Amendments

Improving Awareness & Advocacy of the Michigan Biosolids Program

Volume 15, Second Quarter April 2011

MBT News

2011 Joint Conference

2011 MWEA Biosolids/Industrial Pretreatment Conference

Improving Opportunities for Beneficial Use: An Aerial Perspective.

The 2011 Biosolids/Industrial Pretreatment Conference is scheduled to occur September 27 and 28, 2011 in Kalamazoo. This will be a unique conference, designed to exhibit the cause/effect relationship that professionals in both biosolids and industrial pretreatment have with and among one another. The working environment of tomorrow will be one that stresses communication, collaboration and consolidation. This philosophy is evident in this 2011 Conference, as both MWEA committees have worked together to develop a new, different and creative Conference.

The Conference is scheduled to be held at the recently remodeled Clarion Hotel in Kalamazoo. It will be a full 2-day Conference with 1.0 CECs available. Cost for the Conference is $195 and includes all meals, tours and events. The hotel rate is $79.99 and includes parking and continental breakfast. A tentative Conference timeline and agenda is attached.

The Conference will feature combined general sessions on topics of interest to both industrial pretreatment and biosolids attendees as well as offer sector-specific subjects. Topics include local limit impact on jobs, status of pharmaceuticals in the environment and biosolids, phosphorus limitations and resources, emergency planning, investigating an illegal discharger, struvite, various metal sources and their impact on biosolids, and how to deal effectively with the public. In addition, tours will be offered at the Coca-Cola facility, St. Julian's Winery, Bells Brewing, Pfizer and/or Graphics Packaging.

The featured speaker is Dr. Rufus Chaney, renowned research agronomist with the United States Department of Agriculture. Dr. Chaney obtained a Ph. D. in Biochemistry from Purdue University, and currently works in the Animal Manure and By-Product Laboratory in Beltsville, MD. He has worked on risk assessments for metals in biosolids, soils and crops, and invented the concept of soil metal phytoextraction. His research has also involved using biosolids to restore ecosystems on phytotoxic (specifically Zn, Pb, Ni) waste sites. Dr. Chaney understands and will discuss the importance of the relationship between industrial pretreatment and biosolids as well as provide insight into organic pollutant risk assessment and impacts/bioavailability of heavy metals on sustainable land application.

A 4-hour evening dinner reception will be held at the Kalamazoo Air Zoo, where vendors and attendees will be able to interact and dine beneath the wings of the SR-71 Blackbird. The 2011 IPP and Biosolids Awards will be presented at an awards ceremony. Dozens of airplanes ranging from current military fighters to early training aircraft to helicopters are on display at the facility. Tour guides will be available, and several planes will have open cockpits for attendees to sit in. Attendees will be able to dogfight in flight simulators, ride in a space shuttle, view a 4-D movie and participate in other rides.

Looking Back to Move Forward

The View from the Baron of Biosolids

I just finished listening to an insurance commercial where the premise of the ad is that some people seem to be willing to pay more for car insurance. The ad ends with the statement "The rest of us want to spend less" I guess I must be one of those people, and that includes the fees we pay to apply biosolids!

So how did we get the place where we are paying more? In the 1990's the Michigan biosolids program was literally an accident looking for a place to happen. For those who went through this time bad memories abound including the inability to get fields approved, and the loss of program delegation back to EPA. In order to attempt to 'right the ship" a number of fee paying communities spear headed by Dan Wolz from the city of Wyoming began to meet together in what later became the MWEA biosolids committee. The process of creating the "new" biosolids program was very difficult. One of the most important negotiating points was the need to create a fund to support the necessary governmental over site. This lead to the current biosolids management fee, and the mechanism used for calculating the yearly amount each applying community pays to insure funding. The fee structure was specifically formulated to establish a low fee/ton as an incentive to encourage a high level of participation in beneficial re-use. Any amount of the fund unexpended in the fiscal year would be rolled over into the next year to maintain a lower cost/ton. It was also hoped that a new partnership between the applying communities and the State of Michigan had been formed. A partnership where both groups would have an equal voice in how the program would operate and especially the expenditure of the biosolids fund.

In 2007 the state began to signal that more money was required to operate the program. Some new categories of expenditure began to appear in the yearly budget projections including equipment rental, office space, and especially a large charge to support the executive office. These charges had never been included in the original funding requirements as negotiated between the state and the biosolids committee, and there was no provision in the fee structure to pay for them. In 2009 MDNRE began billing the biosolids fund for these charges. This has resulted in the complete depletion of the biosolids fund resulting in the per ton application fee from approximately $6.00 to the current $10.58. We have now reached the biosolids program/beneficial re-use danger zone. The almost doubling of the fee has placed many applying communities in a dilemma. If the cost for managing the biosolids is less by using another option there is no longer any incentive to continue land application. The fee structure which was specifically designed to encourage beneficial re-use is now acting as a disincentive to our primary goal! The once healthy and adequately funded biosolids program is also in danger. Now that the door has been opened to spend the entire balance each year there is nothing to stop the state from shifting workloads of assigned biosolids staff, or refusing to pay for funding requests that are made to promote beneficial re-use in the state (which is already happening).

So how should we respond? The most important things to do right now are to make sure that your communities governing body is aware of what is happening. It is equally important to contact your local representative and state senator to make sure they also are aware. Let them know that biosolids application has been a highly successful green imitative in our state. Finally, it may be necessary to modify the state law that set the current biosolids program in motion. The language of the law must be modified to clearly define the scope of expenditures for the biosolids fund. Stay tuned for how you can support this imitative when the time comes.

Michigan News

Detroit's sewers to get more attention

1:04 AM, Feb. 21, 2011 |
BY STEVE NEAVLING
DETROIT FREE PRESS STAFF WRITER

As Detroit's suburbs prepare to have more say in the city's aging and financially strapped water and sewage system, they'll have more than rates, transparency and financial contracts to discuss.

The outdated system frequently is criticized for its environmental record, from dumping an average of 40 billion gallons of raw and partially treated sewage into waterways a year, to losing 100 million gallons of water daily to pipe ruptures. As recently as January, the state Department of Natural Resources and Environment lambasted the Detroit Water and Sewerage Department for having poor equipment and inadequate staff to handle the sanitation of sewage solids.

When the solids reach waterways, such as the Detroit and Rouge rivers, fish habitats and public health are in jeopardy, the DNRE said. Solids, for example, contain high levels of E. coli, a great concern to health officials because the bacteria can cause severe stomach cramps, vomiting, bloody diarrhea, dehydration, fever and kidney failure.

"These are big concerns that need to be a priority," said James Clift, policy director at the Michigan Environmental Council. "If this isn't taken care of now, it's going to get worse."

Detroit is asking the state to approve a 25-year, $814-million project to upgrade the system. A public meeting on the plan is scheduled for 7 p.m. Wednesday at Southwestern High School, 6921 W. Fort, in Detroit.

With Mayor Dave Bing allowing the suburbs to select their own representatives to the water board, suburban and city leaders said pollution control will become a priority.

"The violations under the Clean Water Act continue to repeat themselves," Oakland County Water Resources Commissioner John McCulloch said. "There has been complacency in terms of how this should be handled. There's no question that we need an elevated watchdog to oversee this and make sure it doesn't happen again."

Also unhappy with past management of the water and sewage system, Bing's office is searching for a new director and gave oversight of the department in January to new Detroit Chief Operating Officer Chris Brown "to help identify and solve these challenges," mayoral spokeswoman Karen Dumas said.

"Water and sewer are vital to life," Brown said. "We care a lot about the environmental issues. This is the world we all live in, and we have to make it right."

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US EPA News

EPA Establishes Clean Air Act Standards for Boilers and Incinerators

Sensible standards provide significant public health benefits while cutting costs from initial proposal by nearly 50 percent

Release date: 02/23/2011

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WASHINGTON – In response to federal court orders requiring the issuance of final standards, the U.S. Environmental Protection Agency (EPA) is issuing final Clean Air Act standards for boilers and certain incinerators that achieve significant public health protections through reductions in toxic air emissions, including mercury and soot, but cut the cost of implementation by about 50 percent from an earlier proposal issued last year.

Mercury, soot, lead and other harmful pollutants released by boilers and incinerators can lead to developmental disabilities in children, as well as cancer, heart disease, aggravated asthma and premature death in Americans. These standards will avoid between 2,600-6,600 premature deaths, prevent 4,100 heart attacks and avert 42,000 asthma attacks per year in 2014.

In response to a September 2009 court order, EPA issued the proposed rules in April 2010, prompting significant public input. The proposed rules followed a period that began in 2007, when a federal court vacated a set of industry specific standards proposed during the Bush Administration. Based on the public input received following the April 2010 proposal, EPA made extensive revisions, and in December 2010 requested additional time for review to ensure the public's input was fully addressed. The court granted EPA 30 days, resulting in today's announcement.

Based on input from key stakeholders including the public, industry and the public health communities, today's announcement represents a dramatic cut in the cost of implementation, while maintaining maximum public health benefits. As a result, EPA estimates that for every dollar spent to cut these pollutants, the public will see between $10 to $24 in health benefits, including fewer premature deaths.

The agency received more than 4,800 comments from businesses and communities across the country in response to the proposed rules. Public input included a significant amount of information that industry had not provided prior to the proposal. Based on this feedback, and in keeping with President Obama's executive order on regulatory review, EPA revised the draft standards based on the requested input to provide additional flexibility and cost effective techniques – achieving significant pollution reduction and important health benefits, while lowering the cost of pollution control installation and maintenance by about 50 percent, or $1.8 billion.

"The Clean Air Act standards we are issuing today are based on the best available science and have benefitted from significant public input," said Gina McCarthy, assistant administrator for EPA's Office of Air and Radiation. "As a result, they put in place important public

health safeguards to cut harmful toxic air emissions that affect children's development, aggravate asthma and cause heart attacks at costs substantially lower than we had estimated under our original proposal."

Because the final standards significantly differ from the proposals, EPA believes further public review is required. Therefore, EPA will reconsider the final standards under a Clean Air Act process that allows the agency to seek additional public review and comment to ensure full transparency. EPA's reconsideration will cover the emissions standards for large and small boilers and for solid waste incinerators. EPA will release additional details on the reconsideration process in the near future to ensure the public, industry and stakeholders have an opportunity to participate.

About 200,000 boilers are located at small and large sources of air toxic emissions across the country. The final standards require many types of boilers to follow practical, cost-effective work practice standards to reduce emissions. To ensure smooth implementation, EPA is working with the departments of Energy (DOE) and Agriculture (USDA) to provide the diverse set of facilities impacted by the standards with technical assistance that will help boilers burn cleaner and more efficiently. DOE will work with large coal and oil-burning sources to help them identify clean energy strategies that will reduce harmful emissions and make boilers run more efficiently and cost-effectively. In addition, USDA will reach out to small sources to help owners and operators understand the standards and their cost and energy saving features.

The types of boilers and incinerators covered by these updated standards include:

· Boilers at large sources of air toxics emissions: There are about 13,800 boilers located at large sources of air pollutants, including refineries, chemical plants, and other industrial facilities. These standards will reduce emissions of harmful pollutants including mercury, organic air toxics and dioxins at some of the largest pollution sources. EPA estimates that the costs of implementation have been reduced by $1.5 billion from the proposed standard. Health benefits to children and the public associated with reduced exposure to fine particles and ozone from these large source boilers are estimated to be $22 billion to $54 billion in 2014.

· Boilers located at small sources of air toxics emissions: There are about 187,000 boilers located at small sources of air pollutants, including universities, hospitals, hotels and commercial buildings that may be covered by these standards. Due to the small amount of emissions these sources are responsible for, EPA has limited the impact of the final rule making on small entities. The original standards for these have been dramatically refined and updated to ensure maximum flexibility for these sources, including for some sources, revising the requirement from maximum achievable control technology to generally available control technology. The cost reduction from the proposed standard to the final is estimated to be $209 million.

· Solid waste incinerators: There are 88 solid waste incinerators that burn waste at a commercial or an industrial facility, including cement manufacturing facilities. These standards, which facilities will need to meet by 2016 at the latest, will reduce emissions of harmful pollutants including mercury, lead, cadmium, nitrogen dioxide and particle pollution. The cost reduction from the proposed standard to the final is estimated to be $12 million.

In separate but related actions, EPA is finalizing emission standards for sewage sludge incinerators. While there are more than 200 sewage sludge incinerators across the country, EPA expects that over 150 are already in compliance. These standards will reduce emissions of harmful pollutants including mercury, lead, cadmium, and hydrogen chloride from the remaining 50 that may need to leverage existing technologies to meet the new standards.

EPA has also identified which non-hazardous secondary materials are considered solid waste when burned in combustion units. This distinction determines which Clean Air Act standard is applied when the material is burned. The non-hazardous secondary materials that can be burned as non-waste fuel include scrap tires managed under established tire collection programs. This step simplifies the rules and provides additional clarity and direction for facilities. To determine that materials are non-hazardous secondary materials when burned under today's rule, materials must not have been discarded and must be legitimately used as a fuel.

The agency recognizes that secondary materials are widely used today as raw materials, as products, and as fuels in industrial processes. EPA believes that the final rule helps set protective emissions standards under the Clean Air Act.

The emissions standards for sewage sludge incinerators and the definition of solid waste are not part of today's reconsideration.

More information:
http://www.epa.gov/airquality/combustion

Final Rule:
http://www.epa.gov/airquality/combustion/docs/20110221ssi.pdf

National News

Durbin, Kirk push end to dumping sewage in Great Lakes

NEWS-SUN STAFF REPORT

Last Modified: Jan 27, 2011 02:53AM

In a display of bipartisanship, Illinois' two U.S. senators — Republican Mark Kirk and Democrat Dick Durbin — introduced legislation in Congress late Tuesday night to protect the Great Lakes from having raw sewage dumped into them.

The Great Lakes Water Protection Act would increase fines to up to $100,000 a day per violation by 2031, providing communities 20 years to upgrade their sewage treatment facilities. Currently, fines are capped at $37,500 a day.

Money collected from fines would flow to a Great Lakes Cleanup Fund created by the legislation to generate financial resources for the Great Lakes states to improve wastewater treatment options, habitat protection and wastewater treatment systems.

U.S. Reps. Robert Dold, R-Kenilworth, and Dan Lipinski, D-Western Springs, plan to introduce the same bipartisan measure in the House. Kirk and Lipinski sponsored a similar bipartisan bill in the House four years ago.

"With this new bipartisan push in both the Senate and the House, we believe we can make real progress toward protecting our Great Lakes, the crown jewel of the Midwest's ecosystem," Kirk said. "Polluters need to know that dumping toxic waste into a source of drinking water for 30 million people will not be tolerated."

Durbin said he looked forward to taking on Great Lakes polluters.

"Three and a half years ago, when we learned that BP was planning to increase the pollutants it puts into Lake Michigan, the people of Illinois stood up and said no. Polluting our lake further is not an option," said Durbin. "This legislation tackles another significant threat to the water system — municipal sewage."

"More than 30 million people use the Great Lakes for drinking water and recreational purposes such as swimming, boating and fishing each year," Dold said. "We can't allow the dumping of billions of gallons of raw sewage into those same waters. This legislation will help ensure that we can continue to enjoy the benefits of this area's most treasured natural resource."

Besides increasing fines for sewage dumping, the legislation would make it easier to assess fines at existing levels, beginning a year after the bill's passage. Researchers estimate 24 billion gallons of sewage get dumped into the Great Lakes each year.

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Water Environment Federation
the water quality people

WE&T Magazine

February 2011, Vol. 23, No.2

About that phosphorus shortage...

Prices for phosphorus — the prime ingredient in fertilizer and an essential nutrient for life — spiked as much as 800% in recent years. Experts around the globe have predicted a shortage is looming. Among them are scientists from the Global Phosphorus Research Initiative (GPRI), who estimate global phosphorus production will peak around 2034, and readily available supplies will be inadequate to meet demand within 30 to 40 years.

Then again, maybe not. A study released in September by the International Fertilizer Development Center (IFDC; Muscle Shoals, Ala.) estimates that at current production rates, there are sufficient phosphate rock reserves to produce fertilizer for the next 300 to 400 years.

IFDC's findings are based on the agricultural sustainability organization's own assessment of phosphate rock reserves, nearly 90% of which are concentrated in five countries: Morocco, China, South Africa, Jordan, and the United States. The IFDC report claims these countries contain approximately 60 billion Mg of reserves. That's nearly four times the most recent estimate by the U.S. Geological Survey.

"Dire consequences for world agricultural production and food security are linked to peak phosphate," said Steven Van Kauwenbergh, the IFDC principal scientist who authored the report. "However, there is no indication that a 'peak phosphorus' event will occur in 20 to 25 years."

Who's right, and does it matter?

Is Van Kauwenbergh correct? And if so, what do IFDC's findings mean to those championing efforts to remove and recover phosphorus from agricultural and other waste flows so that it can be reused?

Not much, they say.

"If accurate, this geological survey suggests we have more phosphate in the ground," GPRI leaders wrote in a response to the IFDC study. "More megatons does not change the fact that we are fundamentally shifting to an era where cheap fertilizers will be a thing of the past."

James Barnard, a global practice and technology leader at Black & Veatch (Overland Park, Kan.), agrees. "There may be [more] phosphorus out there than we thought, but there's still the question of getting to it," he said.

The United States and Canada, Barnard explained, supply two-thirds of all the world's surplus food and, therefore, use the most fertilizer. But with 85% of the world's phosphorus reserves in Morocco, it will eventually come at a high cost.

"It may be true that as prices go up, more [difficult-to-reach] phosphorus will be mined," Barnard said. "But phosphorus is already out of reach to half of the world's population. If it becomes more expensive, that means food will also become more expensive."

Whether the world has enough phosphorus to sustain life for 30 years or 300 may be beside the point. "We're still working with a limited resource, and reserves are being depleted at an unsustainable rate," Barnard said. "We should still be talking about using fertilizer more sparingly and taking advantage of opportunities to remove and recover phosphorus from the wastestream."

Wastewater treatment plants play a role

While not the largest source of "leaks" in the human phosphorus cycle, wastewater contains a significant amount of phosphorus — approximately 4 to 6 mg/L, Barnard said. Using biological methods, it is possible to reduce the load to 1 mg/L or less — recovering as much as 90% for reuse.

By selling the recovered phosphorus as fertilizer, wastewater treatment plants (WWTPs) can play an important — and potentially profitable — role in helping to forestall a shortage. "A large plant that treats 550 mgd [2 million m^3/d] could potentially recover up to 110,000 pounds [50,000 kg] of phosphorus a year," Barnard estimated.

Some WWTPs are already doing it. The Milwaukee Metropolitan Sewerage District, for example, has been selling its own brand of fertilizer — Milorganite® — since 1925. In Portland, Ore., and elsewhere, smaller WWTPs are using biological methods to recover phosphorus, magnesium, and ammonia and convert it into struvite, a slow-release fertilizer sold to golf courses and nurseries. Still others that discharge into the Great Lakes and Potomac River are removing phosphorus from their effluent — per U.S. Environmental Protection Agency mandate — but then discarding it.

Barnard believes it's only a matter of time before more U.S. WWTPs recognize the value of the phosphorus flowing through them and begin recovering and selling it. The mineral's volatile pricing may drive these efforts.

"The price of phosphates rose dramatically in 2007 and 2008 and then retreated," IFDC's Scott Mall noted. "While [phosphate prices] are higher now than their historical average of the past 50 years, they are cheaper than in the 2007–08 period."

GPRI does not want to wait for prices to rise again to take action. "There is a pressing need to develop a coordinated response to global phosphorus scarcity," its leaders said in their response to the IFDC study.

"For the past 150 years, the mining of phosphorus has been a one-way street," Barnard said. "We discover it, we mine it, we use it and waste it. We need to break that pattern now, before it's too late."

— ***Mary Bufe,*** *WE&T*

NBMA Workshop
Revitalizing Urban Landscapes: Biosolids in the City

The workshop attracted a wide variety of attendees including employees from Washington State Department of Transportation, Washington Department of Ecology, University of Washington, Washington State University, and King County Department of Natural Resources and Parks.

To kick things off Kristen McIvor of Cascade Land Conservancy gave a riveting presentation about her work as the community garden coordinator for Tacoma and Pierce County. With Kristen's help, a staggering number of community gardens have popped up in the region within the

last year. Many more are in the works for next year. Not only are these gardens places for people to forge relationships between neighbors and produce healthy, affordable food, they are also using TAGRO's potting mix. Kristen found that it was the community gardeners themselves that asked for TAGRO by name. As a result, TAGRO has donated a tremendous amount of its potting mix to the community gardens for use in raised beds. Incredible results ensued.

The WSU-Puyallup Low Impact Development project is also studying the effectiveness of alternative paved surfaces in treating stormwater runoff.

Mark Maurer and Sandy Salisbury co-presented and led a discussion surrounding compost use in Washington State Department of Transportation (WSDOT) projects. Sandy gave great examples of how helpful compost is for slope stabilization, erosion control, and roadside revegetation. She gave many examples of where biosolids composts have been used, and noted that they are thankful to have biosolids composts available in some of the more remote areas of the state. While WSDOT does not generally buy very much compost directly (this is done by their contractors), they do set specifications for compost attributes. They have specifications for 3 textural classes: fine, medium, and coarse. In addition, they specify that all compost shall be certified under the US Composting Council's STA (Seal of Testing Assurance) program. Sandy also discussed how they have had better luck with weed control when using high C to N ratio composts (30 and above). Supporting Sandy, Mark Maurer discussed how WSDOT is using compost for stormwater mitigation. For this purpose, WSDOT is primarily using compost blankets, berms, and socks, in addition to using it as a soil amendment in bioswales and stormwater retention ponds. WSDOT has found compost blankets to be a valuable resource in both reducing the amount of flow, and eroded sediment when runoff does occur. As a soil amendment, it has proven to be a powerful tool in not only filtering stormwater pollutants, but also to increase vegetative cover in bioswales and stormwater retention ponds.

Next Craig Cogger, Washington State University-Puyallup, spoke about carbon sequestration in urban soils. He explained that urban soils tend to be very disturbed and depleted of their carbon reserves. By using organic soil amendments like compost and class A biosolids products, we have the ability to increase soil carbon concentrations. Recent research has indicated that on average, about 25% of the carbon added to a receiving soil is sequestered over time.

Workshop participants visit the WSU-Puyallup Salmon Toxicology Lab.

Following the presentations, all attendees toured the new Low Impact Development (LID) research station and salmon toxicology research lab at WSU Puyallup. The purpose of this LID research station is to examine the ability for various technologies to retain and treat stormwater. Technologies ranging from pavement material to bioswales, where biosolids are being tested as a soil amendment, are all being examined. The LID research station is the first of its kind in North America. Complimenting the LID research station is the salmon toxicology research lab. Fish are after all a major component of what we are trying to protect with LID. In the toxicology lab they are examining the impacts of pesticides, heavy metals, and other toxicants on populations, communities, and food webs in aquatic ecosystems. They have recently found that fish exposed to toxicants very early in life, may loose their sense of smell, thereby making them less likely to detect predators.

WATER & WASTES DIGEST

Advanced Vortex Technologies

Maine WWTP implements CSO control, treatment and disinfection solutions

- Bob Andoh

Like many cities in the U.S. with combined sewer systems, the city of Saco, Maine, had issues of wet-weather flows overwhelming its wastewater treatment plant. This was leading to the discharge of untreated sewage and storm water into the Saco River, threatening the area's water quality and sensitive shellfish beds. The city also was faced

with the need to comply with the U.S. Environmental Protection Agency Combined Sewer Overflow (CSO) Control Policy, which mandated new stringent discharge requirements.

The city embarked on a CSO abatement program that included a number of milestone projects involving the implementation of best management practices to help contain trash and other sewer-derived debris from being discharged directly to receiving waters. Having controlled trash and debris, the next major challenge was addressing the issue of excessive wet-weather flows conveyed from two of the main sewers from the downtown area. One option for compliance was to build separate storm water sewers in order to separate storm water runoff from combined and sanitary sewer flows. But apart from this solution being very expensive, it also would cause major disruptions to businesses, particularly in the downtown commercial district.

CSO Control Technology

After evaluating a number of options, the city opted to convey the wet-weather flows from the main sewers directly into the wastewater treatment plant (WWTP). A new 24-in. influent line would transport peak wet-weather flows to the local WWTP, and a CSO treatment system utilizing advanced vortex technologies would control and treat excess wet-weather flows.

Upstream of the WWTP, the flow in this new sewer line passes through new diversion structures that regulate wet-weather flows with self-activating, passive vortex flow control valves. By harnessing the energy in the flow, the valves operate with no external power source and have no moving parts. These units are 22.5- and 16-in. Type C Reg-U-Flo vortex valves, supplied by Hydro Intl. Inc. The valves allow a maximum of 5.2 million gal per day (mgd) of the combined flow to pass through to the headworks at the treatment plant, then divert any excess flow to a wet-weather treatment system comprised of a Storm King with Swirl-Cleanse screen advanced hydrodynamic vortex separator (HDVS) and a Grit King vortex separator, also supplied by Hydro Intl.

The systems installed at Saco provide improved handling, management and treatment of combined sewage and wet-weather flows to meet the Maine Department of Environmental Protection's primary treatment equivalency and disinfection standards for CSO and wet-weather discharges.

The 22-ft-diameter HDVS combines floatables capture, high-rate sedimentation, grit removal and effective mixing (and contact time) for disinfection in a single, compact vessel. The system achieves primary treatment and disinfection with a contact time at design flows of eight minutes, contributing to the compact size of the system. The underflow from the HDVS unit (comprised of grit, sediment, settleable fecal solids, debris and floatables captured by the integral self-cleaning Swirl-Cleanse screen) is returned to the treatment plant in a significantly smaller proportion of the treatment flow—typically less than 10%—for additional processing (e.g., preliminary treatment via the Grit King separator and conventional biological treatment through the rest of the plant). Meanwhile, the clarified, screened and disinfected excess wet-weather overflow is discharged into the Saco River following dechlorination.

Like the flow control valves, the HDVS has no moving parts, relying instead on the energy of the flow to achieve high-rate treatment. The device has a series of internal baffles that produce a stable rotary flow regime in the unit, conducive to high-rate sedimentation and disinfection. The HDVS has a peak design flow of 5.6 mgd, although it can effectively handle hydraulic flows higher than that.

Post-Implementation Performance

Since the system went online in November 2006, the CSO treatment facility at Saco has been subjected to compliance monitoring as part of its consent requirements. This monitoring included a period in the spring of 2007 when a series of storm events caused widespread flooding in a number of New England states. With overflows occurring for five successive days, the storms provided a real test of the robustness of the system. Solids removal, measured by total suspended solids (TSS) and biochemical oxygen demand (BOD), have been observed to be consistently high, even during the period in 2007 when the system was subjected to the sustained loading (see Table 1).

The average influent TSS and BOD observed during the April 2007 events are 111 mg/L and 81.8 mg/L, with corresponding average effluent TSS and BOD of 43.8 mg/L and 21.2 mg/L. These compare well with the results for the entire sample set for overflow events occurring in 2007, which gave overall average influent TSS and BOD of 130.3 mg/L and 86.3 mg/L, with corresponding average effluent TSS and BOD of 48.8 mg/L and 29.4 mg/L. Table 2 provides annual summaries up to the first week in April 2010.

These results show average removals in excess of those anticipated for primary treatment equivalency of combined sewage, particularly for the BOD. It is surmised that the higher BOD removal observed may be a function of the additional effects of the integral self-cleansing fine screen mesh within the HDVS, which has an aperture of 1/6 in. The fecal count numbers are also below the consent requirements for the site, confirming the effectiveness of the HDVS as a contact chamber for high-rate disinfection of CSO and other wet-weather flows.

Findings

The application of advanced vortex technology for optimal CSO control and treatment at Saco utilizes vortex flow controls in diversion chambers to regulate maximum flows to the existing WWTP. This prevents hydraulic overloading and facilitates the diversion of excess combined sewage and wet-weather flows to the new CSO treatment facility, where disinfection and solids removal to meet primary treatment equivalency standards are accomplished.

Project conclusions are as follows:

- The ability to perform several essential unit processes (e.g., grit removal, sedimentation, screening and disinfection) in one vessel resulted in significant savings in overall project costs. These savings were due to the more compact design of the advanced separation system coupled with the

elimination of additional tanks and vessels that would have been required with the conventional approach.

- Results of compliance monitoring over several years have confirmed the efficacy of the advanced vortex technologies and their ability to consistently achieve disinfection and primary treatment equivalency standards, even under stress-loading conditions.
- The technologies deployed at Saco provide CSO communities with an option to achieve compliance with their CSO abatement commitments in a cost-efficient manner.

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Sunny Disposition

Using solar dryers to solve sludge problems

- Michael Hill

The focus of wastewater treatment over the last few decades has been to efficiently collect and treat water prior to discharging it to the environment. These processes invariably produce an effluent sludge material in which all of the pollutants, pathogens and other substances are not degraded completely during the treatment process. Historically, little attention has been paid to the disposal of this residual material. This is now changing, however, for various reasons.

The beneficial reuse of this unavoidable byproduct increasingly is seen as an economically and ecologically important part of the wastewater treatment process. Additionally, sewage sludge is wet and therefore very expensive to transport; it does not compact very well; it may contain a considerable amount of pathogens, organic pollutants and heavy metals; and it has the potential to give off an undesirable odor.

Wastewater treatment plants (WWTPs) have been able to land apply much of their sewage sludge on local farms or dump it at landfill sites. These practices, though, are coming under increasing amounts of public fire and in some cases are becoming banned altogether. Thus, additional treatment steps are required to convert sewage sludge into valuable biosolids that can save money and be reused beneficially.

To accomplish this, the moisture content, volume of pathogens and overall odor must be reduced. The calorific value and biological stability of the effluent solids must be increased. When these treatment conditions are met, the end product is a dried biosolid that can be reused as a fuel in waste-to-energy plants, coal-fired power plants or cement kilns, and also can be used as a Class A fertilizer for agricultural use or land application. Finally, the volume of the wet sludge is reduced dramatically during its conversion to dried biosolids, which dramatically reduces handling and hauling costs.

Solar Solution

High operating costs, energy consumption, emissions and the carbon dioxide (CO2) footprint to convert the wet sludge into dried biosolids have hindered a broad use of traditional sludge treatment processes such as thermal dying, composting and lime stabilization. In this context, an energy-efficient sludge drying technology is available that has been popular for many years in Europe and has been growing in popularity in the U.S.: the Thermo-System active solar sludge dryer. Since its introduction in Europe in the early 1990s, the technology has established an international installation base of more than 150 installations; there are an additional 17 Thermo-System solar dryer projects in operation or under construction in the U.S.

These solar dryers are located in a range of areas—from the cold and wet climate in the Northeast to the dry and hot climate in the Southwest. More than 90% of the energy used in drying the sludge is provided by the sun free of charge and with no CO2 production. As a result, the total dryer consumption is 30 to 40 kWh of electrical energy per ton of water evaporated from the sludge.

The Thermo-System process fundamentally consists of a greenhouse-type structure with a concrete floor surface and containment walls that is referred to as a “drying chamber.” There is a small robotic vehicle, the Electric Mole, which aerates and mixes the sludge contained inside the drying chamber. The drying chamber includes air vents on one gable and exhaust air fans at the opposite gable for air exchange between the drying chamber and the ambient environment. Fans mounted on the trusses of the drying chamber provide turbulent air movement over the sludge to break up any boundary moisture blankets that could form on top of the sludge, as well as evaporate water through forced convection. Climatic sensors located inside and outside the drying chamber relay relevant process parameters to a programmable logic controller (PLC). The PLC uses a propietary and sophisticated software program to monitor and automatically control all aspects of the drying process to fully optimize drying time (see Figure 1).

In Action

To operate the system, liquid or mechanically dewatered sludge is spread on the floor of the chamber. This is typically done manually with a front end loader or dump truck, but it also can be done automatically using pumps. Once the chamber has been filled with sludge, the operator enters the dry solids concentration of the incoming sludge on the PLC. From there, the PLC automatically controls all aspects of drying until the desired dry solids concentration is reached. At that time, an alarm alerts the operator that the chamber is ready to be emptied and filled with new, wet sludge. The automatic drying operation coupled with a low number of

moving parts results in low requirements for operator attention and system maintenance.

Results

Test results from two solar sludge drying trials conducted at an 8,500-sq-ft, full-scale, solar dryer installation in California from April 2009 to June 2009 proved that the technology is capable of producing a dry, safe and high-quality end product similar to conventional gas-fired thermal dryers.

In Trial No. 1, 210 cu yd of sludge was loaded into the dryer at 17.8% dry solids and reached 75% dry solids in 18 days. In Trial No. 2, 210 cu yd of sludge was loaded in to the dryer at 14.7% dry solids and reached 75% dry solids in 14 days. In both trials, pathogen levels were reduced to those required by the U.S. Environmental Protection Agency (EPA) for Class A biosolids.

It is widely expected that the high costs associated with disposal of sewage sludge containing high moisture content will continue to increase. Trucking companies will be forced to charge more as fuel prices rise, and as landfills fill they will charge higher tipping fees or stop taking wet sludge altogether. At the same time, it is expected that the EPA will put pressure on new and existing WWTPs to convert their sludge into biosolids for beneficial reuse. This will prompt a large number of WWTPs to search for technologies capable of consistently drying sludge to low moisture levels and reducing pathogen content.

The Thermo-System's performance coupled with its low energy, operator attention and maintenance requirements are expected to render it a popular technology with treatment plants across the U.S. looking to meet their sludge treatment needs in an economical and environmentally friendly manner.

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Calendar of Events

2011 MBT Meetings

Thursday, May 12, 2011
Location: Chippewa Indian Tribe WWTP, Mt. Pleasant
10:00 a.m. to 12:00 p.m.

Thursday, July 21, 2011
Location: MSU Agricultural Expo Grounds
MBT Tent
10:00 a.m. to 12:00 p.m.

Thursday, November 10, 2011
Location: Bavarian Inn Restaurant, Frankenmuth
10:00 a.m. to 12:00 p.m.
Holiday Party

Other Events

Residuals and Biosolids 2011: Adapting Residuals Management to a Changing Climate
May 22-25, 2011
Sacramento Convention Center
Sacramento, California
http://www.wef.org/ResidualsBiosolids/

MSU Agricultural Expo
July 19-21, 2011
Michigan State University
East Lansing, Michigan

Joint IPP/Biosolids Conference
September 27 & 28, 2011
Clarion Hotel
Kalamazoo, Michigan