Our Vision: The Virginia Water Environment Association (VWEA) will preserve and enhance Virginia’s Water Environment, now and for future generations.
Realize More

Leverage Existing Assets First (LEAF) is our systematic approach to optimizing the performance and productivity of your existing infrastructure while minimizing capital expenditures. For treatment, conveyance, and storage facilities, we understand that your most sustainable solution is the one that leverages the most from your existing assets.

If you’re trusted to protect public health or the environment, we can help.
Evoqua’s BioMag® and CoMag® systems use magnetite to ballast floc and deliver rapid and reliable settling. Both systems dramatically improve plant capacity and treatment performance with existing tanks and a limited footprint.

Choose the BioMag System for ballasting biological floc to enhance activated sludge processes.

Choose the CoMag System for ballasting chemical floc to remove particulate contaminants in wastewater, drinking water and industrial applications.

Represented by:

Heyward Incorporated
10146 West Broad St., Glen Allen, VA 23060
p: (804) 965-0086 www.heywardinc.com

Watch video of magnetite-ballasted settling compared to conventional options at www.evoqua.com/settledown
REIC Consultants, Inc. is a **Top 25 environmental laboratory**, with complete capabilities for organic, inorganic, and bioassay evaluations.

**REIC’s Virginia service center** capabilities include:
- **Pick up and receive samples** via our courier network.
- **Supply clients** with coolers, containers, custody seals, and chain of custody forms for sample collecting
- **In house analyses** for Bacteria *(Shenandoah & Roanoke)*

Clients can access reports the minute they are completed through our REIConnect client portal, for service that is both timely and trustworthy.

### Convenient Service.

REIC has the most extensive lab courier service in the region. Pick-ups at no additional charge for REIC clients.

REIC has a fleet of more than 10 courier vehicles serving Virginia clients, with routes reaching all of the Shenandoah Valley, the southwestern panhandle, and central Virginia.

Our wide-ranging courier service, along with our service centers in Staunton and Roanoke, means we can get your samples into analysis in a matter of hours.

Call REIC to set up a regular sample collection schedule. In many cases we can also do spot pick-ups with relatively short notice.

---

**REIC Virginia Accreditations:**

<table>
<thead>
<tr>
<th>Facility/Location</th>
<th>Accreditation Program</th>
<th>Lab ID No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Lab / Corp HQ</td>
<td>Drinking Water</td>
<td>00281</td>
</tr>
<tr>
<td>Main Lab / Corp HQ</td>
<td>Whole Effluent Toxicity</td>
<td>460148</td>
</tr>
<tr>
<td>Main Lab / Corp HQ</td>
<td>Non-potable Water, Solids</td>
<td>460148</td>
</tr>
<tr>
<td>Roanoke Service Center</td>
<td>Bacteria</td>
<td>460150</td>
</tr>
<tr>
<td>Shenandoah Service Center</td>
<td>Bacteria</td>
<td>460151</td>
</tr>
</tbody>
</table>

---

**REIC Virginia Service Centers**

<table>
<thead>
<tr>
<th>Service Center</th>
<th>Address</th>
<th>Phone No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Lab &amp; Service Centers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main Lab</td>
<td>225 Industrial Park Rd •</td>
<td>800-999-0105</td>
</tr>
<tr>
<td>Corporate Offices</td>
<td>Beaver, WV 25813</td>
<td></td>
</tr>
<tr>
<td><strong>Regional Service Centers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roanoke Service Center</td>
<td>3029-C Peters Creek Rd •</td>
<td>540-777-1276</td>
</tr>
<tr>
<td>Roanoke, VA 24019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shenandoah Service Center</td>
<td>1557 Commerce Rd • Verona,</td>
<td>540-248-0183</td>
</tr>
<tr>
<td>Shenandoah Valley</td>
<td>VA 24482</td>
<td></td>
</tr>
</tbody>
</table>
VWEA FEATURES

2016 Education Seminar
Managing Risk through Process and Organizational Innovation, May 11-12, 2016, Hilton Richmond Hotel & Spa, Short Pump, in Richmond, VA.

WaterJAM One Water
A preview of the upcoming WaterJAM conference September 12-15, 2016 in Virginia Beach.

Forklift Safety
Other than the pickup truck, the forklift is the most common mobile equipment operated by a utility on a daily basis.

Intermittent Operation: An Irresistible Attraction?
Operating wastewater treatment plant processes or equipment intermittently offers the irresistible attraction of reduced energy costs. But take the practice too far, or in the wrong circumstances, and treatment processes can be damaged as a result.

WEF FEATURES

Insight to Refinery Secondary Clarifier Operation
The relationship between sludge settling and sludge volume index.

DEPARTMENTS & ASSOCIATION NEWS

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Central YP Committee 47
Lab Practices Committee News 48
SRAC Third Annual Golf Tournament 50
CVRAC Fourth Annual Golf Tournament 52

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Aeromod - Municipal and industrial wastewater treatment, biological nutrient removal (Seqoxx). Claritor clarification

Ambio - Photoionisation odor control

Amwell - Bar screens, clarifiers, gear drives, grit removal, paddle flocculators, rectangular collectors, rotary distributors, DuralMax stainless steel chainage, scum skimmers

Aquaturbo - Surface aerators, mechanical mixers, deaerators, floatables control

Aquionics - Open and closed channel UV disinfection

BDP Industries - Belt filter presses, screw presses, gravity belt thickeners, rotary drum thickeners

Continental Blower - Multistage centrifugal blowers

Clarifier Cleanseep - Clarifier agate control systems

Ebara Pumps - Water and wastewater pumps, submersibles, dry pit submersibles, self primers, grinders, end suction centrifugal, multistage, dewatering, sump, stainless, and axial flow pumps

Excelsior Blower - Engineered PD blower packages Gardner Denver and Slutblit Blowers

Fibrecast - Hollow-fibre sheet membranes, and MBR systems

Flomotion Systems - Peristaltic pumps, flow, level, and chemical metering equipment

Fluytce Corp. - ISAM SBR, jet aerator, Hydro-Grit, tertiary filtration

Jesco America Corp. - Chemical feed systems and metering pumps

Veolia Water (John Meunier) - Headworks, grit, and CSON/stormwater controls, bar screens, fine screens, spiral screens, drum screens, screenings compactors, Meldon grit removal, package septage and headworks equipment

Keystone Conveyor - Belt and screw conveyors

Kruger - AnoxKaldnes IFAS and MBBR. ANITAmox Annamox deammonification, BOSTYR Biological Aerated Filter, NEOSEP MBR, OASES high purity oxygen systems, ACTIFLO ballasted clarification, Hydrotech Discfilter and Drumfilter Odo Watch/ Odo Sulf

Lobepro - Rotary lobe pumps

Mixtec North America - Mixers and Flocculators for water and wastewater treatment

PCM - Progressive cavity pumps

Plydyne - Dry and emulsion polymers, Polymer feed systems

Prime Solutions - Rotary Pressdewatering systems

Pulsair - Mega-Bubble non-aerating mix systems For water storage tanks and Water/WW Treatment

PX Pumps - Submersible and dry pit submersible Pumps

Stamford Scientific - Fine/coarse bubble diffusers, membrane diffusers, ceramic retrofit, fixed or retrievable grids

Tenco hydro - Dissolved air flotation lamella clarifiers, grease/concentrators, oil/water separators

Thermal Process Systems - Class A thermophilic biosolids ATAD systems, mesophilic aerobic digestion, sidestream ammonia treatment

Ultraflote - Aluminum geodesic domes and heavy-duty flat covers

USEMCO - Package water/booster stations & controls, control systems

Wigen - Drinking water treatment (NF/MF/UF/RO) Pressure filters, Ion exchange equipment, arsenic removal systems

Wilo - Water and Wastewater Pumps, Submersible, Drypits, Grinders, 2nd suction, Split case horizontal

WTP - Headworks screenings and grit removal

Mailing Address: PO Box 1596 Glen Allen, VA 23060

Central/Eastern Virginia: Matt Winschel, PE (804) 545-3115 mwinschel@winenv.com

Western Virginia: Gary Rookstool, PE (540) 632-0111 gary.rookstool@winenv.com

Northern/Central Virginia: Tripp Waymack (804) 613-8533 tripp.waymack@winenv.com

Visit our Website at: www.winenv.com
HAPPY SPRING! AS I WRITE THIS, THE CALENDAR HAS JUST CHANGED FROM WINTER TO SPRING AND IT JUST HAPPENS TO BE WORLD WATER DAY 2016. THESE TWO EVENTS HAVE CONSPIRED TO PROVIDE THE INSPIRATION FOR THIS EDITION OF THE PRESIDENT’S CORNER.

World Water Day is sponsored by the United Nations and held annually as a means of focusing attention on the importance of water and advocating for the sustainable management of water resources. Each year, World Water Day highlights a specific aspect of water; the theme for 2016 is Water and Jobs. In the United Nations World Water Development Report, Water and Jobs (2016), it is estimated that, “half of the global workforce is employed in eight water and natural resource-dependent industries: agriculture, forestry, fisheries, energy, resource-intensive manufacturing, recycling, building and transport.” It is further estimated three out of four of the jobs worldwide are heavily and directly water-dependent. Globally, the report estimates water supply and wastewater utilities employ about 80% of the workers in the water industry (UNESCO-UNEVOC, 2012). While VWEA and our members know the importance of water, it is reassuring to see the global community underscoring the importance of water. The theme for World Water Day in 2017 is wastewater, so stay tuned.

Here in Virginia, the spring is a busy time for the VWEA membership and committees. In March I attended the 32nd Annual Industrial Waste & Pretreatment Conference in Charlottesville, where we began the roll-out of the VWEA State-Only Membership program. In an effort to broaden VWEA membership (e.g., stormwater professionals, utility operators, and state agencies), a State-Only Membership option is now available at a reduced rate ($40/year). Bulk memberships are also available. Benefits for the State-Only membership include:

- Member discounts at state-level WEA events.
- Subscription to The Conduit.
- Notification and updates on local and statewide VWEA events.
- Participation in VWEA Committees.
- Continuing education opportunities for wastewater operators and professional engineers.

The State-Only Membership option is ideal for individuals looking for introductory type exposure to VWEA or for employers looking to stretch their budgets to sign-up as many employees as possible. Of course, we continue to encourage everyone to sign-up for the full WEF membership and take advantage of all the additional benefits that come with it.

Also this spring, is the Stormwater Seminar and Annual Education Seminar, both held in Richmond. Later this summer is the Operations Education Conference & Ops challenge in Roanoke and then the Lab Practices Conference in Charlottesville, both in July. I look forward to seeing many of you and sharing in learning at the many VWEA events scheduled through the spring and summer, culminating with WaterJAM 2016.

“Each year, World Water Day highlights a specific aspect of water; the theme for 2016 is Water and Jobs.”
planning, design and construction management is the foundation from which Whitman, Requardt and Associates, LLP builds today’s infrastructure. Our experienced, multi-disciplined engineers apply sound technical knowledge, while adapting to current and future regulatory, security and sustainability challenges, to create comprehensive wastewater solutions in the public and private sectors.
Managing Risk through Process and Organizational Innovation
Don’t Risk Missing Out on Another Great Education Conference on May 11 and 12

Our world is rapidly changing and so must we when it comes to managing our critical water and wastewater infrastructure. As engineers, utility managers, and operators, much of what we do day-to-day and year-to-year is manage risk – be it permit compliance risk, public health risk, financial risk, risk resulting from equipment failure, risk of an environmental impact, risk from climate change and severe weather, threats to our infrastructure, and other operational and organizational risks. Few of us, however, ever really study how to address such risks. Therefore, we are excited to bring you this year’s Education Conference focusing upon Managing Risk through Process and Organizational Innovation to be held on May 11-12, 2016 in Richmond.

Conference topics will include an in-depth look at treatment process risk mitigation; asset management; and system resilience and emergency preparedness as it relates to utilities throughout Virginia. A total of five wastewater operator credits are available at this event. The conference will be conducted at a new venue this year, the Hilton Short Pump, where superior service and an outstanding setting combine for a truly spectacular space – one where many exhibitors will be featured to showcase their innovative products and technologies. Mark your calendars and we will see you there!

See the program for complete conference and hotel registration details.

– Marty Kazmierczak,
  Education Committee Chair,
  and the entire Education Committee
SEMINAR HIGHLIGHTS
Expertise. National experts, facility staff and consultants will share their strategies for risk mitigation in response to events such as: severe weather, climate change, natural disasters and other threats to our municipal infrastructure. This seminar will cover treatment process and collection system risk mitigation, asset management, system resilience, hazard mitigation and disaster and emergency preparedness.

Networking. 150-200 attendees are expected. Meet the speakers at a complimentary reception and network with peers and promising student engineers.

Education. Receive up to 5 CPEs.

WHO SHOULD ATTEND?
Wastewater treatment operations and maintenance personnel, utility directors, researchers, engineers, students, compliance regulators, and environmental consultants.

ADMISSION
$160 VWEA Members
$195 Non-Members
After April 20: $195 (all attendees)
$375 Exhibitors Booth (with 2 attendees)
Complimentary Registration for Full-Time Students!
Valid Student ID required at check-in.

HOTEL RESERVATIONS
Hilton Richmond Hotel & Spa/Short Pump
12042 West Broad Street
804.364.3600
Block Rate through April 20: $139
Request VAENVI to reserve in the Hotel Block.

QUESTIONS?
Marty Kazmierczak
Education Committee Chair
703.560.6366
mkazmierczak@Dewberry.com

REGISTER ONLINE:
www.vwea.org/event/2016EducationConf

2016 Education Seminar:
Managing Risk through Process and Organizational Innovation
May 11 - 12, 2016 | Hilton Richmond Hotel & Spa / Short Pump, in Richmond, VA
# 2016 Education Seminar

## SEMINAR PROGRAM

### Wednesday, May 11

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:30 to 7:00 pm</td>
<td>Registration</td>
</tr>
<tr>
<td>5:00 to 7:00 pm</td>
<td>Complimentary Reception: Exhibit Hall</td>
</tr>
<tr>
<td></td>
<td><em>All attendees are invited to meet with the seminar speakers and exhibitors at this pre-seminar reception (cash bar)</em></td>
</tr>
</tbody>
</table>

### Thursday, May 12

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 to 3:30 pm</td>
<td>Registration</td>
</tr>
<tr>
<td>8:00 to 8:25 am</td>
<td>Breakfast</td>
</tr>
<tr>
<td>8:00 to 3:30 pm</td>
<td>Exhibits</td>
</tr>
<tr>
<td>8:25 am</td>
<td>Welcome John McGettigan, President VWEA</td>
</tr>
</tbody>
</table>

### KEYNOTE SESSION

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 to 9:30 am</td>
<td>Global and Climate Change and Sea Level Rise: Understanding and Meeting the Challenge from Local to Global Levels * CREDIT (PENDING)</td>
<td>Hans-Peter Plag, ODU</td>
</tr>
<tr>
<td>9:30 to 10:00 am</td>
<td>Break</td>
<td></td>
</tr>
</tbody>
</table>

### MORNING GENERAL SESSION

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 to 11:00 am</td>
<td>Climate Risk and Resilience Planning for Wastewater Infrastructure * CREDIT (PENDING)</td>
<td>Laurens van der Tak, CH2M</td>
</tr>
<tr>
<td>11:00 to 12:00 am</td>
<td>Using Tolerable Risk to Drive Asset Management Decision Making * CREDIT</td>
<td>Gage Muckleroy, GHD</td>
</tr>
<tr>
<td>12:00 to 1:30 pm</td>
<td>Lunch</td>
<td></td>
</tr>
</tbody>
</table>

*CREDIT = CPE WASTEWATER OPERATOR CREDITS*
### Thursday, May 12 (cont.)

**SESSION A: ASSET MANAGEMENT**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 to 2:15 pm</td>
<td>Good to Great: A More Dynamic and Robust Linear Asset Management Program</td>
<td>Jonathan Okafor, Fairfax County, and Paul Longo, Dewberry</td>
</tr>
<tr>
<td>2:15 to 2:45 pm</td>
<td>Utility Infrastructure Asset Management - Easier Said than Done!</td>
<td>Lori Kroll, Draper Aden</td>
</tr>
<tr>
<td>2:45 to 3:15 pm</td>
<td>Development of a System-Wide Force Main Criticality Tool from Available Data Sources to Support Long-Term Investment Planning</td>
<td>Will Gibson, AECOM</td>
</tr>
<tr>
<td>3:15 to 3:45 pm</td>
<td>Afternoon Break</td>
<td>Reny Mowe, Loudoun Water</td>
</tr>
<tr>
<td>3:45 to 4:30 pm</td>
<td>Perspectives on Enterprise Asset Management - Panel Discussion</td>
<td>Rhonda Bowen, HRSD</td>
</tr>
<tr>
<td>4:30 to 5:00 pm</td>
<td>Panel Discussion Q&amp;A</td>
<td>Moderator Session A</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>Thank you and Adjourn!</td>
<td>Moderator Session A</td>
</tr>
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</table>

**SESSION B: TREATMENT PROCESS RISK MANAGEMENT**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:30 to 2:15 pm</td>
<td>Biosolids Regulations in Virginia and Maryland: Charting the Course in a Sea of Uncertainty</td>
<td>Rhonda Bowen, HRSD</td>
</tr>
<tr>
<td>2:15 to 2:45 pm</td>
<td>Operating a Flexible Design at the H.L. Mooney AWRF</td>
<td>Maureen O'Shaughnessy, Prince William County Service Authority</td>
</tr>
<tr>
<td>2:45 to 3:15 pm</td>
<td>Risk Management through Development of Tools to Assist the NYC Nitrogen Program</td>
<td>Wendell Khunjar, Hazen and Sawyer</td>
</tr>
<tr>
<td>3:15 to 3:45 pm</td>
<td>Afternoon Break</td>
<td>Reny Mowe, Loudoun Water</td>
</tr>
<tr>
<td>3:45 to 4:30 pm</td>
<td>Embracing Disruptive Technology as a Risk Management Strategy</td>
<td>Julian Sandino, CH2M</td>
</tr>
<tr>
<td>4:30 to 5:00 pm</td>
<td>How Proactive and Predictive Maintenance reduces Process Risk</td>
<td>Nina Andgren, UOSA</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>Thank you and Adjourn!</td>
<td>Moderator Session B</td>
</tr>
</tbody>
</table>

**SESSION C: SYSTEM RESILIENCE AND EMERGENCY PREPAREDNESS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:15 to 2:45 pm</td>
<td>Disaster Preparedness and Emergency Response in the Nation’s Capital</td>
<td>Jonathan Reeves, DC Water</td>
</tr>
<tr>
<td>2:45 to 3:15 pm</td>
<td>Economics of Risk and Resilience</td>
<td>Chris Behr, HDR</td>
</tr>
<tr>
<td>3:15 to 3:45 pm</td>
<td>Afternoon Break</td>
<td>Reny Mowe, Loudoun Water</td>
</tr>
<tr>
<td>3:45 to 4:30 pm</td>
<td>Real Applications of Emergency Response and Resilience Planning - Experiences from Clarksville WWTP and Bay Park STP</td>
<td>Mike DeNicola, Hazen and Sawyer, Pat Hickey, City of Clarksville</td>
</tr>
<tr>
<td>4:30 to 5:00 pm</td>
<td>Benefit-Cost Analysis Principles for Hazard Mitigation of Treatment Facilities</td>
<td>Gary Brand, FEMA, John Squerciati, Dewberry</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>Thank you and Adjourn!</td>
<td>Moderator Session C</td>
</tr>
</tbody>
</table>

*CREDIT = CPE WASTEWATER OPERATOR CREDITS*
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Water operators and engineers rely on GridBee® electric and air-powered mixers and SolarBee® circulators to help reduce operating costs, achieve better compliance and improve water quality. Factory field service available.

Call us today for prompt, friendly service and fast, reliable results. 1-866-437-8076
The VWEA Operations Education and Operations Challenge Committee invites you to the 5th Annual Wastewater Operations Education Conference and Operations Challenge Competition. The Operation Challenge teams will begin staging for the competition on July 12. This year’s conference will include a half-day workshop on July 13 followed by a full-day of technical sessions on July 14. Continuing Education Credits will be offered for Wastewater Operators and Professional Engineers:

**Wednesday, July 13**
- Biosolids Workshop
- Operators Challenge
- Awards Dinner

**Thursday, July 14**
- Education Track 1 – Plant Optimization
- Education Track 2 – Wastewater Microbiology & On-Site Wastewater Treatment
- Education Track 3 – Collection Systems

There will be an Exhibitors Hall, showcasing products from local equipment manufacturers, vendors, and sales representatives.

For more details regarding registration please visit: www.vwea.org/event/2016Operations

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airvac.water@bilfinger.com
www.water.bilfinger.com
inter’s over, spring is here, and it’s time to start planning your late summer! Experience One Water with friends, both old and new, and other industry professionals in Virginia Beach at WaterJAM 2016!

Come join us in September for WaterJAM – the Joint Annual Meeting of the Virginia Section American Water Works Association (VA AWWA) and the Virginia Water Environment Association (VWEA). Since 2002, WaterJAM has been a record-setting conference registering a growing number of participants each year. More than 1,300 professionals join their friends and colleagues to make WaterJAM one of the most successful state conferences in the United States.

This year’s theme, One Water, is appropriate as the water, wastewater, and stormwater industries move toward a convergence in treatment and water quality. More importantly, One Water is a recognition of the exciting time our industry is going through. This year’s WaterJAM promises the latest in technology to help you advance your knowledge in this highly technical world while allowing you a little fun along the way.

Your WaterJAM Planning Committee has been working tirelessly over the past few months and will continue doing so to fulfill our mission: Plan and implement a sustainable comprehensive conference that brings together technical excellence and innovation while supporting networking opportunities at an exceptional value to all attendees.

A tremendous team is working on your behalf to plan this year’s WaterJAM, and our goal is to exceed your already high expectations for this annual event. Many new committee members have brought new life and excitement into this process which will be reflected when you join us in Virginia Beach later this year!

We have partnered with the Virginia Beach Convention Center (VBCC) and Hilton Virginia Beach Oceanfront Hotel to host our activities from September 12-15, 2016. The oceanfront location not only offers picturesque scenery, but access to local shops and restaurants. We anticipate almost 1,500 professionals coming together to present new ideas, update you on current regulatory initiatives, and discuss industry hot topics that we face in our water, wastewater, and stormwater world.

As a testament to WaterJAM’s successful history, we had another huge response to our Call for Abstracts in 2015. With 348 abstracts submitted, our Technical Program Co-Chairs, Evan Bowles and Adrianna Dimperio, Vice Co-Chairs, Ryan Radspinner and Sarah Lothman, worked exceptionally hard to put together another comprehensive technical program with something for every attendee. Due to this overwhelming response and the quality of the abstracts, this year’s Technical Program will once again offer ten concurrent sessions for a total of 205 presentations to be given over three days. Some of the sessions offered this year include:

- Nutrient Removal and Recovery
- A Technology Forum
- Emerging Technology
- Water and Wastewater Treatment
- Biosolids Management
- Solids Handling
- Stormwater Management (two sessions)
- Asset Management (two sessions)

New this year will be sessions for One Water and Public Outreach and Education. We’re certain there’ll be something for everyone in this diverse program! All of the sessions provide the opportunity for professional engineer educational credits; a large number of presentations will also allow numerous opportunities for both water and wastewater operator educational credits.

Local Arrangements Co-Chairs, Scott Funk and Chris Johnson, Vice Co-Chairs, Stacey Higgins and Beverley Noffsinger, and their well-oiled machine of volunteers from both VA AWWA and VWEA have been hard at work ensuring that your conference experience...
provides much more than just technical growth. The committee is focused on providing activities that give participants opportunities to network, socialize, and have fun – all hallmarks of WaterJAM. While it’s a little early to provide details, there is no doubt this year’s conference will be as memorable as ever.

We’ve once again selected the Signature at Westneck in Virginia Beach to host our Golf Outing. In addition, the ever-popular Clay Shoot will continue to be held at Old Forge Sporting Clays in Providence Forge. These events are sure to provide loads of competition, sponsorship opportunities, and chances to win excellent prizes provided by generous local businesses as well our own One Water community.

New this year, the YP sponsored service event is moving to Monday. The Young Professionals Committee, in coordination with Lynnhaven River NOW and HRSD, is excited to bring WaterJAM attendees a fantastic volunteering opportunity! All attendees, families, and friends are invited to assist HRSD with the construction of oyster castles and the beautification of Lynnhaven River NOW’s Beach Garden Park conveniently located near the convention center. Please sign up for the event on the WaterJAM registration page. For more information, contact Lauren Zuravnsky (L.Zuravnsky@hrsd.com), or Melissa Simpson (SimpsonM@pbworld.com).

For those who would rather stimulate their intellects, we’ve planned some Monday workshops that will provide attendees the opportunity for additional education and collaboration. These workshops will cover timely topics.

After a day of golfing, clay shooting, the YP service event or enjoying the workshops, join your friends at our host hotel, the Hilton Virginia Beach Oceanfront Hotel, for the Meet and Greet as we kick off the conference in style with great food and music. Don’t miss this event, or you’ll likely have your friends telling you the next morning how much fun you missed!

Tuesday’s activities start with the annual 5K fun run/walk along the oceanfront to benefit Water For People. This is always a well-attended event and a great way to kick-off your conference day. The 5K is followed by the General Opening Session. Keynote speaker, Siddhartha Roy, will present findings by the Virginia Tech Research Team related to the Flint, Michigan water crisis. Also a presentation on groundwater recharge will be given by the Featured Speaker, Ted Henifin of HRSD.

Technical sessions will follow on Tuesday afternoon, all day Wednesday, and Thursday morning. Our AWWA mascot, Eddy the Water Drop, will be on-hand to interact with all the attendees. Be sure to look for him throughout the conference. Tuesday afternoon there will be a Networking Reception featuring the Water Reach Silent Auction in the exhibit hall from 5:00 to 6:30 p.m. Be sure to get your bids in for the auction between 2:00 and 6:00 p.m. After 6:30 p.m., Tuesday night will remain a free night to attend consultant and vendor outings or simply to enjoy one of the local eating or nightlife establishments.

As always, the pinnacle of the conference is Wednesday night’s Awards Banquet and Fun Night, which will be held at the VBCC. The pre-dinner reception is a great time to mingle with friends and colleagues and a perfect opportunity to meet our WEF and AWWA national representatives. During the banquet, some of the top performers in our profession will be recognized with prestigious awards.

Once the banquet is finished, it will be time to let loose and have some fun! Once again this year the fun night will feature themed games and prizes along with dancing and refreshments.

The Young Professional (YP) Committee is as active as ever for this year’s WaterJAM. The YP Planning Committee is striving to make WaterJAM 2016 one of the best ever for new and current young professionals and students (see the YP article on page 20). If you have questions or ideas, please contact our YP Liaison Sathya Mathavan at smathavan@dewberry.com.

The Exhibits Committee Co-Chairs, Matt Harrison and Dany Ruby and Vice Co-Chairs, Jon Casarotti and Chris Wilson, are working to make sure this year’s Exhibit Hall is even better than last year. At each break in the Technical Program Tuesday and Wednesday be sure to visit the Exhibit Hall to see the latest technology while enjoying some light refreshments. We will continue
to feature exhibitor trailers, so look for the latest valves, pumps and other emerging technologies. As always, the exhibit area will be hosting the Top Ops Competition Finals, Operations Challenge, and Utility Rodeo demonstrations. And don’t forget the Scavenger Hunt, Networking Reception featuring the Water Reach Silent Auction, the WaterJAM Exhibitors’ sponsored Water For People Raffle, and free Wi-Fi access as you visit with vendors and network over delicious food and beverages. New this year will be a SWAG (Sewer & Water Art Gallery) in the Exhibit Hall. More information to come.

In case you have extra time, we’ve planned additional events before and after the conference. The Water Taste Test is returning. Come out to the boardwalk on Sunday and support the team in educating the public about the value of water and the benefits our industry provides to our communities.

Before you leave for home after your week in Virginia Beach, we suggest you consider one of our facility tours. This year, Doug Groff and Dave Evers are arranging tours that are sure to be informational as well as entertaining.

To keep up with technology and improve sustainability, we encourage the use of the WaterJAM app at this year’s conference (iOS and Android). By using the app, you can bypass the printed program and reduce the amount of paper used at the conference. This year, WaterJAM is working with the VA AWWA/VWEA Sustainability Committee to put on a conference with as small an environmental footprint as possible. Finally, to stay current on the latest WaterJAM news, be sure to follow us on Twitter (#WaterJAM) and find us on Facebook at www.facebook.com/VirginiaWaterJAM.

Because WaterJAM is the premier event for Virginia water professionals, hotel rooms will move quickly, so make sure to register and book early (and save money in the process!). Registration opens online in early May, so be sure to check the VA AWWA and VWEA websites for registration information. We are tremendously excited about this year’s WaterJAM and on behalf of your hard-working WaterJAM Planning Committee, we look forward to seeing you in Virginia Beach in September!

Respectfully,
Stewart Lassiter (slassiter@suffolkva.us) and Phill Yi (pyi@hazenandsawyer.com)
WaterJAM 2016 Co-Chairs

Ideas Transform Communities

HDR’s Integrated Planning Approach is a tool for communities to balance and prioritize their regulatory obligations to achieve optimum net environmental benefits.
So you have heard about the great benefits of WaterJAM, and you are interested in attending this year! Your next step may be to justify the value of your attendance to your manager/boss/supervisor. Sound overwhelming? Well, we hope that the advice below will help you develop your plan and will result in your attendance at WaterJAM 2016 in Virginia Beach.

The advice below was compiled as a general guide to help young professionals through the process of conference attendance justification and value added attendance. However, developing a clear justification for the value of conference attendance is a key skill and is important for career development at any level of experience.

General Tips
• Develop a clear plan and research the program, benefits, and costs prior to requesting attendance.
• Consider what the potential return on investment is for the organization sponsoring your attendance at WaterJAM.
• Focus on knowledge transfer: What information will you bring back to your organization?
• Plan on formalizing this information in a brief memo, presentation, or discussion with your team after attending.
• Register early to take advantage of lower registration rates!
• Remember to highlight that it is generally cost effective to attend a large event (like WaterJAM!) with multiple attributes – technical sessions, networking events, continuing education credits, professional development opportunities, large exhibition hall and multiple vendor contacts – instead of trying to attend a number of small events to achieve the same benefits.
As part of your justification, clearly articulate the connection between your organization’s needs and opportunities offered by the conference program. These connections may focus on networking opportunities, team building if more than one person from your team attends, developing an understanding of current tools and technologies, exploring new and innovative tools and technologies, and volunteer opportunities to further your professional development through involvement in WEA, VA AWWA, and the broader industry.

The following details are important to identify prior to requesting attendance and should be highlighted in your plan to attend WaterJAM:

- **Technical Session Content** – Which sessions will you plan to attend and why?
- **Vendor Contacts** – What vendor booths will you visit and why?
- **Current Technologies** – Which technologies is your organization currently using? Consider the benefits from attending relevant technical sessions and refreshing contact with vendors.
- **Innovative Technologies** – Which new technologies will be discussed or displayed that you plan to learn more about and bring this new information back to your organization?
- **Training/Workshops** – Are there any workshops or training sessions that are relevant to you and your organization? How will this training benefit your professional or technical development?
- **Registration and Travel costs** – You will need to have a defendable estimate of your total attendance costs prior to finalizing your attendance plan.

When developing your total estimated expenses, consider the following costs:

- Registration fees
- Any additional workshop fees
- Any separate ticketed events
- Regional travel costs (calculate mileage if you drive or train/bus/airplane ticket costs)
- Lodging costs (consider booking early to take advantage of any hotel blocks)
- Local transportation costs (taxis, shuttles, rental car, parking, gas)
- Food per diem

Once you have impressed your manager/boss/supervisor and you are on your way to WaterJAM, consider how you will implement your attendance plan and how you will organize the information and contacts you collect at WaterJAM. Take notes or develop your own way of remembering the details! Consider noting the following:

- **Session Information** – Title, speakers’ names, summary, major takeaways, action items (for each session).
- **Networking Events** – Summary, major takeaways, action items, attendees you spoke with and their contact information.
- **Vendors and Products/Technologies** – Description, contact information, benefits, action items.

When you return from WaterJAM, make sure to formalize your acquired knowledge with a brief memo, presentation and/or discussion with your team. This will document the benefits of your attendance and provide a good record of what you learned at WaterJAM. Make sure you provide the return on investment that you promised in your attendance plan!

---

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The WaterJAM Committee is allocating meeting rooms for committee meetings and encouraging all committees to take advantage of this opportunity.

To schedule a committee meeting at WaterJAM, please email Beverly Noffsinger (Beverly.Noffsinger@Arcadis.com) with your committee name and potential head count. If you need a phone for a conference call or any audio visual equipment, please include that in your email. Also, if you have a preferred date and time, please include and we will do our best to accommodate your needs.

In order to get the setup you prefer and into the planner for distribution, we will need your input by June 24th.
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WaterJAM Fresh Ideas Poster Contest
An event for young professionals to present their work at WaterJAM!
All posters on water and wastewater related topics are encouraged

What is the WaterJAM Fresh Ideas Poster Contest?
• An event for students and young professionals to present their work at WaterJAM.
• Posters will be displayed prominently at the statewide 2016 WaterJAM in Virginia Beach, VA.
• A panel of industry experts will select the best overall poster as the WaterJAM Poster Contest Winner.
• The top poster related to drinking water topics will go on to represent the Virginia AWWA Section at the 2017 AWWA Annual Conference and Exposition and win $1,000 to cover travel costs!
• The top poster related to a wastewater topic will receive a prize in the amount of $1,000!

Submit your abstract today!
• Submit abstracts (100 words or less) by August 1, 2016
• Submit your abstracts and questions to:
  - Nathan Kassebaum (757) 548-7304 (nathan.kassebaum@kimley-horn.com)
  - Shekar Sharma (703) 267-2768 (ssharma@hazenandsawyer.com)
The final months of 2015 were busy for the Water Environment Federation (WEF; Alexandria, Va.) government affairs efforts in Congress. Several major funding priorities for WEF and water were accomplished, and several significant policy goals were enacted into law.

**Final FY16 Omnibus Appropriations Bill Restores Funding**

In mid-December, the U.S. Congress reached a final agreement for the fiscal year (FY) 2016 budget for the federal government, the Consolidated Appropriations Act of 2016. The bill provides $1.067 trillion in base funding, which includes $73.7 billion for overseas contingency operations, $7.1 billion in disaster aid, $1.5 billion for program integrity, and $700 million in emergency funding. Read the Consolidated Appropriations Act of 2016 at https://rules.house.gov/bill/114/hr-2029-sa.

Funding to all federal agencies is included in the bill, and it retains or increases the funding amounts for the agencies from FY 2015. The bill holds the U.S. Environmental Protection (EPA) at the FY 2015 enacted level of $8.139 billion. The Clean Water State Revolving Fund is funded at $1.394 billion and the Drinking Water State Revolving Fund is funded at $863 million, restoring severe cuts proposed in 2015 in the draft House and Senate committee bills. The bill did not include funding for Water Infrastructure Finance and Innovation Act (WIFIA) loans and loan guarantees, but it did include language directing EPA to continue to use administrative monies to establish the program.
The bill was free of many of the policy riders that had been hotly debated in Congress, including any restrictions on EPA in proceeding with the implementation of the Clean Water Rule and the Clean Power Rule.

In 2016, WEF will be advocating before Congress and the Administration for full funding for the SRF programs, as well as funding for the WIFIA program to provide low interest loans for infrastructure projects.

Rider That Banned CSO and Wet Weather Bypassing Excluded
Also, in the FY16 Omnibus bill, a major effort to strip an unfunded mandate was successful. The Senate version of the appropriations bill that funds EPA included a rider that would have forbidden wet weather bypassing and combined sewer overflows (CSOs) in the Great Lakes watershed. The compromise language in the final bill will require some additional reporting for CSO events only, but it makes no changes to the Clean Water Act requirements or additional fines.

The Senate’s FY16 appropriations bill contained a policy rider (Sec. 428 of S. 1645) requiring all combined sewer overflows (CSO) in the Great Lakes watershed to be eliminated, including overflows discharged in compliance with a CSO Long Term Control Plan (LTCP) or consent decrees. The rider would have also required water resource recovery facilities (WRRFs) to eliminate discharges of blended effluent that otherwise meet standards established in a WRRF’s National Pollution Discharge Elimination System (NPDES) permit during peak wet weather events.

A recently completed survey of Great Lakes WRRFs estimated the cost-of-compliance to the policy rider exceeded $72 billion in the region. A coalition of cities, counties, and associations is aggressively lobbying Congress in opposition to this policy rider because it has the potential to be extremely costly, requiring massive infrastructure expansion, ratepayer increases, and reopening of consent decrees and/or LTCPs. More than 45 letters were sent to Congress from public agencies and organizations opposed to the policy rider, including WEF, the Water Environment Associations of Indiana, Michigan, New England, New York, and Ohio; and WEF members at agencies throughout the Great Lakes region.

WIFIA Fix and Better Highway Stormwater Management
The highway reauthorization bill, known as the Fixing American Surface Transportation Act (FAST Act) that was enacted into law in December, included a fix to the WIFIA program that WEF helped create and a stormwater management provision that WEF helped draft.

The fix removed a restriction on the use of tax-exempt financing on WIFIA-financed projects. WEF and other water associations have been advocating for the provision since the program was enacted in 2014. The WIFIA program required that WIFIA can finance only up to 49% of a total project cost, and the remaining 51% could not come from a tax-exempt source, such as tax-exempt municipal bonds or private activity bonds. This was limited by Congress in 2014 to keep the cost of creating WIFIA budgets neutral, with the intent of fixing it later. The restriction on tax-exempt financing was removed by the provision in the FAST Act that WEF and other water associations strongly advocated.

Also included in the FAST Act was a stormwater management provision that WEF helped draft that directs metropolitan,
nonmetropolitan, and statewide transportation planning agencies to "improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation," among the list of items to be included when agencies are planning surface transportation projects that use federal funding.

Rep. Donna Edwards (D-Md.), who was a member of the conference committee negotiating the final bill, included the provision. Language similar to the provision was originally developed by Sen. Ben Cardin (D-Md.) with WEF staff assistance and was introduced as the Highway Stormwater Management Act as stand-alone legislation in 2014 and 2015 (S. 518). On behalf of WEF, Dr. Dan Medina of Atkins Global (Epsom, U.K.) and Jim Gibson of Sanitation District #1 in Fort Wright, Ky., participated in a hearing in May 2014 before the Senate Water & Wildlife Subcommittee chaired by Sen. Cardin. During the hearing, the WEF members testified on the importance of better stormwater runoff management during the surface transportation planning process. Sen. Cardin introduced his legislation shortly after the hearing.

The provision that Rep. Edwards included in the bill is a significant step toward better stormwater management included early in the planning process of surface transportation bills. Currently, planning agencies that use federal dollars for projects are given eight criteria to consider during the planning process, such as increased safety, economic growth, and intermodal connectivity. The Edwards provision amends U.S. Code 23, Section 134(h)(1) and 135(D)(1), and will urge planning agencies to "reduce and mitigate stormwater impacts of surface transportation." Planning agencies are not required to include these criteria in projects, but projects that meet more criteria will score higher.

In 2016, WEF will be working closely with EPA to help complete the formation of the WIFIA program and establish another federally backed source of low-interest financing. WEF will also be working with the Federal Highway Administration to incorporate the stormwater management provisions into the project planning process so that stormwater management costs are built into the federally funded highway projects and are not left to local agencies to address after a project is completed.

WaterWeek 2016

WEF invited everyone to attend the National Water Policy Forum, Fly-In, and Expo on April 11-13, in Washington, D.C. Colleagues from around the nation to participated in the 2.5-day meeting, which featured congressional speakers, policy briefings, visits to Capitol Hill, and roundtable dialogues with key policymakers and experts on important regulatory and policy matters. The Forum, Fly-In, and Expo were hosted by WEF, the National Association of Clean Water Agencies, the Water Environment Research Foundation (WERF), and the WateReuse Association. It took place during WaterWeek 2016 (April 10-15). The WEF Government Affairs Committee also held a full committee meeting on the morning of April 11 for committee members.

Since 2011 Steve Dye has served as Legislative Director for the Water Environment Federation (WEF). In his government relations role Steve represents the Federation before Congress, monitors key legislation and federal policies, develops and executes legislative strategies and proposals, and maintains WEF’s excellent reputations before public and private interests in the water sector. He also leads WEF’s Water Advocates Program, a grassroots program designed to mobilize and train WEF members to advocate before federal, state, and local officials.

The information provided in this article is designed to be educational. It is not intended to provide any type of professional advice including without limitation legal, accounting, or engineering. Your use of the information provided here is voluntary and should be based on your own evaluation and analysis of its accuracy, appropriateness for your use, and any potential risks of using the information. The Water Environment Federation (WEF), author and the publisher of this article assume no liability of any kind with respect to the accuracy or completeness of the contents and specifically disclaim any implied warranties of merchantability or fitness of use for a particular purpose. Any references included are provided for informational purposes only and do not constitute endorsement of any sources.
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Annual VWEA / NVRAC 2016 Golf Classic

Tuesday, June 28th 2016
9:00 AM Shotgun Start    7:00 AM Practice Start

Team play is 4 player scramble and will be followed by a lunch awards and prizes ceremony.

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Join VWEA and your water industry associates for a day of golf and fun!

REGISTRATION
Fees are $120.00 per player; includes greens fee, cart fee, driving range, contests, awards and prizes!

Register online at https://www.vwea.org/events/NVRAC Golf Classic

Payment can be made online with a credit card (Visa, Master Card and American Express are accepted) or by check payable to VWEA.

Registration and Payment due by Friday, June 17th

DIRECTIONS
For directions to the course, visit the 1757 Golf Club website at www.1757golfclub.com

1757 Golf Club
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Please consider being an event sponsor.
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Hole - $50 per hole
Longest Drive Contest - $50 per hole
Closest to the Pin Contest - $50 per hole

CONTACT INFORMATION
For more information or if you don’t have a complete team, please contact Thom Lipinski at

Tlipinski@loudounwater.org
or
(571) 291-7992

2016 NVRAC Golf Classic Tuesday, June 28th 2016 at 9:00 am
Operators of refinery wastewater treatment facilities routinely measure sludge volume index (SVI), allowing them to detect deteriorating sludge settling quality. This test, however, does not allow the operator to accurately analyze secondary clarifier performance, including clarifier capacity and the required return activated sludge (RAS) flow. A settling flux analysis is required to predict clarifier operation, yet the constants required to generate the settling flux curve are difficult to develop.

For state-point analyses, settling flux curves must be representative of the biomass in the system or use a previously developed relationship between SVI and empirical sludge settling parameters (such as those developed by Daigger and Roper [1985], Daigger [1995], and Wahlberg and Keinath [1988/1995]). These relationships were developed using municipal facilities with varied industrial contributions. Due to the inherent differences in the biomass at both facilities, revised parameters were created for use in the previously developed correlations between SVI and settling parameters for refinery biomass.

**Methodology**

Zone settling velocities (ZSV) were obtained from settling column tests and used to generate empirical sludge settling constants $V_0$ and $K$ (Vesilind, 1974) at four separate refineries. The facilities that contain two sets of data were analyzed during periods with different biomass settling characteristics (SVI values). The columns were large (4- to 5-feet deep and at least 3 inches in diameter), mechanically stirred, and water-jacketed using a submersible pump located in the effluent lauder to maintain a steady effluent temperature during the tests. An example of a settling apparatus is presented in Figure 1.

The initial solids concentration, $X_i$, was varied by dilution with secondary effluent or concentrated by the addition of return activated sludge (RAS) or settling. Settling tests were performed at different mixed liquor concentrations ($X_i$) to develop the empirical parameters $V_0$ and $K$ of the Vesilind (1974) equation.

$$V_s = V_0 \cdot e^{-KX_i} \quad (1)$$

Where:

$V_s = $ zone settling velocity (m/hr),

$X_i = $ initial solids concentration (g/L), and

$V_0$ (m/hr) and $K$ (L/g) = sludge specific parameters.

The settling flux, $G_s$, is defined as the product of the settling velocity and solids concentration.

$$G_s = V_0 \cdot X_i \cdot e^{-KX_i} \quad (2)$$

---

| A-1 | 10.0 | 0.50 | 110 | 1-L unstirred graduated cylinder |
| B-1 | 9.3  | 0.40 | 112 | 1-L unstirred graduated cylinder |
| B-2 | 9.8  | 0.37 | 112 | 1-L unstirred graduated cylinder |
| C-1 | 11.9 | 0.36 | 89  | 1-L unstirred graduated cylinder |
| C-2 | 12.5 | 0.33 | 59  | 1-L unstirred graduated cylinder |
| D-1 | 9.5  | 0.26 | 113 | 1-L unstirred graduated beaker  |
| D-2 | 15.5 | 0.35 | 128 | 1-L unstirred graduated beaker  |

**Figure 1. Typical column test apparatus**
Where:
Gs = settling flux (kg/m²·hr),
Xi = initial solids concentration (g/L), and
Vo (m/hr) and K (L/g) = sludge specific parameters.

The SVI for each test condition was obtained using a 1-L unstirred settling apparatus. All SVI values fell within the range used by Wahlberg and Keinath (47.9 ± 235) for an SVI performed in a 1-L graduated cylinder not stirred (SVIGN). Table 1 summarizes the data.

The empirical model for predicting setting flux that was developed by Wahlberg and Keinath for the 1-L SVIGN is demonstrated in Equation 3.

\[ G_s = X_i \cdot \frac{1}{l} \cdot e^{-\left(\delta \cdot SVI - (\beta + \delta \cdot SVI) \cdot X_i\right)} \] (3)

Where:
Gs = solids flux (kg/m²·d).

Average model parameters \( \alpha, \beta, \delta, \) and \( \gamma \) generated for the SVIGN and their standard deviation was reported as follows:

\[ \alpha = 0.351 \pm 0.071 \text{ L/g} \]
\[ \beta = 0.00058 \pm 0.00053 \text{ L/mL} \]
\[ \delta = 0.00602 \pm 0.00115 \text{ g/mL} \]
\[ \gamma = 18.2 \pm 3.2 \text{ m/h} \]

Substituting these model parameters in Equation 3 yields the following:

\[ G_s = X_i \cdot 11.2 \cdot e^{-\left(0.000009 \cdot SVI - (0.306 + 0.00057 \cdot SVI) \cdot X_i\right)} \] (4)

Using Equation 2, a settling flux curve was generated for each data set in Table 2 by plotting Gs as a function of Xi, Vo, and K. A second flux curve was generated using Equation 3. The model parameters \( \alpha, \beta, \delta, \) and \( \gamma \) were generated for each of the seven settling runs by adjusting the four parameters to obtain a minimum of squared differences between the two models using the Wahlberg and Keinath parameters as the starting parameters.

Substituting the revised model parameters in Equation 3 yields the following equation presented by Wahlberg and Keinath:

\[ G_s = X_i \cdot 11.2 \cdot e^{-\left(0.000009 \cdot SVI - (0.306 + 0.00057 \cdot SVI) \cdot X_i\right)} \] (5)

Daigger developed a best-fit relationship for a combined data set using the following equation suggested by Wahlberg (1988).

---

Table 2. Wahlberg and Keinath refinery model parameter estimates

<table>
<thead>
<tr>
<th>Refinery-run</th>
<th>Vo (m/hr)</th>
<th>ln Vo (m/hr)</th>
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<th>k2 (L/g)</th>
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<td>2.30</td>
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<td>9.26</td>
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<td>9.46</td>
<td>2.25</td>
<td>0.1262</td>
<td>0.001153</td>
</tr>
<tr>
<td>Average</td>
<td>11.196</td>
<td>2.40*</td>
<td>0.1859*</td>
<td>0.001830</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>2.283</td>
<td>0.19</td>
<td>0.03567</td>
<td>0.000434</td>
</tr>
</tbody>
</table>

*Outside of mean ± standard deviation of original Wahlberg parameters.

Table 3. Daigger refinery model parameter estimates

<table>
<thead>
<tr>
<th>Solids Flux, kg/m²·day</th>
<th>Solids Concentration (g/L)</th>
<th>Original Wahlberg Model Parameters</th>
<th>Revised Wahlberg Model Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>e (L/g)</td>
<td>B (L/mL)</td>
<td>δ (g/mL)</td>
<td>γ (m/h)</td>
</tr>
<tr>
<td>A-1</td>
<td>0.428</td>
<td>0.00062</td>
<td>0.00000</td>
</tr>
<tr>
<td>B-1</td>
<td>0.333</td>
<td>0.00057</td>
<td>0.00000</td>
</tr>
<tr>
<td>B-2</td>
<td>0.299</td>
<td>0.00060</td>
<td>0.00000</td>
</tr>
<tr>
<td>C-1</td>
<td>0.310</td>
<td>0.00057</td>
<td>0.00002</td>
</tr>
<tr>
<td>C-2</td>
<td>0.292</td>
<td>0.00057</td>
<td>0.00000</td>
</tr>
<tr>
<td>D-1</td>
<td>0.283</td>
<td>0.00056</td>
<td>0.00000</td>
</tr>
<tr>
<td>D-2</td>
<td>0.198</td>
<td>0.00052</td>
<td>0.00004</td>
</tr>
<tr>
<td>Average</td>
<td>0.306</td>
<td>0.00057</td>
<td>0.000009*</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.068</td>
<td>0.00003</td>
<td>0.000015</td>
</tr>
</tbody>
</table>

*Outside of mean ± standard deviation of original Wahlberg parameters.

---

Figure 2. Settling flux curves using original and revised Wahlberg and Keinath model parameters
Starting parameters. Table 3 demonstrates the calculated model parameters for each of the settling test.

Substituting the revised model parameters in Equation 7 yields the following:

\[ \ln V_s = 2.40 - (0.1860 + 0.00183 \cdot SVI) \cdot X_i \]  

(9)

A settling flux curve was generated using the original model parameters and the revised model parameters generated with the refinery biomass. Figures 2 and 3 illustrate the flux curve generated for an SVI of 100 mL/g for the original and revised Wahlberg and Keinath and Daigger parameters, respectively.

Both curves indicate the refinery biomass has greater settling properties compared to the settling properties the previous models indicated.

Figure 4 presents the individual derived Wahlberg and Keinath model parameters plotted at an SVI of 100 mL/g (Table 2) as well as the combined revised Wahlberg and Keinath parameters for the same SVI (Equation 5).

As demonstrated, there is a significant variation in the settling flux curves generated for each refinery compared to the combined parameters.

**Summary and Conclusions**

Seven separate model runs using biomass from refinery wastewater treatment facilities were used to evaluate the existing relationships for generating settling flux curves from SVI data. This comparison developed revised model parameters for refinery biomass, as expressed in Equation 5:

\[ G_s = X_i \cdot 11.2 \cdot e^{[-0.000009 \cdot SVI - (0.306 + 0.00057 \cdot SVI) \cdot X_i]} \]

(10)

This equation can also be represented as a settling flux, \( G_s \), by the multiplying the setting velocity and solids concentration.

\[ G_s = X_i \cdot Vo \cdot e^{[-(k_1 + k_2 \cdot SVI) \cdot X_i]} \]  

(7)

Average model parameters \( \ln Vo \), \( k_1 \), and \( k_2 \) generated for the SVI and their standard deviation was reported by Daigger:

\[ \ln Vo = 1.871 \pm 0.546 \text{ m/h} \]

\[ k_1 = 0.1646 \pm 0.0070 \text{ L/g} \]

\[ k_2 = 0.001586 \pm 0.000546 \text{ L/mL} \]

Substituting these model parameters into Equation 6 yields the following:

\[ \ln V_s = 1.871 - (0.1646 + 0.001586 \cdot SVI) \cdot X_i \]  

(8)

Equation 2 was used to generate a settling flux curve for each data set by plotting \( G_s \) as a function of \( X_i \), \( Vo \), and \( K \). A second flux curve was generated using Equation 7. The model parameters \( Vo \), \( k_1 \), and \( k_2 \) were generated for the seven refinery runs by adjusting the three parameters to obtain a minimum of squared differences between the two models using Daigger’s original parameters as the starting parameters.
This revised correlation can be used for better insight on clarifier capacity and operation at a refinery activated sludge treatment facility than could be discerned with prior published correlations. However, the variation in refinery model predicted settling flux data and actual data is significant and warrants careful consideration when using a correlation.

Everett L. Gill is a supervising engineer at the Sunrise, Fla., office, and T. Houston Flippin is a chief engineer at the Nashville office of Brown and Caldwell (Walnut Creek, Calif.)

References


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Thinking of water in new ways
FORKLIFT SAFETY

By J. Leonard Ignatowski, PE.
Other than the pickup truck, the forklift is the most common mobile equipment operated by a utility on a daily basis. The forklift performs a wide range of lifting, moving, and stacking operations for individual or pallet loads with greater ease and quickness than manual labor and without the stress and physical effort associated with manual labor.

The modern forklift originated as a small hoist mounted on a manually moved wooden wagon in the late 1800s. Forklift improvements gradually developed from battery powered electric motor drives to forks and hydraulics. The major breakthrough in forklift use was not in the forklift itself, but in industrial acceptance of the standard pallet for shipping products in the late 1930s. The WWII monumental battlefield supply needs accelerated the use of the forklift world-wide from the U.S. factories to battle front supply depots. The industrial adoption of vertical storage to reduce warehouse land cost resulted in the verticalization of the forklift with overhead protection. An assortment of special attachments for unique shaped loads were developed to increase the forklift’s versatility and productivity.1

How much of a threat are forklifts to the safety and welfare of your employees and your utility’s financial soundness? The Virginia Occupation Safety and Health (VOSH) plan lists forklift operations with the eighth highest number of state violations2, while on the national level, Occupational Safety and Health Administration (OSHA) lists forklift citations as the sixth most frequent.3 OSHA estimates that operator forklift accidents cause about 85 fatal accidents per year. Forklift tipping with the operator jumping off is the number one fatality at 42% of forklift accidents. The primary reason is that the operator is crushed by the tipping load or forklift when attempting to jump out of the cab. The next two highest fatality accidents are being crushed between the vehicle and the ground (25%) and between two vehicles (11%). Approximately 34,900 serious injury accidents and 61,800 non-serious injury accidents are recorded per year.4 5 One source states that 80% of accidents involve a pedestrian.5 The average cost of a forklift accident is $135,000.5

These accident statistics show that despite a forklift’s demure and simple appearance, a wide range of deadly hazards are waiting to strike injury and even death to the careless or untrained operator or the unsuspecting pedestrian in the work place with potentially high Owner financial liability, personal injury, and physical damage.

OSHA Standard, General Industry 29 CFR 1910.178, Powered Industrial Trucks, regulates the required training, safe operation, and construction of a forklift. The official designation for a forklift is power industrial truck (PIT). VOSH has adopted the OSHA forklift standard with no exceptions. OSHA standard list seven forklift classes of which the first five classes are generally used in the drinking water utility industry. The seven classes are the following:

<table>
<thead>
<tr>
<th>CLASS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Electric Motor Rider Truck</td>
</tr>
<tr>
<td>II</td>
<td>Electric Motor Narrow Aisle Truck</td>
</tr>
<tr>
<td>III</td>
<td>Electric Motor Hand Truck or Hand/Rider Truck</td>
</tr>
<tr>
<td>IV</td>
<td>Internal Combustion Engine Truck (Solid/Cushion Tires)</td>
</tr>
<tr>
<td>V</td>
<td>Internal Combustion Engine Truck (Pneumatic Tires)</td>
</tr>
<tr>
<td>VI</td>
<td>Electric or Internal Combustion Engine Tractor</td>
</tr>
<tr>
<td>VII</td>
<td>Rough Terrain Forklift Truck</td>
</tr>
</tbody>
</table>

“A wide range of deadly hazards are waiting to strike injury and even death to the careless or untrained operator.”
Some common and very preventable forklift operator accidents include the following:

1. Not wearing the seat belt on sit-down forklift.
2. Horseplay or forklift misuse.
3. Not sounding the horn at a corner or intersection.
4. Allowing riders on the PIT sides or fork assembly.
5. Raising or lowering a load while moving.
6. Not chocking the truck and trailer wheels when parking.
7. Not completely lowering the forks to the ground when parking.
8. Using the forks to raise a person.
9. Not performing a safety and operational check at the start of each shift.
10. Smoking in refueling or electrical charging areas.

OHSA mandatory regulatory compliance for safe forklift operation consists of two categories of operator training and certification and forklift construction standard under the cited standard which is readily available on the internet at: https://www.osha.gov/SLTC/poweredindustrialtrucks/standards.html. Some critical points are the following:

1. **Operator Training:** The employer has the responsibility to train and certify an employee before allowing him to operate each designated forklift class. (A separate operator certification is required for each forklift class.) The minimum age for an operator is 18 years old. Certification is valid for three years. Refresher training is mandatory when an operator has a forklift accident, a near-miss incident, or is observed operating in an unsafe manner. An excellent starting point is the OSHA Frequently Asked Questions for Training at the website, https://www.osha.gov/html/faq-pit.html and training program assistance at https://www.osha.gov/SLTC/etools/pit/assistance/. The standard lists the trainer qualifications and the topics to be taught in the class. The purchase order for a new forklift should include a vendor’s orientation to demonstrate standard and special model features and control locations and conduct orientation rides with loads for all operators. Two Operations and Maintenance manuals are recommended with one copy kept on the forklift. The Internet is an excellent source of free information regarding forklift compliance including training lessons, safety checklists, and videos. Double check to insure that the information is current. YouTube offers a high number of recorded forklift accidents such as this one, https://www.youtube.com/watch?v=CAHnJhLWaWE. Some of the accidents are too good to be true. (A special thanks to Rusty Smith of McCall Handling Co. of Chantilly, Va. who provided the operator’s training certification and subject guidance.)

2. **Power Industrial Truck (Forklift) Standard:** OSHA standard “Power Industrial Truck section 1910.178(a),” and the American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1-1969 specify the forklift design and construction. To ensure safe and stable load carrying, the operator must understand the Triangle of Stability concept which involves the forklift and load centers of gravity. This concept is too involved for this discussion. Understanding and more importantly applying the Triangle of Stability concept by the forklift supervisor and operator is essential to prevent a forklift tipping or load loss accident. One common accident cause is driving a loaded forklift in the forward direction where the load obstructs the forward vision. In the latter case, the forklift should be driven in the rear direction with extreme caution. Owners of older forklifts need to check for current mandatory safety features such as a seat belt and horn. Wearing the seat belt is probably the most important operator compliance since the belt prevents the operator from being thrown from the forklift in a tipping or collision accident. A forklift safety environment starts and ends with a utility promoting a safe working environment. The first step is to design safe forklift operation into a new facility and to identify and remove existing forklift safety physical hazards. Proper operator training and forklift maintenance is an ongoing effort. An often-missed point is to incorporate forklift operation awareness in every employee’s work.
safety orientation. A secretary searching for a supervisor in a forklift work area needs to be aware of a forklift accident potential to prevent from becoming a forklift accident casualty or fatality. As previously stated, pedestrians are involved in an estimated 80% of forklift accidents.

A novel approach to increase employee forklift safety awareness is to conduct a safety rodeo involving a written test on forklift knowledge, forklift safety inspection test, and operating proficiency over an obstacle course with assorted loads. If you are a supervisor or manager with forklift operational responsibility, the best recommendation is to complete a certification class and actually operate a forklift to gain a true appreciation of its usefulness and dangers. I did!

Footnotes
2. “VOSH Top 10 Violations: What Do They Mean to State Agencies?” Commonwealth Worker Compensation Service website

“A forklift safety environment starts and ends with a utility promoting a safe working environment. The first step is to design safe forklift operation into a new facility and to identify and remove existing forklift safety physical hazards.”

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One of VWEA’s most important missions is education – both for our members and for our industry. We have all heard about how encouraging the next generation of operators, laboratory scientists and engineers will ensure we have the best trained staff to continue the important work of providing clean and safe water to our communities. VWEA is committed to this very important mission – and we put our money to work!

The Board has authorized five scholarships this year – serving everyone from college freshman, to community college students, to graduate engineering students, and operators. The scholarships are:

- **Rising Freshman** – open to all 2016 High School graduates planning to begin attending Virginia universities or community colleges and studying civil or environmental engineering or physical/environmental sciences.
- **Undergraduate** – open to all undergraduates attending Virginia universities or community colleges and studying civil or environmental engineering or physical/environmental sciences.
- **Sonny Roden Memorial** – open to all graduate students enrolled in civil or environmental engineering or physical/environmental science graduate programs at Virginia universities.
- **Operators** – open to all operators employed in the wastewater treatment profession in Virginia. VWEA will award up to three scholarships for operators to attend the Operator Short Course at Virginia Tech (one award will include full tuition and board and two will be for tuition only).
- **Member Dependent** – open to all children of current VWEA members enrolled at Virginia universities or community colleges in a civil or environmental engineering or physical/environmental science undergraduate program.

While all of these are important the greatest benefit to VWEA members is the Member Dependent scholarship which positively contributes to the future success of children of VWEA members. All of you with college aged children studying civil/environmental engineering or physical/environmental science at a Virginia university or community college should ensure that they apply for this very special benefit!

All of the awards are $2,000 each except for the Full Tuition and Board Operators Award which is $2,500.

Applications are available on the VWEA website. Most are due back to us on May 20, 2016, except for the Operator Scholarship which is due July 25, 2016. Please spread the word to your co-workers, your kids, your kids’ schools, and anyone who could use a boost to help pay their education expenses. You might be helping the next plant superintendent, chief chemist or director of engineering, and future VWEA leader!
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Central VA YP Activities Update

LEARNING, VOLUNTEERING, AND CONNECTING

By Jun Meng

After enjoying a successful year in 2015 – bringing together existing and prospective YP members in the central Virginia region, the Joint VA-AWWA and VWEA Central YP Committee jump-started another great year! One of the goals is to engage members and provide them with opportunities to learn, volunteer, and get connected, and ultimately to be able to benefit their career and enhance life. In 2016, we are just going to keep doing that.

Last year, the committee put together nine events, including a facility tour of the Richmond Wastewater Treatment Plant, a project tour of the Richmond Main Street Station Phase III Development, an annual YP Bowling Night event, a stream cleanup event at Cheswick Park, and several other social meetups. All the events had great turnout and were well-received, provided YPs with the opportunities to learn more about the industry, exchange ideas, broaden their social circle, and most importantly – get involved and have fun!

To continue the success in 2016, the committee held the annual event planning meeting back in December, and eight YP members committed in volunteering to plan and facilitate events this year. In January, we held a team-building event at Escape Room RVA followed by afterhours. In February, members were given the opportunity to tour the facility of Henrico Water Treatment Plant lead by the Division Director Mr. Russ Navratil. Both events were well-attended and enjoyed.

As we enter spring, the committee will strive to continue the momentum. With many events in the pipeline, we look forward to meeting more of you, and strongly encourage you to get involved.

For additional information and questions, please contact Jun Meng at jmeng@greeley-hansen.com.
The VWEA/VA AWWA Joint Laboratory Practices Committee (LPC) is proud to announce that the 22nd Annual Good Laboratory Practices Conference will be held at the Omni in Charlottesville on July 25 and 26 this year. The event will consist of six half-day workshops on July 25 with topics on BOD/CBOD/COD/TOC, troubleshooting for colorimetric analysis, deionized water systems, drinking water microbiology, General Nutrient Permit reporting and fundamentals of instrumentation including new methodologies. Technical programs will be presented on July 26 with topics from the areas of drinking water, wastewater, and management. There will be an exhibitors’ reception on the evening of July 25 with the latest in instrumentation and equipment on display.

The LPC also plans to present a workshop at this year’s Water JAM in Virginia Beach on September 12. The theme is “Tools for Fast-tracking Change.”

The Good Laboratory Practices Conference is an excellent opportunity to meet and network with fellow professionals from all over Virginia, and earn CPEs for wastewater and water operators and CECs. Information regarding these worthwhile events, as well as contact information will be posted on the VWEA and VA AWWA websites. So mark your calendars, and be on the lookout for more information to come!

The LPC membership is represented by a variety of municipal wastewater and drinking water laboratories, commercial laboratories, as well as regulatory agencies and laboratory vendors. Meetings are held throughout the year to discuss such interesting topics as laboratory issues, changing methodologies, regulatory concerns, and quality assurance requirements.

The remaining LPC meetings for 2016 are scheduled as follows: June 22 and October 12. Meetings are held at the Henrico Water Reclamation Facility with subcommittee meetings starting at 10:00 a.m. and full committee meeting at 11:00 a.m. There is a short technical presentation with lunch provided. We encourage everyone interested to join and participate, and take advantage of the wealth of knowledge and experience that is there.
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Intermittent Operation: An Irresistible Attraction?

Operating wastewater treatment plant processes or equipment intermittently offers the irresistible attraction of reduced energy costs. But take the practice too far, or in the wrong circumstances, and treatment processes can be damaged as a result. Marcia Sherony, National Sales Manager of Hydro International, looks at the trend to introduce intermittent plant operation in some processes in wastewater treatment. Using grit removal as an example, she considers the opportunities and pitfalls.

The cost of energy is a constant consideration on the operating budget of plant operators. Public facilities that treat and distribute drinking water and those that collect and treat wastewater are energy-intensive, accounting for approximately 3% of U.S. electricity use (approximately 100 billion kWh annually).1

For local governments, this level of consumption means that water and wastewater facilities are one of the largest and most energy intensive loads they own and operate, representing up to 35% of municipal energy use.2 Wastewater facilities in particular have a wide variety of processes and associated equipment that consume energy.

The equipment and processes used in treatment plant operation, and the amount of energy they use, vary significantly reflecting the regional topography and environmental conditions and requirements to treat certain types or concentrations of waste.

Looking for savings in energy usage
Any plant operator tasked with auditing wastewater processes to isolate the biggest energy consumers and identify operational efficiencies faces conflicting priorities. Both operators and engineering designers are motivated firstly by maintaining or improving the availability and reliability of their facilities. Any energy-efficiency opportunities have to be considered within this context.

A waste treatment plant engineer knows that motors and motor-driven equipment use a significant amount of energy to pump, filter, and aerate water. Indeed, wastewater aeration, pumping and solids processing account for a significant amount of the electricity used in wastewater treatment. Approximately 42,000 wastewater pumping stations across the country operate to meet continuous and varying wastewater flows and typically, pumps are the most prominent energy consumers.

However, each piece of equipment is part of an integrated system. Therefore, it is important to consider facility performance when introducing energy-efficiency measures and to determine which measure or combination of measures will result in the biggest energy reduction for a given investment, and avoid degradation in performance.

Frequent targets of cost-cutting audits are pumps and the subsequent activated sludge treatment process. Both processes can be energy-intensive in many plants. For example, in a typical activated sludge treatment plant, the aeration system typically represents 60% of a plant’s electricity use; pumping represents an additional 15%, of which grit slurry pumping is a small part.
Grit system considerations

It’s tempting to think that diurnal flow variations and wet versus dry weather variations in incoming wastewater flow volumes might be met with intermittent grit pumping schedules. While plants should continue to reduce electricity consumption where possible, balancing the system performance efficiency and operation of any other downstream treatment processes must also be considered. The loss of digester performance and aeration basin efficiency, along with the time and expense to clean either, can quickly offset any savings realized by running the grit pump intermittently.

As there are no industry guidelines available for intermittent running of grit pumps, careful and continuous attention to flow and incoming grit load is required and intermittent operation is often not suited to many plants and locations for a variety of considerations including flows, collection system design, condition of the collection system, and grit loading.

Continuous grit pumping is recommended in many applications to ensure that elevated grit loads and wet weather events are covered when higher grit volumes can be expected. It is also important that total solids in pumped grit slurry remains at approximately 1% or below, otherwise washing and dewatering equipment efficiency can degrade and risk plugging, as can piping.

Where conditions allow, it is possible to consider intermittent pump operation, which should always be assessed by an expert. For example, it could be used if the range between the peak and average flow is very great, (i.e., high wet weather flow spikes) or there are very low overnight incoming flows with small grit loadings such as may occur at small plants. However, the entire grit system must be designed to handle the build-up of grit which will occur with intermittent operation.

When operating the grit system intermittently, it is advisable that continuous operation is still enabled during wet weather events. This can be achieved either by influent flow sensing triggered by a set point for automatically switching between continuous and intermittent operation, or a manual control switch with timed intervals during dry weather and continuous during wet. The latter carries a certain risk if not well attended.

High-performance grit separation system can be optimized for intermittent flows. In the latest developments of the Eutek HeadCell®, for example, an expanded grit underflow collector allows grit to inventory while the pump is not operating. Flexible grit pump operation can be optimized by plant operations personnel based on grit load and plant demand while minimizing energy consumption. Intermittent pump operation can also reduce plant use of non-potable water associated with the grit washing/dewatering system components as these components typically run in tandem with the grit pump.

Design implications

In other grit collection technologies, energy usage is dependent on the process design as well as the operating equipment. For example, aerated grit basins can be a significant source of power consumption due to the blowers used to supply air to diffusers located in the basin. Aeration basins typically have a recommended air delivery rate of three to eight cfm of basin length, where the basin length is the standard three to eight times its width, and designed for a detention time of three minutes at peak flow. This means that a typical basin of 55 ft length, and a width of 7 ft to 18 ft, could require 165 to 440 cfm of air, and need up to 100HP of power to drive the air compressor. There are, of course, far bigger basins which require more air and higher power to produce it.

The next power user in a grit system is typically the grit pump and any potential saving through intermittent operation would be attractive. However, will intermittent pump operation impact the grit- or other subsequent processes? Combined sewer plants and plants with large peak to average flow ratios will see a significant increase in grit load at higher flows.

Grit quantities are typically reported to range from 0.53-24 ft³/mgal (M&E) and operating grit pumps intermittently during high influent loadings can be detrimental to the grit removal process and cause plugging, loss of grit and system failure. Pumping intermittently increases the concentration of the grit slurry as well as the problematic debris accumulated in the grit pump and grit slurry piping.

In fact, even without intermittent pump operation, the lack of sound design guidance may contribute to the problems met in removing, conveying, and processing grit slurry at many treatment facilities; combined sewer collection systems are particularly prone. It is ironic that this process is intended to prevent or reduce downstream maintenance, but often is fraught with its own frequent maintenance issues such as plugged grit slurry collection sumps, plugged grit slurry piping, failed grit slurry pumps, and plugged grit slurry concentrators. Intermittent operation will only exacerbate such problems.

Careful conclusion

While decisions to run equipment like pumps, including grit pumps, intermittently can save electricity and lower energy costs, care must be taken to match the operating schedule to plant inflow conditions. Careful assessment, and the right grit removal equipment, will greatly reduce the risks of extra costs incurred through ineffective removal using conventional technologies or intermittently pumping decisions influenced solely by the desire to cut the dollars.

Consulting closely with engineering designers and equipment manufacturers is therefore essential to take advantage of the opportunities of intermittent operation without running unnecessary risks.

End notes

2. Consortium for Energy Efficiency National Municipal Water and Wastewater Facility Initiative

For more information please contact Sharon Lindsay of Sharon Lindsay Communications at: sharon@sharonlindsaypr.co.uk
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