to divide Florida into four sub-regional areas: the Panhandle, Northeast Florida, Central Florida and South Florida.

In 2010, Central and South Florida were similar with total consumption of approximately 2.1 billion gallons per day in each region. In both, a combination of potable water consumption, landscape irrigation, industrial use and electricity generation—characterized as “development” water—was the dominant water consumer.

Water use in Northeast Florida accounted for about 600 million gallons per day, while in the Panhandle it was a little over 400 million gallons per day.

Agriculture in both Central and South Florida is the second largest water consumer. In 2010, agriculture accounted for approximately one billion gallons of water per day in Central Florida while in South Florida, it was about 800 million gallons per day.

In South Florida, population size was the primary factor for the region's rank. In Central Florida, population size plus the widespread use of landscape irrigation on sprawling developments combined to rank it first in water consumption.

The report writers projected 2010 water consumption to 2070 based on two different scenarios. The first, termed “trend,” projected water use into the future on a population growth scenario that reflects population density, development sprawl and density, and agricultural land use with no change in per capita water consumption rates within those categories.

By 2070, Central Florida will lead the state in regional water consumption, rising to 3.25 billion gallons of water per day. In South Florida, regional water consumption will increase but is not predicted to exceed 3 billion gallons per day.

Water consumption in Northeast Florida will double, to a bit below 1.250 billion gallons per day, the highest rate of increase in Florida's four regions. The Panhandle's total water consumption will rise to 600 million gallons per day.

Analyzing the data by county allowed the report writers to tease apart some of the factors the model relied on to make its predictions.

In Central Florida, population growth accounts for far more of the increase in water demand than in any other region. Population will more than triple there, based on current trends.

But overall, the prediction of water consumption for the region did not triple because the extra proportion of water for development was offset by a loss of agricultural water use in the region.

In South Florida, water for development at current trends will double, with agriculture contributing to increase its share of total water consumption. There, agri-

culture will decline a little less than in the Central Florida region, according to predictions.

In the Northeast and Panhandle regions, population growth and its ensuing demand for water due to development accounts for almost all of the increased water consumption in 2070 under the trend scenario.

The state water management districts have issued similar predictions of insufficient water supplies in their periodic water use plans. WMD planning efforts typically have a time horizon of 20 years.

“Each water management district uses its own methodology to identify water demand. Our study is not based on the more detailed data available to the districts but instead is intended to provide an ‘airplane view’ of the issue statewide,” said Vivian Young, AICP, communications director for 1000 Friends of Florida.

She said their report shares the districts' message.

Water 2070 comparatively covers all five water management districts over much longer time frame and therefore provides

a different context for Florida's potential water shortage.

The report's authors starkly noted that the trend scenario is unsustainable.

Water supplies for “development” are not sufficient to meet the 2070 trend for population growth that maintains its current per capita water consumption. Increased levels of water conservation will be essential to meet the demand.

The authors used other studies to posit that landscape irrigation in sprawling residential and commercial developments accounted for three times more water use than high-density development, with less open space requiring landscaping and its irrigation needs.

Water conservation measures such as water-saving toilets and low-flow fixtures are also significantly effective in reducing per capita water use.

With respect to landscape irrigation, “smart” irrigation systems that operate on schedules and use sensor-based irrigation can reduce water use by as much as 20 percent.

Based on water conservation methods currently being used, the demographers developed a second scenario based on the adoption of water-saving methods that have proven effective at the municipal and subdivision scale, and have been shown to significantly decrease per capita water consumption, particularly by reducing landscape irrigation.

The alternative analysis indicated that total water consumption in Central Florida in 2070 could be reduced to about 2.75 billion gallons per day with proven conservation strategies. This is 500 million gallons per day less than the trend prediction.

In South Florida, with an already compact population footprint, the alternative scenario predicts a total water consumption of 2.55 billion gallons per day, a 400 million-gallons-a-day savings over the trend scenario.

Water conservation measures would also produce markedly reduced consumption in the other two regions. For Northeast Florida, the measure would keep total daily consumption well below a billion gallons per day, and below half of billion gallons a day in the Panhandle region.

The assumptions used to model water



WATER
Continued on Page 9





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Researchers study breakdown methods for personal care products in domestic wastewater

By ROY LAUGHLIN

Activated sludge technology is the prevalent method of treatment in today's wastewater treatment plants. But as well as the technology breaks down organic substances, some synthetic organic chemicals pass through plants virtually unscathed.

Refractory synthetics may then contaminate ground and surface waters receiving the effluent. And as water reuse expands, their presence is even less appreciated.

Among the chemicals resistant to activated sludge destruction, pharmaceuticals and other personal care products, or PCPs, top the list of chemicals of emerging concern. They are used in large quantities and likely to be disposed of or excreted into wastewater.

Many of the substances have been chemically engineered or selected from natural products for their resistance to breakdown in the human body. That resistance carries over to microbial degradation in activated sludge treatment as well as to the environment.

University of Minnesota researchers recently released the results of a study that provided insights that could improve PCP

degradation in activated sludge treatment system.

They scrutinized carbamazepine, a widely used resistant pharmaceutical, describing the molecule's structure as a "puckered tricyclic dibenzazepine ring structure with a carboxamide functionality appended to the ring nitrogen atom."

Carbamazepine occurs widely in wastewater treatment plant effluents because of its use to treat epilepsy and similar conditions, and its substantial resistance to activated sludge biodegradation.

The research effort was initiated with a search of databases for microorganisms with enzymes possibly capable of degrading carbamazepine. The search focused on Rieske dehydrogenases present in bacteria known to have enzymatic capability to break down structurally similar multi-ring organic molecules.

Their search yielded microorganisms producing the following degradation enzymes: toluene 2,3 dioxygenase produced by one bacterium species, naphthalene 1,2 dioxygenase produced by another bacterium species, and two different biphenyl 2,3 dioxygenase enzymes produced by each of two bacteria species.

The investigators then combed two other databases that contain structural information such as amino acid sequence, molecular size, shape and catalytic site characteristics regarding bacterial Rieske dioxygenase.

"Rieske dehydrogenases comprise a broad class of redox enzymes with an oxygen-reactive iron atom in the catalytic site that is located in an interior pocket in the enzyme," said lead author Kelly Aukema, a biochemist doing postdoctoral research at the University of Minnesota's Biotechnology Institute, in describing the unusual proteins.

Using the molecular structure data and data based on algorithms they developed for the investigation, the researchers predicted which enzymes from the four bacteria species could be capable of degrading carbamazepine.

The estimates were based on calculations of atomic radii, bond length and angles, and plausible molecular configuration of the enzymes and carbamazepine. This was the in-silico aspect of the project.

The research involved substantial calculation efforts to identify energy-minimized enzyme and substrate conformation

at temperatures and pressures near ambient levels. The output of those massive sets of calculations provided a pictorial rendition of the results.

Like GIS overlays, the simplified graphic is the result of substantial data input followed by huge calculation numbers resulting in three dimensional renderings.

The initial calculations required the use of the university's supercomputer to perform the immense number of parallel calculations to identify the minimum energy molecular topologies that comprised the in-silico research.

Of the four enzymes selected for in-silico characterization, only a single enzyme from one microorganism emerged as the most likely of the four enzymes to degrade carbamazepine.

To test the accuracy of the computer simulations, the investigators then cultured the four microorganisms that were identified in the database sweep and tested their ability to degrade carbamazepine.

They were *Para Burkholderia xenovorans* LB400, *Sphingobium yanoikuyae* B1, *Pseudomonas* sp. strain NCIB 9816-4 and *Pseudomonas* sp. strain NCIB 9816-4.

Cultures of *E. coli* were the controls to indicate that a process not associated with enzymatic degradation might indicate degradation in its absence.

The bacteria were cultured before the tests in media containing biphenyl and naphthalene to strongly induce biphenyl 2,3-dioxygenases and naphthalene 1,2-dioxygenase.

The in-vitro degradation observed fit the computer predictions nicely.

While three of the microorganisms demonstrated limited capacity to degrade carbamazepine in vitro, the one the in-silico investigation identified as a degrader, *P. xenovorans* LB400, demonstrated substantial carbamazepine degradation in its cultures.

Further examination of the molecular topology data led the investigators to propose a novel explanation for the carbamazepine's paradoxical resistance to degradation in comparison to a number of other polycyclic compounds readily degraded that look like carbamazepine structurally.

Based on additional computer modeling that followed the degradation work, the researchers proposed a keyhole/keylock model of substrate specificity.

The keyhole/keylock model, introduced by other researchers in 2012, may apply to 60 percent of all currently characterized oxidoreductase enzymes. The researchers concluded that the modeling approach has big potential since there are thousands of different enzymes to which it could be applied.

Following the carbamazepine degradation that *P. xenovorans* LB400 demonstrated in culture, the investigators conducted one final set of degradation assays using the organism.

They cultured the organism for 24 hours with 22 contaminants of emerging concern. The contaminants were present initially at 10 parts per million in the culture medium. Of those 22, a dozen were significantly degraded.

The substances demonstrating significant degradation included clofibrate, dimethyl phthalate, diethyl phthalate, octocrylene, bisphenol a, galoxilide, 4-nonylphenol, atenolol, metoprolol, sertraline and tonalid.

Degradation spanned from 24 to 100 percent.

Interpreting the results, the investigators wrote that *P. xenovorans* LB400 expresses multiple biodegradative enzymes, so the broad range of observed PCP degradation was not necessarily a result of the biphenyl dioxygenase they studied so closely.

The degraded compounds were clustered by source and enzyme class in a pattern indicating that their chemical structure—rather than the source of the con-

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BREAKDOWN
Continued on Page 16

UCF proposes to construct 12-megawatt solar array on Orlando campus

By **BLANCHE HARDY, PG**

The University of Central Florida is taking a large step forward in implementing its Climate Action Plan by proposing to install a solar array on roughly 50 acres of land on the south-east corner of their campus.

Once complete, the array will be the largest non-utility solar facility in the state. UCF officials anticipate that the array will reduce the university's \$10 million plus annual utility bill by \$2 million.

The project must be approved by the university's board of trustees before construction can begin.

Rachel Williams, communications coordinator with UCF News & Information, said the project would cost approximately \$14.2 million.

"Discussions are ongoing about how to fund the project," she said. "An identified funding source will be part of the materials presented to the board of trustees before they vote."

Estimates indicate that the project, including operation and maintenance costs, could be paid off within 15 years.

The proposed 12-megawatt solar array may provide close to half of UCF's peak demand for electricity.

While UCF's proposed array is much larger than Florida's existing two-megawatt solar power generation plant at Gulf Coast University, Florida universities remain far behind California's Stanford University and the University of California's 60-megawatt plants.

"The project was discussed at the June 14 finance and facilities committee meeting," Williams said. "It is slated to go before the board of trustees for a vote on Oct. 26."

UCF officials anticipate the project will go on-line quickly, partly because no additional facilities need to be constructed.

If the project is approved by the board,

the solar array could be up and running in mid-2019.

"Sanford-based ESA Renewables has been identified in a competitive-bid process as the preferred contractor to help design the solar farm," Williams said.

ESA Renewables' contract is part of the materials the board will review and vote on, she noted.

An agreement must also be entered into with Duke Energy, UCF's energy provider, to allow the new solar plant to tie into the

WATER From Page 7

consumption are equally as significant as the report's predictions.

One of those assumptions is that the population will increase by 15 million people by 2070 from the 18.8 million in 2010.

In addition, the report used an Alachua County study to characterize water consumption in rural/suburban census tracts. Tracts with less than 2,000 people per square mile, according to that study, used three times as much water as urban census tracts.

The report also assumes that some agricultural land will be lost to development but its water demands will remain the same per acre.

Declining agricultural water consumption is thus calculated in South and Central Florida based on declining agricultural effort in those two regions.

In summarizing the implications of the model, the authors noted that statewide water consumption will double by 2070 without implementing water conservation measures.

If compact development patterns are widely used and water conservation yields a 20 percent reduction, a 27 percent reduction of development-related water consumption statewide from the trend prediction is possible.

Overall, under the alternative scenario

grid serving the campus.

The solar array will provide more than energy to the campus.

"An important element of this project is that it's educational," she said. "UCF has made it clear that the solar farm should be designed in such a way that it provides educational opportunities for students and faculty.

"Potential learning opportunities include students testing different coats on the panels and measuring the efficiency

with conservation in both agriculture and development, water consumption statewide would still increase by 50 percent compared to the 2010 baseline.

"Better water conservation strategies in new development are part of the solution, as are both public and private reuse of water, but none of these alone will do the job," said Young. "A comprehensive approach incorporating both public and private water conservation strategies is essential.

"It also is very important to understand that individual water consumption, particularly as it relates to landscaping, is the major contributor to the problem and effective education and strategies addressing landscaping is imperative."

Young characterized Central Florida's situation as "the perfect storm."

"(Central Florida) is projected to have the highest rates of population growth and has the most sprawling development patterns in the state," she said. "For these reasons, increasing the amount of land put into conservation is particularly imperative in Central Florida—not only for protecting land but also to better protect its water resources."

Even considering the St. Johns River wetlands in the region, Central Florida has the poorest record for conservation over the past half century.

This report is not a blueprint for water supply development. It dealt entirely with the consumption side of water demand

of different types of panels, among others."

The university's Climate Action Plan was adopted in 2007 as an energy-conservation and climate-protection strategy.

"UCF aspires to have 15 percent renewable energy produced on campus by 2020 to reduce the university's carbon footprint," Williams said. "This project would allow us to meet that goal."

UCF plans to be carbon neutral by the year 2050.

It did not attempt to model even the last 20 years of rainfall data that clearly indicate a 20 percent decline in rainfall in most areas across the state. Its dataset included no water demand for preserving and protecting natural habitat.

Nor did it account for any influence sea level rise might have on potable water source characteristics of the Floridan Aquifer in any of the four regions studied, or surface water sources near the coast.

The population trends did not account for in-state migration that might occur should the rate of sea level rise increase dramatically in the next 50 years and initiate a mass migration from South Florida and coastal areas to Central Florida.

"We are working on securing funding for Sea Level 2070 and, at that time, plan to analyze what impact sea level rise could have on Florida's future population growth and development patterns," Young said.

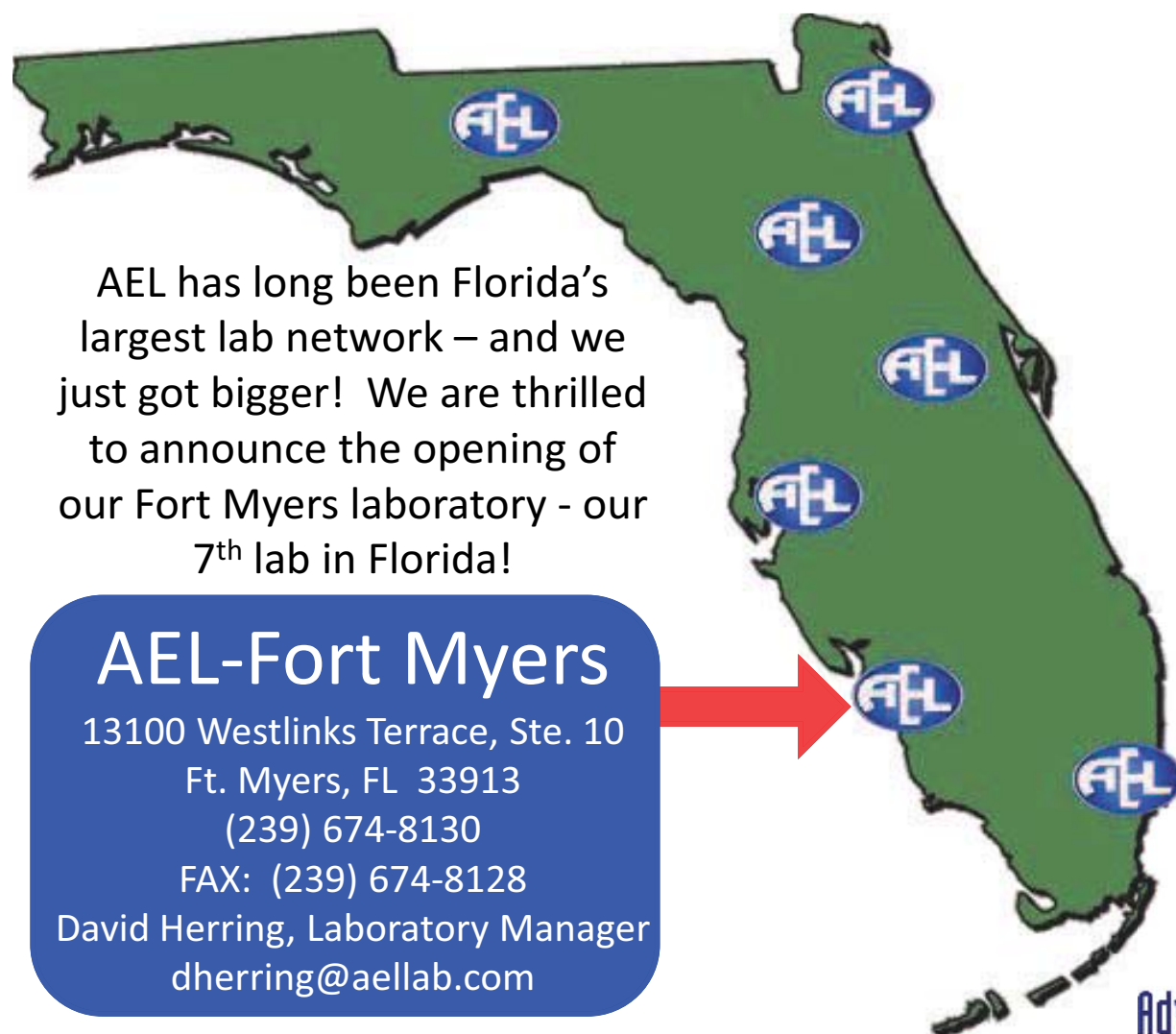
The report focused heavily on the effect of Florida's population growth on water demand for the next half century. It relied on expert data collections from the University of Florida's Bureau of Economic and Business Research and used it to develop the scenarios in the report.

The goal was, Young said, to reach a lay audience to expand the awareness of how broadening land and water conservation through workable measure is essential to meet Florida's future water demands.

The report accomplished that goal.

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Advanced Environmental Laboratories, Inc.

Proposed EPA budget reflects 30 percent funding cut, staff reductions

By ROY LAUGHLIN

When the Trump administration released its proposed 2018 U.S. Environmental Protection Agency budget to provide details of proposed spending by category and program, it revealed in detail the promised 30 percent cut in funding as well as substantial reductions in personnel.

EPA's proposed total budget for FY 2018 is \$5.7 billion, down by \$2.5 billion from \$8.2 billion in FY 2017. It is the leanest budget since the 1990 budget of \$5.461 billion.

Significant personnel cuts accompany the proposed program funding reduction. EPA staff is slated to drop from FY 2017's 15,416 to 11,611 in FY 2018.

Science researchers would bear the brunt of the cut, but dozens of administrative positions will also be vacated. The last time the EPA had fewer employees than proposed was in 1983.

The 2018 budget outlines funding for about 175 agency programs. A few programs will see more or equal funding in 2018 but many programs have been eliminated, and for those surviving, the cuts are substantial.

Programs slated for increase

A handful of budget categories are slated for modest increases. Operations and

Administration would increase from \$68 million to \$79 million, an \$11 million increase. A portion of the increase provides Scott Pruitt with round-the-clock security.

The Human Health Protection Drinking Water Program would increase \$3.512 million to \$3.567 million. The Legal Advice Support Program would increase from \$15.450 million to \$15.548 million.

The Regulatory/Economic-Management and Analysis Program would increase from \$14.546 million to \$15.208 million. Toxic Substances Chemical Risk Review and Reduction would increase from \$58.443 million to \$65.036 million. The 2016 Lautenberg Act required this funding to meet its legislatively increased levels for toxic substances review.

New budget categories

A few new programs and subprograms are added to this year's EPA budget. Subprograms Endocrine Disruptors and Computational Toxicology would receive \$10 million and \$17 million, respectively.

The Endocrine Disruptors subprogram is new to the extent that it has been put into its own category, having been moved from Toxic Risk Review and Prevention program.

Another new budget category, Workforce Reshaping under Operations and Management is slated for \$46 million.

Although every other category in Operations and Administration is slated for multimillion dollar cuts, the Workforce Reshaping addition was so large that overall, Operations and Administration would increase by \$14.649 million.

EPA's Water Infrastructure Finance and Innovation Act program was launched in late 2016. Its first funding may be provided in the 2018 budget.

Deep budget cuts

All remaining EPA programs and subprograms, numbering about 170, face significant funding reductions due to direct financial cutbacks, substantial reductions in scope or change in focus.

In terms of absolute dollar amounts, a few programs areas slated for cuts stand out.

Total State and Tribal Assistance Grants would decline by \$678 million. Leaking Underground Storage Tanks, a program to be ended, would see a reduction of \$44.274 million. Hazardous Substances Superfund would see a decrease of \$330.026 million.

Enforcement spending would decline by \$66.772 million. That may not seem so large in comparison to those mentioned above but, in 2017, that program's funding was \$166.059 million and with the proposed cuts would be just \$99.287 million in fiscal year 2018.

The largest proposed cuts to any pro-

gram were in Environmental Programs and Management. Funding would decline from \$2.630 billion to \$1.717 billion a cut of \$912.785 million.

Geographic Programs, for example those aiding Chesapeake Bay, the Gulf of Mexico or South Florida, were not far behind. Trump zeroed those out of the budget, a reduction of \$462.924 million.

Science and Technology would be cut by \$282.439 million. The Science & Technology Program's total funding would be reduced from \$733.251 million to \$450.812 million.

In a similar way, Chemical Safety and Sustainability would receive a cut of \$42.499 million, but its 2017 total was only \$126.688 million, so its proportional cut is significant considering its mission.

Pesticide Licensing, a program EPA Administrator Scott Pruitt praised for its economic benefits, would see only a \$1 million cut.

The Florida impact

In Florida, EPA's funding loss may not be immediately devastating, but in a year when state government cut Florida Department of Environmental Protection funding by about \$1 billion, it's certainly going to create problems.

In 2016, EPA program support to Florida entities totaled \$143.208 million. In 2017, EPA program support totaled \$60.852 million as of mid-June, so total EPA funding to Florida this year could be more than \$100 million and closer to the 2016 total.

By far, EPA's contribution to the Drinking Water State Revolving Fund dominates its support for Florida.

In 2016 and 2017, EPA capitalization grants to the fund were \$59.178 million and \$32.350 million, respectively. In 2016, the EPA contributed another \$45 million to the state revolving fund for grants along with another \$1.691 million for water infrastructure grants as authorized by EPA appropriations.

It's worth noting that, across Florida, at least one water or wastewater project per month begins that is funded at least in part or provided financial assistance by the State Revolving Fund.

If the capitalization grants decline as indicated by the 2018 EPA budget proposal, new water infrastructure projects would follow.

In 2016, the last full year of data available, Florida's multiple National Estuary Programs received more than \$8 million and by June, 2017, had received \$2.853 million. State Indoor Radon grants totaled \$1.2 million in both 2016 and 2017.

Brownfield Assessment and Cleanup Cooperative Agreements totaled \$6.1 million in 2016. Beach Monitoring and Notification Program Implementation Grants totaled \$1.979 million in 2016.

The Leaking Underground Storage Tank Trust Fund Program received \$1.9 million, and a companion program, the State and Tribal Underground Storage Tank Program received \$700,000. The Nonpoint Source Implementation Program received \$11.978 million. The preceding three budget figures were for 2016, as the 2017 figures are not yet available.

Overall, these represent just a sampling of programs provided funding. In 2016, 20 different EPA funding programs contributed to Florida's total EPA support.

So far in 2017, 13 different EPA programs provided funding. By the end of the year, the total number of EPA programs supporting efforts in Florida will likely increase to at least close to 2016 levels.

Four of the programs listed above will be canceled next year, and two others will be substantially reduced. The Underground Storage Tank Program and the Brownfields Program are notable.

Only Ann Gorsuch under President Ronald Reagan attempted to make such deep cuts in the EPA budget. She was ultimately removed from her position and the ensuing Democrat-dominated Congresses

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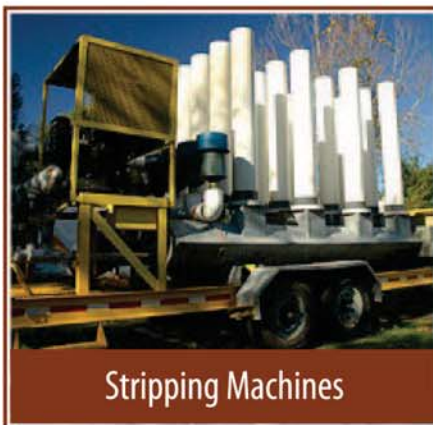
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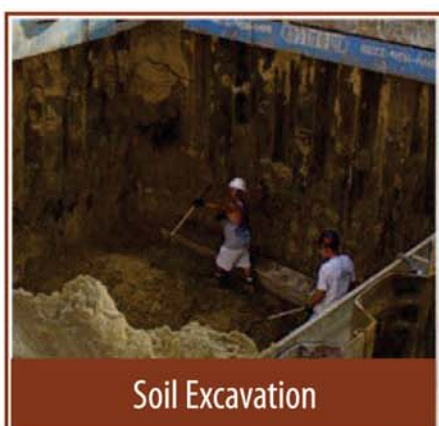
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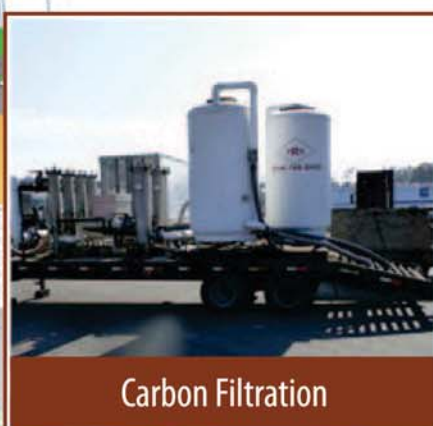
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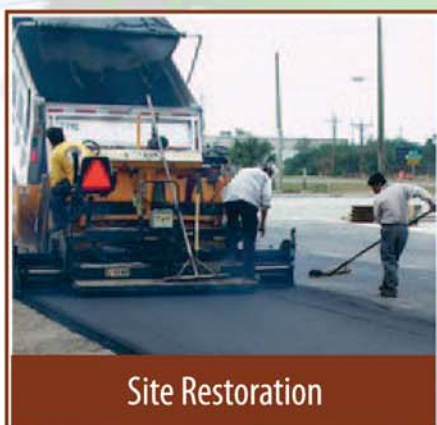
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EPA
Continued on Page 16

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JULY 23-25 – Conference: Summer Conference of the Florida Chapter of the Solid Waste Association of North America, Fort Myers, FL. Call (727) 940-8855 or visit www.swanfl.org.

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

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AUG. 2 – Course: FlaWARN Regional Meetings 2017, Jacksonville, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

AUG. 2-4 – Conference: FLERA Conference 2017, Environmental Leadership in Changing Times, Sarasota, FL. Presented by the Florida Local Environmental Resource Agencies Inc. Call (850) 701-4800 or visit www.flera.org.

AUG. 2-5 – Course: Backflow Prevention Assembly Tester Training and Certification, Tallahassee, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

AUG. 2-5 – Conference: 2017 FES/FICE Annual Summer Conference, Palm Beach, FL. Presented by the Florida Engineering Society and the Florida Institute of Consulting Engineers. Call (850) 224-7121 or visit www.fleng.org.

AUG. 3-4 – Exam: Backflow Prevention Recertification Exam, West Palm Beach, FL. Presented by the University of Florida TREEO Center. Call (352) 392-9570 or visit www.treeo.ufl.edu.

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AUG. 7-11 – Conference: National Environmental Monitoring Conference, Washington, DC. Cosponsored by The NELAC Institute under a cooperative agreement with the U.S. Environmental Protection Agency. Visit www.nemc.us.

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AUG. 10-11 – Conference: American Water Resources Association Florida Chapter Annual Conference, Key Largo, FL. E-mail awra@awraflorida.org or visit www.awraflorida.org.

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AUG. 13-14 – Conference: 2017 North American Hazardous Materials Management Association National Conference, Clearwater, FL. Call (303) 451-5945 or visit nahmma.org.

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Backflow Prevention Courses

Backflow Prevention Recertification
Aug. 3-4, 2017 | West Palm Beach, FL
Aug. 5-6, 2017 | Bradenton, FL
Aug. 11-12, 2017 | Miami, FL
Sep. 8-9, 2017 | Ft. Myers, FL
Sep. 9-10, 2017 | Bradenton, FL
Sep. 11-12, 2017 | Orlando, FL
Sep. 29-30, 2017 | Venice, FL

Backflow Prevention Assembly Tester Training & Certification
Aug. 2-5, 2017 | Tallahassee, FL
Aug. 21-25, 2017 | Pensacola, FL
Sep. 11-15, 2017 | Gainesville, FL
Sep. 15-23, 2017* | Venice, FL
Sep. 18-26, 2017 | Medley, FL (Two consecutive Mon. & Tues., Spanish Only)
*(Two consecutive Fri. & Sat.)
**(Two consecutive Sat. & Sun.)

Backflow Prevention Assembly Repair & Maintenance Training & Certification
Aug. 18-19, 2017 | Venice, FL
Sep. 11-13, 2017 | Altamonte Springs, FL
Sep. 13-15, 2017 | Orlando, FL
Sep. 18-20, 2017 | Gainesville, FL

Water/Wastewater Courses

Introduction to Lift Station Maintenance
Aug. 28, 2017 | Lecanto, FL

Microbiology of Activated Sludge
Aug. 29-31, 2017 | Gainesville, FL

Water Distribution Systems Operator Level 1 Training
Aug. 29-31, 2017 | Kissimmee, FL

Activated Sludge Process Control & Troubleshooting
Sep. 19-22, 2017 | Gainesville, FL

SCADA & Electrical Training: What Utility Staff Need to Know
Sep. 26-27, 2017 | Gainesville, FL

Asbestos Courses

Asbestos Refreshers
Aug. 1-2, 2017 | Ft. Walton Beach, FL
Sep. 11-13, 2017 | Gainesville, FL

Solid Waste Courses

Initial & Refresher Solid Waste Courses
Aug. 15-17, 2017 | Davie, FL
Sep. 19-21, 2017 | Plant City, FL

Getting Back to Basics with Landfill Gas (LFG)
Sep. 27, 2017 | Plant City, FL

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The rule stipulated that the final new effluent limitations are applicable “on a date determined by the permitting authority that is as soon as possible beginning Nov. 1, 2018, but no later than Dec. 31, 2023.”

Pruitt’s decision was based on administrative petitions from the Utility Water Act Group and the U.S. Small Business Administration asking for reconsideration

of the 2015 ELG rule.

In responding to the petition, EPA proposed to postpone compliance dates for the most stringent “best available technology economically achievable requirements” for waste streams from fly ash transport water, bottom ash transport water, flue gas desulfurization wastewater, flue gas mercury control wastewater and gasification wastewater.

In April, 2017, Pruitt sent letters to the governors of all 50 states to remind them

of the “flexibilities available to NPDES permitting authorities on the 2015 Steam Electric ELG Final Rule.” That flexibility was the range of dates for adherence.

In the letter, he also noted that the rule had one inflexible date of Nov. 1, 2018, to meet pretreatment standards for discharges to publicly owned treatment works.

Pruitt wrote that EPA intends to consider the petitioner’s request for relief from the deadlines in the final rule for both direct and indirect discharges along with the request for reconsideration of certain substantive aspects of the rule.

EPA website redesign. In May, the EPA announced the rollout of a new group of web pages on the Waters of the United States rule.

In its press release, the agency said the new pages’ purpose was to provide the public with information about EPA’s review of the definition of the WOTUS rule as set out in the 2015 Clean Water Rule.

The new web pages discuss little science and instead are focused primarily on a limiting legal definition of the term “Waters of the United States” that the Trump administration promised.

It restores the definition of WOTUS to that in effect until 2006 that was replaced because it was found to be ineffective at protecting water resources.

Dolphin systems affected by environmental conditions. Recently published research from National Oceanic and Atmospheric Administration scientists and researchers at Florida Atlantic University’s Harbor Branch Oceanographic Institute summarized a series of studies showing that environmental conditions can affect dolphin endocrine and immune system responses in adaptive and sometimes maladaptive ways.

The synthesis study focused on four different dolphin groups. Two of the dolphin groups were managed-care dolphins, one kept by the U.S. Navy and the other by the Atlanta Aquarium.

Two wild populations, one in the Indian River Lagoon and the other in Charleston Harbor, SC, were from areas characterized as having high tissue burdens of mercury and persistent organic compounds.

The results showed that, generally, the immune systems of wild dolphins in contaminated habitats were more active. The researchers found that the managed-care dolphins had significantly lower immune cell and endocrine system indicators of exposure to pathogens and environmental stressors.

Some of the lower responses in managed-care dolphins are likely due to a reduction of helminth infection due to veterinary care, nutrition, high water quality and moderate habitat temperature. Wild dolphins in particular, had higher antibody levels for five marine bacteria compared to at least one of the managed-care dolphin groups.

The report discussed the likelihood that exposure to chemical contaminants, pathogens and other environmental conditions affect the wild dolphins’ immune and endocrine system stress responses.

The authors concluded that their data indicate that the environment shapes immune and endocrine responses in dolphins.

They suggested that water temperature differences might play a role in shaping the differences in endocrine responses among the four dolphin groups studied.

Preservatives in consumer products. In a recent report, the Environmental Defense Fund ranked the risks from 16 chemical preservatives used in food and other consumer products.

Its goal was to “develop comprehensive toxicological profiles for a representative set of commercially available preservatives in a structured, transparent and comparable manner using the GreenScreen for Safer Chemicals method.”

The assessment was based on GreenScreen evaluation procedures, a framework based on a literature review for toxicity studies characterizing 18 human health, environmental and physical hazard

end points.

The procedure yielded a hazard score for each endpoint using prescribed criteria.

The report noted that preservatives present a paradoxical challenge in assessing risks. Microorganisms can occur in consumer products because they may be present in the raw ingredients used make the products, or could be introduced during manufacture or use by the consumer.

And yet, the report noted, there is a lack of comparable toxicological evaluation, either by chemical classes or using available structured datasets for preservatives. None of the preservation chemicals were rated as safer chemicals in the GreenScreen benchmark scores.

Only one chemical, DMDM hydantoin, was rated “Avoid—chemical of high concern” because it scored high in human carcinogenicity. That occurs because the compound breaks down and releases formaldehyde, a known potent human carcinogen.

Eight other chemicals including benzyl alcohol, sorbic acid and propylparaben were characterized as possessing moderate to very high activity for skin sensitization. Eleven of the preservatives scored moderate to very high for eye irritation. These were rated “Use but search for safer alternatives.”

On the environmental side of the evaluation, 12 of the 16 chemicals scored moderate to high for acute and chronic aquatic toxicity, based on the GreenScreen evaluation.

EDF maintains that the development of inherently safer chemicals should be just as important as the development of chemicals with improved performance.

The report authors also recommended that chemical innovators “tackle hazard hot-spots,” those endpoints with the highest hazard scores.

In a larger context, the report urged the establishment of a Chemical Assessment Clearinghouse to provide “comprehensive, structured, transparent and comparable health and safety assessments of chemicals in a centralized, web-accessible repository.”

Trump withdraws from climate accord. President Trump announced in early June that the U.S. would cease “all implementation of the nonbinding Paris Accord,” justifying the decision as necessary to save jobs and unburden American industry from the accord’s obligations.

White House officials said that the U.S. would follow the exit process outlined in the accord, which will occur over a three-and-a-half year period—allowing Trump’s successor to possibly reverse the decision.

The effect of Trump’s decision is significant, but perhaps not disastrous. On the environment side, the U.S. has already made substantial progress with reducing its greenhouse gas emissions.

In 2015, the most recent year for which data are available, the U.S. had decreased greenhouse gas emissions by 12 percent from the baseline 2005 emission level. According to an article in the *New York Times*, with no additional federal action, market forces could lead to greenhouse reductions of 15-19 percent by 2025.


Both state and local governments said that they will continue to pursue climate friendly policies and rules. In June, Hawaii Gov. David Inge announced that his state would be the first to join the Paris Climate Accord.

If other states follow, that could make a further contribution to reaching the 26-28 percent reduction below 2005 emission levels by 2025, even in the absence of any Trump administration support.

Dropping out of the Paris Climate Accord is substantially less significant than Trump administration efforts to reverse key parts of the Obama administration’s Climate Action Plan. That plan was one of the pillars of the U.S. strategy to meet the accord’s goals.

It also provided benefits to citizens in terms of increased safety and reliability of natural gas pipelines, energy price stability by ensuring a diverse energy portfolio, financial return on efficiency, and jobs in renewable energy.

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DEP issues completion order for controversial Tallahassee health facility

By **BLANCHE HARDY, PG**

In May, the Florida Department of Environmental Protection issued a site rehabilitation completion order for the Big Bend Cares properties in Tallahassee.

The site is roughly four acres comprised of the block created by South Adams, East Magnolia, South Monroe and Wallis streets.

The Care Point Health and Wellness Center is under construction on the site. Big Bend Cares will operate the center.

A ground-breaking ceremony was held last September and the \$11 million, 27,000-square-foot facility is anticipated to open in September.

DEP issued notification of contamination to Robert Renzi, director of Big Bend Cares, on Sept. 21, 2016. The contaminants of concern included arsenic, chromium and polynuclear aromatic hydrocarbons resulting from historic uses of the property including paint shop operations, automotive repair and wrecked car storage.

Local resident and community advocate Edward Holifield, MD, initially reported the discovery of contamination on the Care Point property to DEP in response to an environment site assessment that was conducted.

Contaminants documented during a June, 2015, Phase II ESA included arsenic in excess of direct exposure residential limits in samples collected from two borings at 2.8 and 2.3 milligram/kilogram and chromium in excess of leachability based on groundwater criteria in one soil boring at 51 mg/kg.

In October, 2016, site cleanup contractor ECS Inc. reported samples collected on-site exceeded direct exposure residential limits for total benzo(a)pyrene equivalents of 0.1512 and 0.5323 mg/kg in two soil borings. The limit for soils is 0.1 mg/kg.

The samples were collected in the direct vicinity of an abandoned bituminous pipe which was removed in conjunction with surrounding soils allowing DEP to close the benzo(a)pyrene contamination issue.

DEP Northwest District officials reviewed submittals addressing on-site contamination in October, 2016, and in January and March, 2017. The department's May SRCO states that "(b)ased on the data, information and interpretations presented in the submittals, ECS concludes that there is no evidence of impacted soil or groundwater requiring additional assessment, remedial action or monitoring at the identified parcels."

The site's cleanup completion has come under fire by Leon County Commissioner Bill Proctor as well as Holifield. Proctor and Holifield approached the state attorney's office in February this year seeking an investigation into cleanup activities performed at the site.

The state attorney subsequently found

that there was no evidence to support criminal prosecution regarding the site's cleanup.

Holifield's concerns go beyond the environmental element. He has been a longtime critic of Care Point's practice, claiming the nonprofit facility will not treat the surrounding low-income and uninsured south-side residents.

Big Bend received \$1.5 million for construction of facilities for the uninsured by the local Frenchtown Community Redevelopment Agency.

The nonprofit's information indicates that Big Bend Cares and Care Point will function as separate entities providing services through individual offices to meet the needs of both the insured and uninsured as required by the CRA.

UCF researchers mimic photosynthesis

By **ROY LAUGHLIN**

Chemists and biochemists have experienced notable success synthesizing biological molecules—DNA, for example. But what about chlorophyll, the molecule that moves the sun's energy into living organisms as chemical energy?

A team of researchers at the University of Central Florida recently described synthesis and proof of concept testing of a series of "metal-organic frameworks," compounds that trap light energy, transferring it to CO₂ and reducing it to formic acid and two conjugated formic acid compounds.

This process mimics photosynthesis and could be a technologically exploitable way of synthesizing organic compounds as solar fuels or organic feedstock while reducing carbon dioxide releases to the atmosphere, according to the researchers.

The researchers described synthesis of a series of titanium oxide compounds with four identical organic ligands bonded by nitrogen to the central titanium oxide molecule. The organic substituents were a homologous series of alkanes from methyl to heptyl, including both straight-chain and branched isomers.

The research also attempted to make titanium oxide-organic compounds beginning with 2,5-diaminoterephthalate and 2-amino-terephthalate. Additional steps to modify terephthalate ligands after chemical synthesis was also attempted with varying levels of success.

The researchers described metal-organic frameworks, or MOFs, as "a class of porous materials composed of metal-oxide clusters connected through organic links forming highly crystalline open structures that offer a promising alternative to metal-oxide semiconductors for photocatalysis."

Their goal was to improve the light energy-transforming ability that titanium compounds are known to possess. Inorganic titanium compounds absorb ultraviolet light. That limits inorganic titanium

compounds' technological utility to harness solar energy because the sun's ultraviolet energy output is far less than visible spectrum emissions.

Also, most of the sun's ultraviolet light energy is absorbed by the atmosphere's ozone layer before it reaches the earth's surface.

The researchers hoped to find one or more titanium oxide-organic compounds that exhibited multiple chemical behaviors necessary for reducing CO₂.

The method was to synthesize and test a structurally similar set of organic side chains attached to a titanium oxide MOF core. The investigators then compared visible light absorption across the range of compounds.

The experiments also examined the transfer of absorbed light's energy to CO₂ to chemically reduce it by substituting hydrogens on the carbon for three of the oxygen's bonds.

Finally, MOFs had to be in a physical form, in this case, small open lattice particles that could admit CO₂ so that it could react.

The research was a comparative study of both the structural and photocatalytic properties of these titanium oxide MOFs demonstrated throughout a homologous series of organic ligands.

The titanium system is not yet ready to compete with photosynthesis for CO₂ reduction. The quantum yield for even the best light absorbing titanium MOF tested by was 1.8 percent. Photosynthesis in plants has a quantum yield of somewhat less than 10 percent of CO₂ fixed, depending on the plant species and other environmental conditions.

The researchers concluded that the study allowed them to understand how small variations in the organic linker of the MOF can result in tuning of the photo-physical and photocatalytic properties of the materials solely by selection of specific substituents in the organic links.

That is an important step forward in rational design of CO₂ reduction in a man-made chemical system.

GA Power starts coal ash cleanup in Brunswick

By **ROY LAUGHLIN**

In May, Georgia Power Co. razed an oil/coal-fired electrical generation unit at its Plant McManus facility in Brunswick, GA, just north of the Florida state line.

When the coal-burning generating unit was retired in April, 2015, it was the end of a 60-year era in the use of oil and coal as a generator fuel at the facility.

Plant McManus still has nine active combustion turbine generating units and will continue generating electricity into the

foreseeable future.

When removal of concrete and steel debris from the demolished generating unit is completed, an estimated 550,000 cubic yards of coal ash and ash-contaminated soil will be excavated and moved to a permitted landfill off-site. The ash is the residue of decades of coal use as a fuel at the plant.

The coal ash disposal site was formerly a saltwater marsh at the edge of the plant. In the early 1950s, Geor-

McMANUS
Continued on Page 15



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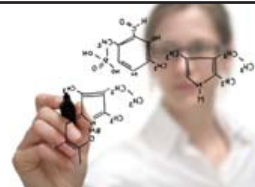
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Co-processing of coal, phosphate ore a viable source of rare earth elements

By ROY LAUGHLIN

The U.S. is critically dependent on rare earth metals, or REMs, for electronics, communications, electricity production, solar power and many others advanced technologies.

REM experts are the first to point out that the 18-20 elements in the REM category aren't so much "rare" as they are present in extremely low concentrations.

The difficulty of concentrating and refining these elements makes them rare and expensive as commodities. They are

present in currently-exploitable clays at concentrations of between one and 10 percent.

The U.S. Department of Energy is funding national laboratories and research organizations to develop new separation and refining technologies so that lower grade sources can become more economically feasible.

In the past five years, co-processing of mining streams for materials including phosphate and coal are seen as potentially productive REM sources.

The Florida Industrial and Phosphate

Research Institute in Bartow is one DOE R&D partner now researching technologies to separate REM minerals from phosphate ore.

FIPRI researchers are progressing through a three-phase R&D program. In the first phase, now complete, researchers identified REM in phosphate ores as well as their concentrations, characterized REM-bearing minerals and particulate size fractions with the highest REM content, and identified two potential byproducts in the phosphate beneficiation process that could yield economically-recoverable REM minerals from the vastly greater phosphate ore matrix.

FIPRI recently completed and published a survey of REM content in phosphate ore fractions.

"The top four rare earth elements found in Florida phosphate are cerium, Ce; lanthanum, La; yttrium, Y; and neodymium, Nd," said J. Patrick Zhang, PhD, FIPRI's research director.

REMs are surrogate calcium substituents within the calcium phosphate crystals. They are also present as extremely small particles in the clay fraction.

REM concentrations are roughly equal in clays mined along with phosphate ore and in acid precipitates of phosphate ore.

The small particle material seems to have the best potential as the starting material for an REM separation process.

Concentrations of individual REMs in the phosphate ore ranges from a low of 1.22 parts per million for thallium to 132 ppm for both Ce and Y. Lanthanum and neodymium are present at somewhat lower concentrations, 60-90 and 80-110 ppm, respectively.

"We are talking about 18 REMs," said Zhang. "There are six major REM that are in highest concentrations (in phosphate ores or beneficiation process materials). We are focusing on four ... that are very valuable."

Those include cerium, lanthanum, neodymium and yttrium. Of these, two stand out. Phosphate ores and associated REM clay minerals mingled with them could satisfy the world demand for yttrium and the U.S. demand for neodymium, he said.

The more valuable the REM, the more likely its prospects of profitable extractions from low concentrations in phosphate ore.

Two phases of the research remain to be completed. During the coming months, FIPRI researchers will construct and operate a pilot-scale particle separation process to selectively recover the smallest particles, concentrating on those that have the highest REM content.

In that work, they will use a flotation technology developed by Roe-Hoan Yoon, PhD, NAE, a university distinguished professor at Virginia Polytechnic Institute and State University.

Particle flotation is an established separation technology, so prospects for tweaking it for effective REM particle recovery from phosphate processing streams has prospects of success.

Extracting REM from most materials including phosphate ore would not be economical if only the REM were recovered.

"If we can recover the other (rare earth) elements from the same material we mine, we do not have mining costs or need to apply for mining permits," explained Zhang. As long as phosphate recovery remains profitable, phosphate mining could be a reliable source, through co-processing, for REM.

Coal mining, could be another REM side-stream source. Coal processing produces a waste stream of pulverized coal particles along with clays that hold REM.

Professor Yoon is one of the leading researchers in particle flotation separation technology and has developed a patented process aimed at recovering tons of coal particles from coal mine wastes as a profitable operation, including the potential separation of REM minerals in accompanying clays.

Yoon and his colleagues, as well as DOE program managers, consider coal

mining wastes as another high-volume waste stream that contains enough "heavy" REMs to become an economically viable domestic source.

In general, the two sources—phosphate and coal—will not be in direct competition because REM occurrence does not significantly overlap. Coal is likelier to be a source of "heavy REM" while "light REM" are more abundant in phosphate ores.

Another difference between REM recovery from coal and phosphate mining byproducts is that coal will be reclaimed by floatation separation. Coal mine slag heaps may be substantially reduced.

In contrast, Zhang explained, REM recovery from phosphate mining is limited to current mining and beneficiation processing. Uranium in Florida's phosphogypsum wastes causes high radioactivity levels, rendering them unsuitable for REM extraction.

Joseph Laurino, PhD, president of Periodic Products Inc. in Ft. Lauderdale, partnered with Penn Pro Engineering of Mulberry to use patented proprietary polymer-linked chelating organic molecules to sequester REM from phosphate process water and clays at the mine rather than in the phosphate processing plant.

The chelating compounds that Laurino developed specifically bind 17 REMs based on size and charge.

"These polymers extract REM from parts per million concentrations in clays into polymers that when fully saturated have REM concentrations that are 25-30 percent (of the polymer-REM material)," he said. This is higher than North America REM ores.

"Our polymers do not see the other metals," he continued. "There is no other method to selectively extract REM from other metals in thousand-fold excess."

The results he described occurred in a laboratory-scale study funded by FIPRI last year and just completed.

Laurino and his engineering partners plan to propose construction of a pilot-scale separation plant. The plant would "wash" three tons of clay per minute, producing a polymer-bound REM extract that is 30 percent REM by mass.

Even if the pilot plant reaches its treatment goal of three tons per minute, Laurino noted, it will not treat all the annual reject material from phosphate mines.

Laurino's ultimate goal, in partnership with the engineering company, is to "offer companies opportunities to remove REM from their wastes."

A looming global REM shortage is the primary economic driver of DOE's intense scrutiny of alternative sources, including the concept of piggy-backing REM recovery from the processing streams of phosphate and coal.

The need has often been couched in terms of China's potentially malevolent restrictions on REM exports to the U.S.

China imposed export restrictions in 2010, but ended them in January, 2015, following an adverse finding by the World Trade Organization.

China never restricted REM-containing products. They remained available at economically attractive prices during the interval when China restricted REM exports.

The real issue of the looming shortage is that commercial exploitation at the present rate will exhaust even China's once extensive reserves in a decade or two.

If U.S. efforts to obtain REM "ores" from waste streams mature, the U.S. and China will still be bound together by REM.

According to Zhang, the U.S. has in the past refined light REMs, while China is the leader for refining heavy REMs. That could continue into the future to each nation's mutual economic advantage.

Beyond that, REM extraction processes hold the promise of substantially decreasing waste mass from both coal and phosphate production.

In Florida, decreasing the phosphate industry's environmental footprint would be a huge benefit of REM extraction.

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State, federal funding to assist Pinellas with beach renourishment effort

By PRAKASH GANDHI

Environmental officials in Pinellas County are working on some major projects to breathe new life into their beachfront.

The county, working closely with state and federal agencies, is spending millions of dollars on beach renourishment efforts that they believe will provide both environmental as well as economic benefits.

The county landed \$30 million to help complete the restoration efforts at three popular beaches—Sand Key, Upham Key and Treasure Island.

The funding for the Pinellas County Shore Protection Project will help restore the beaches, the centerpiece of the county's tourist-driven economy.

The federal projects are administered by the Jacksonville District of the U.S. Army Corps of Engineers.

The project will cover 22 miles of shoreline actively maintained by the federal government.

"There are areas that are highly eroded, some all the way back to the seawall," said Kelli Levy, the county's director of environmental management. "This renourishment program supports the natural habitat that the beach provides. It also provides a huge storm buffer to the properties."

INJECTION

From Page 1

would allow for the construction of an exploratory well and a monitoring well.

Such wells may only be used to determine if a UIC well would be feasible in the proposed area.

"The exploratory well permit is the first phase and does not allow injection into the well or disposal of leachate," Miller said. "The exploratory well provides the necessary data to determine if injection of leachate is feasible."

"To move past the exploratory phase, the applicant has the burden to demonstrate to the department that the geology is conducive to injection, the confining layer properties will prevent the migration of fluid outside of the injection zone, the injection zone is suitable to receive fluid and will not impact water quality, and the well integrity is strong enough to handle the volume and pressure of material," she said.

The applicant is also required to provide financial assurance so that any unanticipated impacts can be promptly addressed.

The exploratory phase takes between 12 and 18 months to complete. The original Class V exploratory well application was filed by Waste Management in August, 2016. The public meeting and 30-day comment period kicked off on April 18, 2017, and is now nearing its end.

"Following the exploratory phase, Waste Management would then be required to apply for a 'construction and testing' permit," Miller said. "This permit would require up to two years of testing to ensure proper operation."

"During this phase, the permittee is required to test the mechanical integrity of the well using a pressure test and a tracer test to ensure the well is of sound construction and that there are no leaks."

In addition, a dual-zone monitoring well would be drilled to collect data to ensure there is no migration of any injected fluids. All data would be reported to DEP for review, she said.

Once the construction and testing phase is complete, Waste Management could then apply for an operation permit.

"For this permit to be issued, the applicant would have to demonstrate, based on data collected during the testing phase, that the well is operating as designed with no leaks or integrity concerns, that the well is able to operate in a manner that ensures the injected fluid remains in the intended injection zone and the migration of injected water into the adjacent aquifer is prevented," Miller said.

All phases of permitting are publicly noticed, allowing the public to submit comments and attend public meetings.

The corps is scheduled to go to bid in July on the project for Sand Key, the beach that runs from Clearwater to Redington Beach.

Construction is expected to start in the fall and should take six to eight months to complete.

The corps will pick up 60 percent of the cost, the Florida Department of Environmental Protection will cover 20 percent and Pinellas the remaining 20 percent from a portion of tourist development taxes set aside each year for beach renourishment.

While the corps administers the work, Pinellas County assists with permitting, providing easements and staging areas, funding and local management for the project.

Additional funding was provided this year to cover the damage caused by the pounding waves from Hurricane Hermine in 2016.

The hurricane stalled off the Gulf Coast for several days at the end of August and the beginning of September impacting the bay area with heavy rainfall and gusty winds.

During the storm, large portions of sand

washed away from Pinellas beaches, reducing the amount of shoreline.

County beach experts said the erosion from Hermine was the worst in almost a decade.

Beach renourishment involves dredging sand from the Gulf of Mexico and pumping it onto eroding beaches through flexible pipelines.

The new sand is then distributed by

McMANUS

From Page 13

Georgia Power built a dike across the northern edge of the marsh between the mainland and Crispin Island, site of the plant.

The dike formed a freshwater pond by excluding tidal saltwater flow. Later, coal combustion residuals, otherwise known as coal ash, were impounded in the pond behind the dike.

Coal ash and contaminated soil will be excavated and removed. Some excavation on adjacent properties bordering the pond will also be necessary.

Once the coal ash removal is complete, the dike will be removed and saltwater tidal flow will be restored. That work should be completed in the spring of 2018.

bulldozers to ensure that beaches are restored to at least a 40-foot width.

Officials said that beach renourishment helps provide recreational opportunities for beach visitors in a county long praised for its beautiful sandy shoreline.

"We have a lot of private and public infrastructure on our coastline and this program protects that infrastructure," said Levy.

Under an agreement with the Georgia Environmental Protection Division, Georgia Power has installed a pump and treat system to clean up the groundwater below the pond. The system will remove additional contaminants and prevent them from moving off-site in groundwater plumes.

The Plant McManus coal ash site is one of 29 coal ash storage facilities that Georgia Power has near its generating facilities.

The coal ash from 17 ponds near rivers and lakes will be excavated and moved to lined, permitted coal ash landfills.

At the 12 other sites, Georgia Power will bring coal ash storage facilities up to current standards under an agreement with the state EPD.



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DEP awards nearly \$3 million for six stormwater projects across state

Staff report

The Florida Department of Environmental Protection recently awarded nearly \$3 million for six stormwater projects across Florida.

Funded through annual appropriations from the state Legislature, total maximum daily load grants support projects designed to improve water quality in impaired springs, rivers, lakes and estuaries.

"The department is eager to partner with communities to improve water quality in coastal estuaries," said Drew Bartlett, deputy secretary for ecosystems restoration at the department. "Healthy waterways are a top priority for Florida's

residents and visitors."

Specifically, the TMDL grant program provides funding assistance for communities to implement projects to better manage or treat stormwater.

Recently awarded TMDL grants for stormwater infrastructure improvements include an award of \$800,000 for the replacement of nearly 600 existing stormwater catch basin inlets in Cape Coral; and \$250,000 for swales, sedimentation boxes, closed drainage piping and back-flow preventers in Fort Myers.

In addition, \$550,000 was awarded for catch basins, sedimentation boxes, baffle boxes and exfiltration trenches in Palmetto Bay; \$300,000 for a retrofit

project in Pompano Beach; \$100,000 for drainage improvements in South Miami; and \$935,618 for drainage improvements in Volusia County.

EPA

From Page 10

restored the cuts.

The damage, though, was long-lasting. The EPA lost its early lead in quantitative risk assessment development. This time around, the U.S. will lose its lead and credentials in climate change research and other environmental research areas.

State and local governments may play

LEESBURG

From Page 1

velop a remediation plan.

Testing and analysis showed the soil contamination was significant, said city Public Works Director DC Maudlin. Arsenic was among the contaminants found, he said.

Tests also showed trace amounts of arsenic in the groundwater. However, the arsenic concentrations were within allowable limits.

Maudlin said there was no indication that the arsenic in the soil was leeching

BREAKDOWN

From Page 8

taminant—determined whether they were degraded.

Those degraded by more than 50 percent were predicted to undergo biotransformation via esterase or amidase enzymes. The more recalcitrant compounds, those degraded by less than 50 percent in 24 hours, were predicted to be transformed via mono or dioxygenase.

Notable to the authors in their screening results was that so many of the chemicals the microorganisms degraded are considered recalcitrant to removal by activated sludge treatment. The 10 ppm exposure concentration in their in-vitro test was orders of magnitude higher than the contaminants' concentration in wastewater treatment plants.

Nevertheless, they said, if a mechanism could be designed and used in wastewater treatment plants to concentrate these contaminants, the bacteria with the appropriate enzyme systems could likely break them down more extensively.

Bioremediation offers an additional benefit because metabolites produced are not usually carcinogenic. Strong chemical oxidation methods used in treatment plants may produce carcinogenic products from some contaminants of emerging concern.

This study is one of the few to look at contaminants of emerging concern and to

Since 2002, the department has awarded approximately \$120 million in TMDL funding, including \$6.1 million to date in fiscal year 2016-17.

a pivotal role in Pruitt's ability to sell his EPA downsizing to Congress. We found, within the month after the release of the 2018 EPA budget plan, not a single endorsement of the funding cuts by any state or local government official.

Time will tell whether state and local pushback is enough to convince Congress to moderate the proposed gutting of the EPA's programs and people.

into the groundwater and that no groundwater remediation was required.

The remediation plan developed by Universal consists of removing the contaminated soil and disposing of it at a Class I landfill.

He said the plan does not include excavating contaminated soil beyond the limits of the pond or remediation beyond the project site.

Hudson added that Leesburg officials contacted the Florida Department of Environmental Protection. DEP approved the plan that will cost \$1,100,000.

evaluate biodegradation by a single bacterial strain and culture.

Results indicate the utility of the database screening to assist in identifying organisms possessing likely enzymatic capability.

"As it is impossible to test every possible pollutant with every known enzyme or strain of bacteria to determine which bacteria can degrade which chemicals, it is critical to predict which compounds can be degraded by which enzyme types," said Aukema. "This work is an attempt to extend prediction capabilities to an enzyme type that is commonly involved in aromatic hydrocarbon degradation.

"With much trial and error, we found it was critical for accurate prediction that we accounted for the shape and chemical makeup of the keyhole entrance into the enzyme active site."

The researchers hope that the methods they developed will inspire others to develop prediction methods for other enzymes.



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