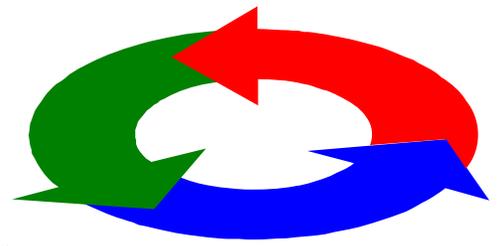


# Amendments



Improving Awareness & Advocacy of the Michigan Biosolids Program

Volume 16, First Quarter

February, 2012

## Biosolids Program Update

### Program Fees

If you are a Biosolids Program Fee Payer, you have already received your invoice, and you can see that your biosolids land application fee is \$12.92 per dry ton. Most of you are probably upset with this increase and some of you will be looking at biosolids disposal alternatives for 2012. We don't blame you. **We urge you to discuss the situation with your city manager or mayor and your elected officials.**

### Michigan Biosolids Team Activities

The Michigan Biosolids Team (MBT) displayed at the 2012 Michigan Township Association (MTA) Annual Conference in Detroit. MDEQ Team Members: Jim Johnson, Dr. Bahram Zamani, and Greg Merricle gave out bags of Biosolids Popcorn, handed out information folders, and talked one-on-one to Township Officials.

The MBT also displayed at the 2012 AWWA/MWEA Joint Expo at the Lansing Center in Lansing. MDEQ Members Johnson, Zamani, Merricle, Dave Schipper and MDARD Member Steve Mahoney passed out Biosolids Team Calendars, information folders, and again, gave out many bags of popcorn.

### Biosolids Seminars

At the January 12, 2012 MBT meeting in Grandville, the MBT decided to plan a one day seminar for September, 2012 and a two day conference for March, 2013. We will begin gathering information for both events at the next MBT meeting on **March 15, 2012, at 8:30 a.m. at the City of Ann Arbor WWTP.** If there are topics you would like to discuss, feel free to contact Steve Mahoney at [mahoneys@michigan.gov](mailto:mahoneys@michigan.gov) or 517-241-2508.



## Michigan News

### New director takes helm at Detroit Water and Sewerage

November 21, 2011

STEVE PARDO/ The Detroit News

Detroit - A former public service administrator for the city of Ann Arbor has been named the director of the Detroit Water and Sewerage Commission.

Sue McCormick will start in the top leadership job of the department Jan 1. Detroit Mayor Dave Bing appointed her, and the seven-member Board of Water Commissioners unanimously approved her to serve as the director.

The department hasn't had a permanent director since July 2010. Former director Victor Mercado, along with former Detroit Mayor Kwame Kilpatrick and his father, Bernard, face federal charges of racketeering, bribery, tax evasion and fraud.

McCormick's appointment follows a Nov. 4 ruling by U.S. District Judge Sean Cox that gave the department director greater control over personnel and collective bargaining agreements. An attorney representing union workers at the department filed a motion looking to block the changes. Cox denied the motion last week. Attorney Herbert Sanders, representing AFSCME Council 25 workers, vowed to appeal.

The department has been under federal oversight since 1977 over violations of the Clean Water Act. Personnel issues — including the inability of staff skilled trades and other areas of the plant — have consistently been cited over the years as reasons for the plant not meeting Clean Water Act standards.

McCormick managed Ann Arbor's entire physical infrastructure, including the water and sewer system.

*Continued on Page 2*

*Continued from Page 1*

She first joined Ann Arbor city government as Water Utilities Director in January 2001.

Before that, she was employed for 22 years by the Lansing Board of Water and Light, serving as environmental chemist, environmental laboratory manager, manager of water and steam planning, water technical support manager and business development manager.

The department supplies water to about 3 million customers throughout Detroit and 76 other Michigan communities.

[spardo@detnews.com](mailto:spardo@detnews.com) (313) 222-2112

## Ann Arbor officials planning to spend \$100M-plus to rebuild 1930s-era wastewater treatment plant

Posted: Mon, Feb 6, 2012 : 5:59 a.m.



An aerial view of the Ann Arbor Wastewater Treatment Plant located just east of the city limits in Ann Arbor Township along the Huron River. Courtesy of City of Ann Arbor

The city of **Ann Arbor** is about to undertake **one of the largest capital improvement projects in its history**: a complete rebuild of half the city's wastewater treatment plant.

The potentially \$120 million facilities renovation project comes on the heels of another project nearing completion at the plant. That included replacing worn out and inefficient residual solids processing equipment and other upgrades at a cost of more than \$50 million.

The **Ann Arbor City Council** is being asked Monday night to tentatively approve a **\$92.9 million construction contract** with the **Walsh Construction Co.**

The council already took action on Jan. 23 to approve a **\$10.8 million contract with Malcolm Pirnie Inc.** for engineering services to support construction. The firm has been **under contract with the city since March 2005** to assist in designing the project. Due to the aging and deteriorating facilities, the city is undertaking the renovations to ensure long-term treatment capacity and reliability. Construction is expected to extend over five fiscal years, and it must be done without impeding the flow of wastewater to the plant.

The **Ann Arbor Wastewater Treatment Plant** takes in nearly 19 million gallons of wastewater per day from the city of Ann Arbor and Pittsfield, Scio and Ann Arbor townships. The overall site actually consists of two plants — an older West Plant constructed in the 1930s and a newer East Plant constructed in the late 1970s.

The work about to get under way includes demolition and complete replacement of the older West Plant, improvements to newer East Plant and replacement of the plant electrical grid and stand-by generators. The **Ann Arbor City Council** recently approved a notice of intent to issue up to **\$120 million in sewage disposal system revenue bonds** for the project.

**Earl Kenzie**, the city's wastewater treatment services manager, said it's more likely the project will come in somewhere between \$100 million and \$110 million.

Kenzie appeared before the City Council recently to explain the project, along with **Mike Amicangelo**, senior utilities engineer at the plant. They were joined by two consulting engineers — **Tom Porter** and **Chris Englert** — from **Malcolm Pirnie Inc.**

The renovations to the West Plant include rehabilitating existing flow control structures, complete demolition and replacement of primary and secondary treatment equipment, and construction of new buildings. Other

*Continued on Page 3*

improvements include installation of a new electrical distribution system and two new emergency power generators, utilities relocation, replacement of stormwater collection system equipment, installation of new roadways, and replacement of aeration systems with energy efficient blowers.

Kenzie said the opening of contractor bids on the project took place Jan. 11 and there were six proposals submitted. **Lakeshore TolTest Corp.**, with offices in Detroit, was the lowest bidder at \$83.3 million. The highest bidder was Southfield-based **Barton Malow** at \$102.9 million. Other proposals came in from **Granger Construction** (\$90 million), **Walsh Construction** (\$92.9 million), **Walbridge Aldinger** (\$95.4 million), and **Hunt/Colasanti** (\$100 million). The three lowest bidders were brought in for interviews in January and the city's staff recommended the council approve a contract with Walsh.

To put it in perspective, the work being done at the wastewater treatment plant will cost more than the combined total of two other large capital projects the city has taken on in recent years — the \$50 million underground parking structure still being built on South Fifth Avenue downtown, and the nearly \$50 million Ann Arbor Municipal Center project. The wastewater treatment plant is located just east of the city limits and US-23, off Dixboro Road along the Huron River, mostly in Ann Arbor Township.



The West Plant portion of the facility is slated to be completely demolished and rebuilt during the project, which is expected to span five fiscal years.

The plant, which runs continuously and is staffed 24-7, serves about 130,000 people in the city of Ann Arbor and portions of Ann Arbor, Pittsfield and Scio townships.

The plant's permitted capacity is 29.5 million gallons per day, while the average daily flow is about 18.5 million gallons. The maximum hydraulic flow is 48 million gallons per day. Amicangelo said the East Plant was built between 1977 and 1981 and has a permitted capacity of 20 million gallons per day. The older West Plant, which is being replaced, was built in 1936 and saw upgrades through 1964. It has a permitted capacity of 9.5 million gallons per day. "The plant is in such poor condition at this point that it was taken offline in 2006, so that old West Plant is no longer operational," Amicangelo said.

An old photo from July 29, 1936, shows the original administration building for the West Plant, the same building that's still standing today, though it's structurally unsound now. Based on the condition of the plant, Amicangelo said, the city developed a facilities master plan that was completed in January 2004. Recommendations that came out of the master plan included complete replacement of the West Plant and upgrades to the East Plant. Amicangelo said it's been a long and complex process to come up with a design. The original contract with Malcolm Pirnie dates back to March 2005. "One of the reasons why the project took so long is because of the regulatory requirements that we had to meet," Amicangelo said, tracing the preliminary site plan review back to 2009.



Another overhead shot of the Ann Arbor Wastewater Treatment Plant. Courtesy of City of Ann Arbor

Continued on Page 4

*Continued from Page 3*

The city also had to get what's known as a "conditional letter of map revision" from the Federal Emergency Management Agency, also known as FEMA. That process lasted from November 2009 to August 2010 and involved revising maps to take the plant out of the floodplain. The city also needed approval of a stormwater management plan from Washtenaw County and Ann Arbor Township, a process that lasted from November 2009 to September 2010. The city went through the final site plan review process with Ann Arbor Township from August 2010 to December 2010 and then sought a construction permit from the Michigan Department of Environmental Quality, which took from May 2011 to October 2011.

Amicangelo said there are a number of site limitations that prevent the plant from being able to expand beyond its existing footprint, as it's bordered to the north by the Norfolk Southern Railroad, to the west and south by the Huron River, and to the east by Fleming Creek.

"Everything we do within the facility — every upgrade, every equipment replacement — has to be done within that footprint," he said. "The site's fully utilized." Adding to the logistical challenge is that utility connections to the East Plant pass through the area being demolished.

Another challenge has been the embankment separating the plant from the river. Although it has effectively provided flood protection to the plant for decades, it does not meet current FEMA standards and the plant is considered in a 100-year floodplain. Without improvements there, the plant would be required to meet building standards that include flood proofing all new buildings to provide protection against damage from a 500-year flood, and that would add significant costs to the project. The city instead petitioned FEMA to readjust its maps and move the floodplain lines south to remove the plant from the flood-prone zone. The city had to agree to make improvements to the embankment to get FEMA to go along with the map revision. Those improvements to protect the plant from the Huron River and Fleming Creek floodwaters are now included in the facilities renovation project.



Due to the aging and deteriorating facilities, the city is undertaking the renovations to ensure long-term treatment capacity and reliability.

Courtesy of City of Ann Arbor

Amicangelo said it'll take about nine months to complete the embankment work before the city can proceed with actual construction of buildings. He said the contractor on the project can dig utility trenches and do demolition work in the meantime. The newly constructed facilities are expected to include more-efficient, computer-controlled technology that will allow the city to treat wastewater using less energy while reducing phosphorus and nitrogen, according to project officials.

"When we're done with this project ... there'll be areas for future use — future tanks and facilities — in case the plant ever has to expand its capacity," Porter said. The city has been approved for a \$109 million loan at 2.5 percent interest rate from a revolving fund managed by the DEQ. By financing the project that way, the savings to the city over the 20-year life of the loan will be about \$35 million, according to the city's consulting financial advisor. Additionally, the city is able to receive \$2.2 million in loan principal forgiveness for green project features, which essentially equates to grant money.

Englert said the city expects to save another \$1.5 million from a sales tax exemption for contractor purchases on the project through the Michigan Department of Treasury.

The DEQ approved the project plan on Jan. 6. A final order of approval for the revolving fund loan is expected on March 12, with the loan closing on April 10.

*Continued on Page 5*

**Tom Crawford**, the city's chief financial officer, said the fact that the city is embarking on such a major project is the reason why utility rates have steadily increased, and why the city's utility funds show surpluses year after year. That money is being stockpiled for projects like this. Even while undertaking a nine-figure project, Crawford pointed out the rate increases have been kept to typically less than 5 percent over a number of years so there isn't a sudden rate shock to users. All of the city's utility funds — water, sewer and stormwater — are performing capital projects and need the funds in order to make improvements, he said.

"There's been a long ramp-up with the rates and our rate adjustments have been very modest when compared to other communities," Mayor **John Hieftje** said. "And last time I looked at the DNR numbers, Ann Arbor was in the bottom 10 percent as far as our rates, and that's a good thing," he added. "That's some of the lowest rates in the state, and hopefully we'll be able to continue that even as this contract goes forward."

*Ryan J. Stanton covers government and politics for AnnArbor.com. Reach him at [ryanstanton@annarbor.com](mailto:ryanstanton@annarbor.com) or 734-623-2529. You also can [follow him on Twitter](#) or [subscribe](#) to AnnArbor.com's email newsletters.*

Tags: Ann Arbor City Council, Ann Arbor Wastewater Treatment Plant, Ann Arbor city budget, Earl Kenzie, John Hieftje, Mike Amicangelo, Tom Crawford,

## Around the Great Lakes

### Ohio

#### Toledo officials argue over how to handle sewage sludge



THE TOLEDO BLADE

BY CLAUDIA BOYD-BARRETT  
BLADE STAFF WRITER

Bay View Park sewage treatment plant.

Sewage sludge -- the smelly,

pathogen-containing solid left behind in the wastewater treatment process -- has become a hot topic for debate at Toledo City Council this week as representatives argue over whether it's safe to put the muck in a disposal facility jutting into Maumee Bay.

About half of Toledo's sludge already goes to the facility, known as Facility 3. The large, diked-in area was built by the U.S. Army Corps of Engineers in the 1970s as a place to house contaminated sediments dredged from the Maumee River and Maumee Bay shipping channels.

Under the current arrangement, a company called S&L Fertilizer takes the sludge to Facility 3 and mixes it with the dredging. After leaving the mixture for a year to kill off pathogens, S&L gives it back to the city to use as landfill cover.

Another company, Toledo-based N-Viro International Corporation, processes the rest of the sludge at the city's wastewater treatment plant, turning the muck into a type of soil for use on agricultural sites.

Now, the Bell Administration wants to allow S&L to take all of the city's sludge -- about 50,000 tons a year -- to Facility 3. The move has angered N-Viro executives, who have processed the sludge for years, and also alarmed some city councilmen, who say more research needs to be done to ensure contaminants from the sludge aren't leaking into the bay. "This is the most important decision this council has ever had to make," councilman D. Michael Collins warned his colleagues at a meeting yesterday. "The unintended consequences may well have far-reaching effects." Mr. Collins pointed to 2010 satellite data from a Bowling Green-based company Blue Water Satellite, Inc., which appears to show concentrations of

*Continued on Page 6*

E. coli and phosphorus around Facility 3. In a letter addressed to a Blue Water distributor, Natural Resources Management, LLC, the company's Chief Technical Officer, Robert Vincent, concluded that Facility 3 was likely a source of the phosphorus in the bay, and possibly the E. coli.

Phosphorus is a by-product of sewage and also agricultural runoff that contributes to the formation of blue-green algae, a toxic bloom that has plagued Lake Erie for more than a decade and continues to get worse. E. coli is a bacterium that can cause diarrhea and other more serious health problems in humans.

Jim Harpen, Blue Water's manager of business development said yesterday, however, that the company's E. coli data is not conclusive, and based on an experimental technique. He said the phosphorus findings are correct, although there are many other sites in the area, such as the wastewater treatment plant itself, that are also leaking phosphorus. He said the company no longer has the 2010 images, and could not provide information on the phosphorus concentration levels around Facility 3.

Toledo's public utilities director Dave Welch said the city has tested the water around Facility 3 for E. coli and phosphorus on several occasions to see if contaminants are leaking. The levels of each were found to be minuscule, far below the maximum amount permitted by the Ohio Environmental Protection Agency, and tests conducted on Aug. 25 concluded there was no evidence of leaching from the dike walls of the facility into the bay.

Ohio EPA has also inspected the facility and found no evidence of leaching, according to information provided by spokesman Dina Pierce. Corps of Engineers representative Jan Miller, based in Cincinnati, said Facility 3 is constructed so that water

in the facility gradually seeps through a series of cells and the contaminants naturally stick to the rocks and sediments inside. If any did leach through they would likely be dead by the time they reached the water, Mr. Miller indicated. The Corps does not test the water around the facility. City utilities director, Mr. Welch, insisted that concerns pathogens could leak from the sludge into the bay are unfounded. Some councilmen agreed.

Joe McNamara accused Mr. Collins of touting "junk science" and said the contamination fears are merely a tactic of rival company N-Viro to discredit S&L and hold on to its contract with the city. Toledo paid N-Viro \$824,000 last year to process half of the sludge. S&L was paid \$454,000. Under the new contract, the city would pay S&L \$760,000 annually.

N-Viro's vice president of business development, Robert Bohmer, and board member Tom Kovacik spoke out against S&L before council this week, accusing the company of contaminating the bay. S&L's head, Terry Perry, in turn defended his company's practices and record.

Councilman Mike Craig expressed frustration over the city's failure to award the contract sooner.

"I can't believe I'm sitting here listening to this a year and a half after we should have voted on this contract," Mr. Craig said. But councilman Rob Ludeman agreed with Mr. Collins that further testing should be done first. Mr. Collins has asked that the Ohio State University's Stone Lab Research Center be called in to do an analysis.

Council will discuss the issue further, and possibly vote on the contract during its Oct. 4 meeting. Contact Claudia Boyd-Barrett [cbarrett@theblade.com](mailto:cbarrett@theblade.com) or 419-724-6272.

## Indiana

### **Indiana Moving Slowly on Lake Phosphorus Rules .**

January 29, 2012 11:23 a.m.

ASSOCIATED PRESS

MUNCIE — A state effort to address phosphorous pollution that has fouled Indiana's waterways is moving forward slowly, but environmental groups' hopes for help from lawmakers is likely to be dashed this year.

The Indiana Department of Environmental Management is working on new rules to establish numeric standards for phosphorus in lakes. But a bill that would place restrictions on the application of lawn fertilizer containing phosphorous is unlikely to get a hearing in the House, according to Casey Arqawi, press secretary for state Rep. Dick Dodge, R-Pleasant Lake.

The Indiana Conservation Alliance, whose 30 members include the Indiana Wildlife Federation, The Nature Conservancy and the Indiana Lakes Management Society, had made passage of the bill a priority, but the boycott by House Democrats over divisive right-to-work legislation caused delays that could make it difficult for the bill to be heard, Arqawi told The Star Press (<http://tspne.ws/xFQKrQ>).

Phosphorus has been blamed for algae blooms that have tainted waterways across the state in recent years.

In August 2011, state officials found high levels of blue-green algae at eight of 13 public swimming beaches sampled, including Potato Creek State Park, Chain O'Lakes State Park and Raccoon State Recreation Area.

Sampling by Indiana University-Purdue University at Indianapolis also found high levels of the algae, also known as cyanobacteria, in Geist, Morse, Eagle Creek and Patoka reservoirs.

A similar bloom in Prairie Creek Reservoir in 2010 affected about 700,000 drinking water customers in Muncie, Indianapolis and other communities, causing a horrible smell and taste that lasted for days.

Exposure to blue-green algae during swimming, wading and water-skiing can lead to rashes, skin and eye irritation and other issues, including nausea, stomach aches and tingling in fingers and toes.

The U.S. Environmental Protection Agency in 1988 recommended that states accelerate the adoption of nutrient standards for water bodies. The EPA has continued to encourage states to adopt standards since that time.

Shivi Selvaratnam, a technical water quality specialist at IDEM, said the state is in the process of adopting standards for lakes and reservoirs. The pending phosphorus rule also would affect municipal wastewater treatment plants.

Selvaratnam said officials hope to draft rule language by the end of the summer.

If Indiana does not finish the rule-making, the EPA could apply national lakes nutrient criteria to Indiana lakes.

© Copyright 2012 ASSOCIATED PRESS. All rights reserved. Neither this material nor its presentation may be published, broadcast, rewritten or redistributed.

## Deep Tunnel System Inspection Under Way

POSTED: 7:22 am CST January 30, 2012  
UPDATED: 6:51 pm CST January 30, 2012

**MILWAUKEE** -- An inspection of Milwaukee's Deep Tunnel is under way. The Milwaukee Metropolitan Sewerage District built the 19.5 mile Deep Tunnel project to help give the utility more time to treat wastewater during heavy rains. The Deep Tunnel's first full year of operation was in 1994 and had its last full inspection in 2002. The system involves tunnels located 300 feet underground where the MMSD can divert untreated water until facilities can process it. "The tunnel is basically a big bathtub, and it holds wastewater until the treatment plants have time to treat it," MMSD spokesman Bill Graffin said. MMSD has had to send some partially treated sewage into the lake on occasions when heavy downpours had filled the tunnels. This year's inspection marks the first time in 10 years where every inch of the tunnel will be inspected. Two newer additions to the Deep Tunnel -- a 7.1-mile extension on the northwest side and a two-mile extension near 27th Street -- will not be checked during this inspection. Crews have been able to inspect one mile of the tunnel so far, which puts them a little behind schedule but Graffin said they do expect to finish this winter and definitely before the spring rains. "There's sediment between here and Jones Island that's been accumulating over the years, and they're trying to figure out a way to get that out of the way so they can get the machinery in there to inspect the tunnel," Graffin said. MMSD experts will also be examining video shot down in the tunnel to make sure it passes inspection and is structurally sound.

Copyright 2012 by [WISN.com](http://www.wisn.com). All rights reserved. This material may not be published, broadcast, rewritten or redistributed  
Read more:  
<http://www.wisn.com/news/30329965/detail.html#ixzz1mHHUw2MR> or  
<http://www.wisn.com/news/30329965/detail.html#ixzz1mHHekfyS>

## Living Filter

By Sally Brown, University of Washington

At the recent W 2170, the group toured the Penn State's Living Filter field site. In 1962, the State College wastewater treatment plant was faced with the potential for costly upgrades in order to protect the water quality of the trout stream where the plant had historically discharged. As an alternative solution, the plant was allowed to test direct irrigation of the effluent on a 516 acre site. Direct irrigation began on the half cropped, half forested site on an experimental basis in 1963 and switched to continuous operation in 1983.

Each day the WWTP treats 2-3 million gallons of water with treated effluent having between 10-12 mg L N and 3-4 mg L total P. The plant has a 3 hour storage capacity, so every day, rain or shine, snow or heat wave, the treated effluent is sprayed onto the Living Filter. This, including rainfall, comes to a total of 140 inches applied, with 28" lost through evapotranspiration, 10" of rainfall runoff ending with a total of 102 " for groundwater recharge. The site is continuously sampled and used for research. Groundwater N at the site has been consistently below 10 mg L since the plant was upgraded to include a denitrification step and effluent N concentrations were reduced to current levels. Depth to groundwater at the site is over 100', so there is a significant time to contact.

At the meeting we heard about ongoing research on the fate of carbamazepine in the soils. It partitions strongly to organic matter and concentrations fall significantly once you sample below the surface 15 cm. We also met the engineer who set up the filter and the agronomist in charge of cropping the open areas. They talked about learning how to spray select areas at select times, avoiding the wheat when it was close to harvest, and avoiding trees when temperatures were below freezing. The area is used by local residents for recreation and hunting. Driving through the site it seemed like an excellent way to preserve open space, return water to the ground, and save on costly plant upgrades.

## Struvite Provides Phosphorus for Greenhouse Grown Plants in a Soiless Substrate

By Rita Hummel, Craig Cogger, Robert Riley and Andy Bary,  
Washington State University-Puyallup

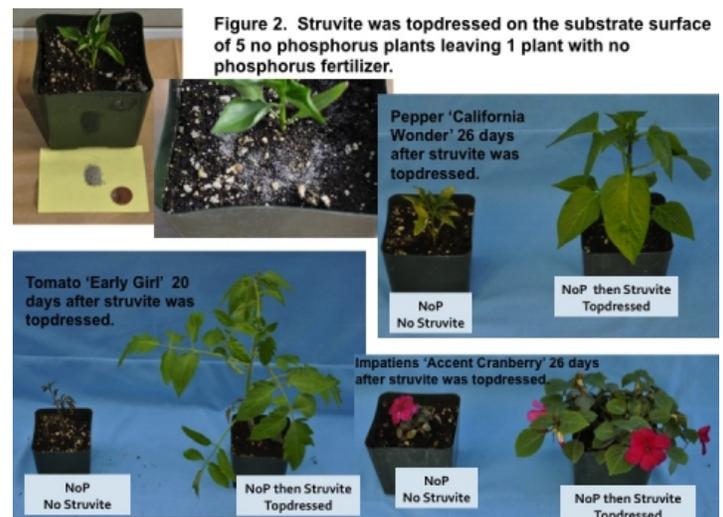
Container-crop production practices call for the frequent addition of water and fertilizers to soiless media to produce high value crops. The soiless growth substrates typically used for producing greenhouse and nursery crops in containers are deficient in phosphorus. It is a standard production practice to incorporate phosphorus, commonly superphosphate, into the growing media prior to potting most container-grown plants. Struvite (magnesium ammonium phosphate hexahydrate) is a by-product of wastewater treatment and research has shown it has potential to serve as a phosphorus source for plants grown in containers. A production system that utilizes struvite from wastewater would enhance the nutrient use efficiency and sustainability of container crops.

We conducted a preliminary experiment in spring 2011 to evaluate struvite obtained from the King County wastewater treatment plant as a phosphorus fertilizer for greenhouse-grown basil, cucumber, impatiens, marigold, pepper, sunflower, tomato and zinnia plants. Plants were started in plug trays and transplanted to 4-inch pots. The growth substrate was a commercially available sphagnum peat-perlite mix amended with dolomitic limestone, a wetting agent and Micromax® micronutrient mix. Three phosphorus treatments were applied by thorough mixing into this substrate: 1) triple superphosphate (TSP) at a commonly recommended rate of 1lb/yd<sup>3</sup>; 2) struvite at a rate equivalent to TSP; and 3) no added phosphorus. Nitrogen and potassium were applied twice weekly at 200 ppm N from a water soluble 15-0-15 fertilizer, no additional phosphorus fertilizer was applied. Shoot growth and quality results indicated there was no significant difference in size or quality of the struvite and TSP plants but the no phosphorus plants were stunted and not of marketable quality (see Figure 1).



In an effort to determine if the phosphorus deficiency could be overcome by adding struvite to the phosphorus deficient plants, we topdressed struvite (amount equivalent to incorporated) on the substrate surface of 5 no-phosphorus replicates. This left one no phosphorus plant for comparison. The images in Figure 2 show that the no phosphorus plants with struvite added as a topdressing rapidly out-grew the phosphorus deficiency.

Additional research to determine optimum struvite rates, struvite performance in non-peat based substrates, struvite longevity and solubility is needed but preliminary results indicate struvite can serve as a phosphorus fertilizer for greenhouse crop production.



## Biosolids--Grounded in Sound Science

Around the world, applying biosolids to agricultural land for crop production has been a common practice for decades. Long-term scientific studies over the years have consistently demonstrated that biosolids recycling is both safe and beneficial. This research strongly supports the finding of the U.S. Environmental Protection Agency that "In fact, in all the years that properly treated biosolids have been applied to the land, we have been unable to find one documented case of illness or disease that resulted." (Martha Prothro, former Deputy Assistant Administrator for Water, U.S. EPA, 9/1/ 1992).

### Many studies attest to the safety and efficacy of biosolids recycling:

**Finding:** There were no observed differences between disease occurrence in domestic animals on farms using biosolids and on control farms. Similarly, there was no significant difference in the presence of adverse effects to residents of either farms using biosolids or the control farms. Biosolids were also found to be effective in increasing crop yields.

**Source:** Comprehensive health effects study comparing the health status of residents living on 47 Ohio farms using biosolids with those on 46 control farms. The 1985, study sponsored by the Environmental Protection Agency, was conducted jointly by Ohio State University and the Ohio Farm Bureau Federation.

**Finding:** Biosolids are extremely safe when used in agriculture as a nutrient source and soil conditioner. They can be used in ways that do not endanger the environment or the food chain.

**Source:** Article for the October 1990 issue of BioCycle; Rufus L. Chaney discussed the impact of biosolids on the human diet and took an updated look at biosolids management regulations. Chaney is with the Soil-Microbial Systems Laboratory of Agricultural Research Service, U.S. Department of Agriculture.

**Finding:** Biosolids provide nutrients and organic matter that can be used beneficially for growing crops. They can supply appreciable amounts of nitrogen and phosphorus. The return of organic solids to the soil will contribute to the maintenance of organic matter levels. Some biosolids also help neutralize acidity in soils (similar to the function played by agricultural

limestone) so as to help maintain the proper soil pH for crop growth.

**Source:** Lee W. Jacobs reviewed the agricultural application of biosolids for a recent book on biosolids. Jacobs is associate professor in the Department of Crop and Soil Sciences of Michigan State University.

**Finding:** Runoff from pastures receiving a surface application of biosolids exhibited the least overall potential for pollution when compared with pastureland that received applications of dairy and poultry manure or to commercial fertilizer.

**Source:** One of the conclusions from a 1984 article in the Journal of Environmental Quality by R.V. McLeod and R.O. Hegg.

**Finding:** Research into the application of biosolids to agricultural land for over 20 years indicates that properly applied, high quality biosolids can be safely utilized on crop and forest lands, for reclamation of disturbed lands, and on urban and residential turf grass and ornamental plantings.

**Source:** The Water Environment Research Foundation (WERF) documented long-term experience of biosolids land application programs in a report issued in 1993.

**Finding:** In recent years, crop yields on biosolids-improved farm land in Yuma, Arizona, have been 10 to 85 percent higher than crop yields on soils receiving commercial fertilizers. In addition, no significant increase in metal concentrations in plant tissues was observed.

**Source:** WERF Report, 1993 citing biosolids application in Yuma, AZ, begun in 1980.

**Finding:** Groundwater and surface water monitoring data from the Hampton Roads, Virginia, biosolids management program shows no environmental degradation. The site was monitored more extensively than any other site surveyed.

**Source:** WERF Report, 1993. The Hampton Roads Sanitation District operates the Progress Farm using biosolids applications. The District gathered comprehensive data on soil, groundwater and surface water quality for two years before using biosolids. This data has provided a long-term scientific baseline to study the effects of biosolids.

*Continued on Page 11*

**Finding:** Soils act as extremely tight binders for organic and most inorganic pollutants, and this significantly reduces the ability of these pollutants to enter the environment and be exposed to humans, plants, and animals.

**Source:** "How Toxic are Toxic Chemicals in Soil," by Martin Alexander, Environmental Science and Technology, Vol. 29, No. 11, November 1995.

## Wastewater system generates energy, produces drinking water

**Contact:** Layne Cameron, University Relations, Office: (517) 353-8819, Cell: (765) 748-4827, [layne.cameron@ur.msu.edu](mailto:layne.cameron@ur.msu.edu); Wei Liao, Biosystems and Agricultural Engineering, Office: (517) 432-7205, [liao@msu.edu](mailto:liao@msu.edu)

**Published:** Dec. 01, 2011 [E-mail Editor](#)

EAST LANSING, Mich. — A Michigan State University researcher is using a \$1.92 million Department of Defense grant to develop a portable wastewater treatment system that could improve the military's efficiency.

The solar-bio-nano project, which is being spearheaded by [Wei Liao](#), an MSU assistant professor of biosystems and agricultural engineering, also will generate energy and produce drinking water, thus providing a potential blueprint for the future of municipal/agricultural wastewater treatment systems.

During military operations, shipping from port to bases on or near the front lines can push the cost of water up to nearly \$60 per gallon. A portable, self-sustaining system would allow the bases to be more nimble and cost-effective, Liao said.

"Bases on or near the front lines could transport this small-scale system by semi-truck and will greatly reduce their demand for water and fuel," he said. "The integrated system can serve about 600 people, is patentable and hopefully can be scaled up to serve larger populations."

The integrated system will comprise three major components. First, the solar unit will use new materials and employ a novel configuration making it up to 80 percent lighter than traditional solar units. Second, biological conversion processes will break down wastewater and food scraps to produce methane that can be used as fuel. Finally, a nano-filtration system

will then take the discharge from the biological processes to provide drinking water.

If the team's project proves effective in military settings, it has great potential in a wide range of wastewater treatment systems, from agricultural operations to municipal wastewater treatment plants, Liao said.

"The short-term goal is to drive costs down and to allow the military to alleviate supply chains' overarching control over its maneuvers," he said. "The long-term goal is to apply advanced and integrated technologies to transform agricultural and municipal wastes from an environmental liability into a public and private asset."

Working with Liao on the project, are MSU colleagues Ilsoon Lee, an MSU associate professor of chemical engineering, and Abraham Engeda, an MSU professor of mechanical engineering. Liao's project was one of 32 initiatives funded by the DoD's Strategic Environmental Research and Development Program.

Michigan State University has been working to advance the common good in uncommon ways for more than 150 years. One of the top research universities in the world, MSU focuses its vast resources on creating solutions to some of the world's most pressing challenges, while providing life-changing opportunities to a diverse and inclusive academic community through more than 200 programs of study in 17 degree-granting colleges.

## Calendar of Events

### MBT Meetings

Thursday, March 15, 2012 10:00 a.m.

Location: Ann Arbor WWTP

Thursday, May 17, 2012 10:00 a.m.

Location: West Bay Co. WWTP, Bay City Michigan

Thursday, July 19, 2012 10:00 a.m.

Location: MSU Ag Expo, East Lansing

### Other Events

July 17-19, 2012

MSU Ag Expo, Michigan State University

MBT Display and Demonstration Plot