



# **Metropolitan Water Reclamation District of Greater Chicago**

**WELCOME  
TO THE APRIL EDITION  
OF THE 2018  
M&R SEMINAR SERIES**

# BEFORE WE BEGIN

- **SAFETY PRECAUTIONS**
  - PLEASE FOLLOW EXIT SIGN IN CASE OF EMERGENCY EVALUATION
  - AUTOMATED EXTERNAL DEFIBRILLATOR (AED) LOCATED OUTSIDE
- **PLEASE SILENCE CELL PHONES OR SMART PHONES**
- **QUESTION AND ANSWER SESSION WILL FOLLOW PRESENTATION**
- **PLEASE FILL EVALUATION FORM**
- **SEMINAR SLIDES WILL BE POSTED ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ Reports ⇒ M&R Data and Reports ⇒ M&R Seminar Series ⇒ 2018 Seminar Series)**
- **STREAM VIDEO WILL BE AVAILABLE ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ MWRDGC RSS Feeds)**

# Gregory Yarnik

***Current:*** Principal Environmental Specialist, IWD M&R Department MWRD

***Experience:***

- Pollution Control Officer III, IWD M&R Department MWRD
- Pollution Control Officer II, IWD M&R Department MWRD
- Pollution Control Officer I, IWD M&R Department MWRD
- 1988 to present Adjunct Professor of Biology - Division of Health and Science, College of DuPage, Glen Ellyn

***Education:***

- MS Biology - Illinois State University, Normal, IL
- BS, Biology and Philosophy - MacMurray College, Jacksonville, IL

***Activities:***

- Volunteer - Cook County Forest Preserve District, Deer Grove East Prairie and Woodland Restoration Program
- Volunteer - Buffalo Creek Clean Water Partnership Watershed Restoration Group

# Matthew McGregor

*Current:* Principal Engineer, M&O Department, MWRD

## *Experience:*

- Principal Civil Engineer, M&R Department, MWRD
- Senior Civil Engineer, M&R Department, MWRD
- Associate Civil Engineer, M&O Department, MWRD
- Assistant Civil Engineer, M&O Department, MWRD
- Design Engineer, GRAEF

## *Education:*

- MS, Environmental Management and Sustainability, Illinois Institute of Technology
- BS, Civil Engineering, University of Illinois at Urbana-Champaign

## *Professional:*

- WEF Residuals and Biosolids Committee
- NACWA Biosolids Management Committee
- IWEA Biosolids Committee

# Joseph Kozak

***Current:*** Principal Environmental Scientist, M&R Department, MWRD

***Experience:***

- Senior Environmental Scientist, M&R Department, MWRD
- Post Doctoral Research Soil Scientist, U.S. Department of Agriculture, Ft. Collins, CO

***Education:***

- PhD, Environmental Engineering, Northwestern University, Evanston, IL
- MS, Environmental Geosciences, Michigan State University, East Lansing, MI
- BS, Geology, University of Notre Dame, Notre Dame, IN

***Professional:***

- Member of WEF Municipal Resource Recovery Design Committee
- Member of IWEA Nutrient Removal and Recovery Committee
- Registered Professional Engineer with the State of Illinois



# Metropolitan Water Reclamation District of Greater Chicago

## Development and Implementation of the Metropolitan Water Reclamation District of Greater Chicago's Resource Recovery Ordinance

Greg Yarnik  
Matt McGregor  
Joe Kozak

April 27, 2018



# Outline

- **District Strategic Business Plan**
- **Resource Recovery Ordinance**
- **Programs**
  - **Bio P**
  - **Biogas**
  - **Composting/Yard Waste**
  - **“Water”**
- **Conclusions**



# Strategic Business Plan

- **Goals**
  - 1: Excellence
  - 2: Add Value
  - **3: Resource Recovery**
  - 4: Develop Employees
  - 5: Leading Partnerships
  - 6: Technology



# Strategic Business Plan: Resource Recovery

- **The District will pursue the recovery of natural resources**
  - **Water**
  - **Energy**
  - **Phosphorus**
  - **Biosolids**
  - **Recycle and Prevention**
- **The Resource Recovery Ordinance was adopted to institute and implement programs for this purpose and regulate activities**



# Resource Recovery Ordinance (Nov 26, 2017)

- Under this RRO, the District may accept certain deliveries **high strength liquid waste, vegetative material, woodchips**, and other recovered resources to maximize the beneficial reuse of recovered resources for the production of renewable energy resources, to allow for the recovery and resale of valuable resources, to reduce greenhouse gases, to promote a more sustainable society, and to assist or enhance treatment at the District WRPs



# Resource Recovery Ordinance

- **What is high strength liquid waste that is suitable for RRO programs and what are we seeking?**
  - Digestible liquid slurry
  - High in BOD or COD (for P removal or co-digestion) or high in phosphorus (for P recovery)
  - Non-hazardous
  - Free of debris, contaminants, or pollutants
- **What is vegetative material?**
  - Brush, grass clippings, leaves, and twigs
  - Free of debris and unbagged
- **What are woodchips?**
  - <1” woody material



# Resource Recovery Ordinance

- **Regulation of Authorization and Delivery**
- **Cost**
  - Administration, processing, analytical screening, and delivery
- **Monitoring**
- **Local Pretreatment Limits and User Charge will not change b/c of the RRO**



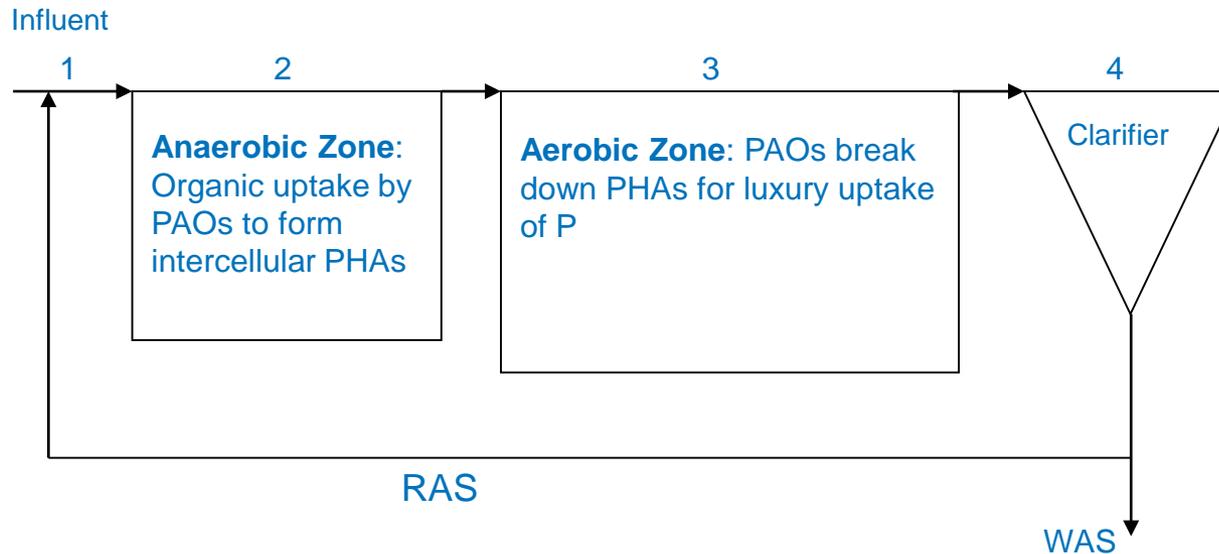
# Bio P Program-Why and what is Bio P?

- **Big 3 plants have compliance schedules in NPDES permits**
  - 1 mg/L avg monthly TP
  - 2030 backstop of 0.5 mg/L annual geomean
- **Other 4 plants either have P limit in draft permits or will**
- **Bio P will allow to biologically remove P from influent and subsequently recover it in a downstream process, e.g. Ostara®**
  - **Chemical P removal does not allow for recovery and reuse**



# Bio P Program-Why and what is Bio P?

- **Bio P needs sufficient organic matter entering activated sludge process for efficacy and stabilization**



- Simple philosophy
  - Some microorganisms can have luxury uptake P into their cells if the right environment is provided (EBPR process)
  - The P accumulated cells can be removed from the main liquid stream via solids separation.
  - The P is released in proper solids processing for harvesting
- Sustainability
  - Less energy is required for EBPR compared to conventional secondary treatment process



# Bio P Program-Why and what is Bio P?

- Also need organic material for denitrification and to meet oxygen demand of returned activated sludge
- Periodically, Bio P plants can be helped with extra organic matter to help stabilize the process and ensure performance
  - Have successfully pilot tested carbon supplementation at CWRP with a commercial product MicroC, but is there another alternative?
  - HSLWs is a viable option



# Bio P Program

- **Why HSLWs?**
  - **Waste products may be too expensive to discharge into collection system for the source**
  - **May be landfilling and not beneficially or effectively using waste**
  - **Alternative end users may not be local → high shipping costs and tipping fees**
  - **The RRO program may be a cost-effective option for sources AND the District will be beneficially using the waste**



# Bio P Program

- **What HSLWs may be suited for Bio-P?**
  - Solicit potential sources thru IWD database
  - Look into regional haulers
  - Identify industries that may have appropriate material
    - Meat packing industry
    - Beer/Wine waste
    - Sugar waste
    - Dairy industry
  - **Market Assessment conclusions → ~400,000 sCOD lb/d available regionally but there is competition**



# Bio P Program Application Process

**The Bio P Program's application process is:**

- 1. Submittal of an Organic Material Delivery Authorization (OMDA) Application**
- 2. Submittal of a Sample of the HSLW to be Delivered for MWRD Screening**
- 3. Review and Approval by M&R Program Director**



# Bio P Program Application Process

## Application

- **Haulers are required to submit an OMDA Application**
- **The application contains a Material Acceptance Agreement (MAA) for each HSLW to be delivered**
- **All drivers and vehicles used to haul material must be listed for review and approval**



# Bio P Program Application Process

## Material Screening to determine acceptability

- Does the HSLW contain contaminants that would interfere or pass through the WRP?
- Does the HSLW benefit one resource recovery program over another?
- Does the HSLW contain acceptable levels of carbon for one of the resource recovery programs?
- Is there enough material to provide a steady source for the receiving program?



# Bio P Program Application Process

- **What specifically are we targeting?**

Constituent	Value	Limit
COD	75,000 mg/L	Minimum
sCOD	>50% COD	Minimum
%VS	75%	Minimum
pH	4-10	Range

Pollutants of Concern to Minimize	
Cr+6	CN-
Cr (tot)	P
Cu	Toxic Organic Compounds
Fe	Mo
Pb	Se
Hg	As
Ni	



# Bio P Program Application Process

## Application Review and Approval

- **Application is reviewed for completeness**
- **Screening sample results are reviewed for acceptability**
- **EM&RD, ALD, and IWD recommend approval or rejection**
- **Approved OMDA and MAA(s) are sent to the hauler**
- **Approved vehicles and drivers are sent to Stickney and Calumet police with permission to allow deliveries**



# Bio P Program Delivery, Offloading, and Truck Screening

- **Bringing a truck of HSLW to the WRP requires steps to ensure the security at our plants and the integrity of the treatment systems.**
- **All permit holders are required to follow the same delivery procedures:**
  - **48-hr advance notice to the receiving WRP**
  - **Pre-payment coupon collected at time of delivery**
  - **Vehicle and driver must be registered with WRP Police**



# Bio P Program Delivery, Offloading, and Truck Screening

- **Stickney and Calumet have dedicated receiving stations for HSLW offloading**
- **A member of WRP operations staff is present for each offloading event**
- **During offloading**
  - **Coupon and manifest are provided to WRP staff**
  - **Sample is collected**
  - **Truck unloads material to WRP offloading location**



# Bio P Program Delivery, Offloading, and Truck Screening

- **Each truckload of HSLW is screened for quality by ALD.**
- **Screening results are reviewed by both EM&RD and IWD to determine if they meet required quality standards.**
- **Samples that do not pass quality control criteria result in notification to permit holder and potential OMDA withdrawal or other enforcement action, such as rejection.**



# Bio P Program-Status and summary at Stickney (as of February 28, 2018)

- Program started: April 26, 2017
- Trucks received: 191 trucks
- Receiving: Battery D western most channel
- Storage volume: 240,000 gallons (or 47 trucks)
- Carbon dosed: 613,489 lbs as COD





# Bio P Program-Status and summary at Calumet (as of February 28, 2018)

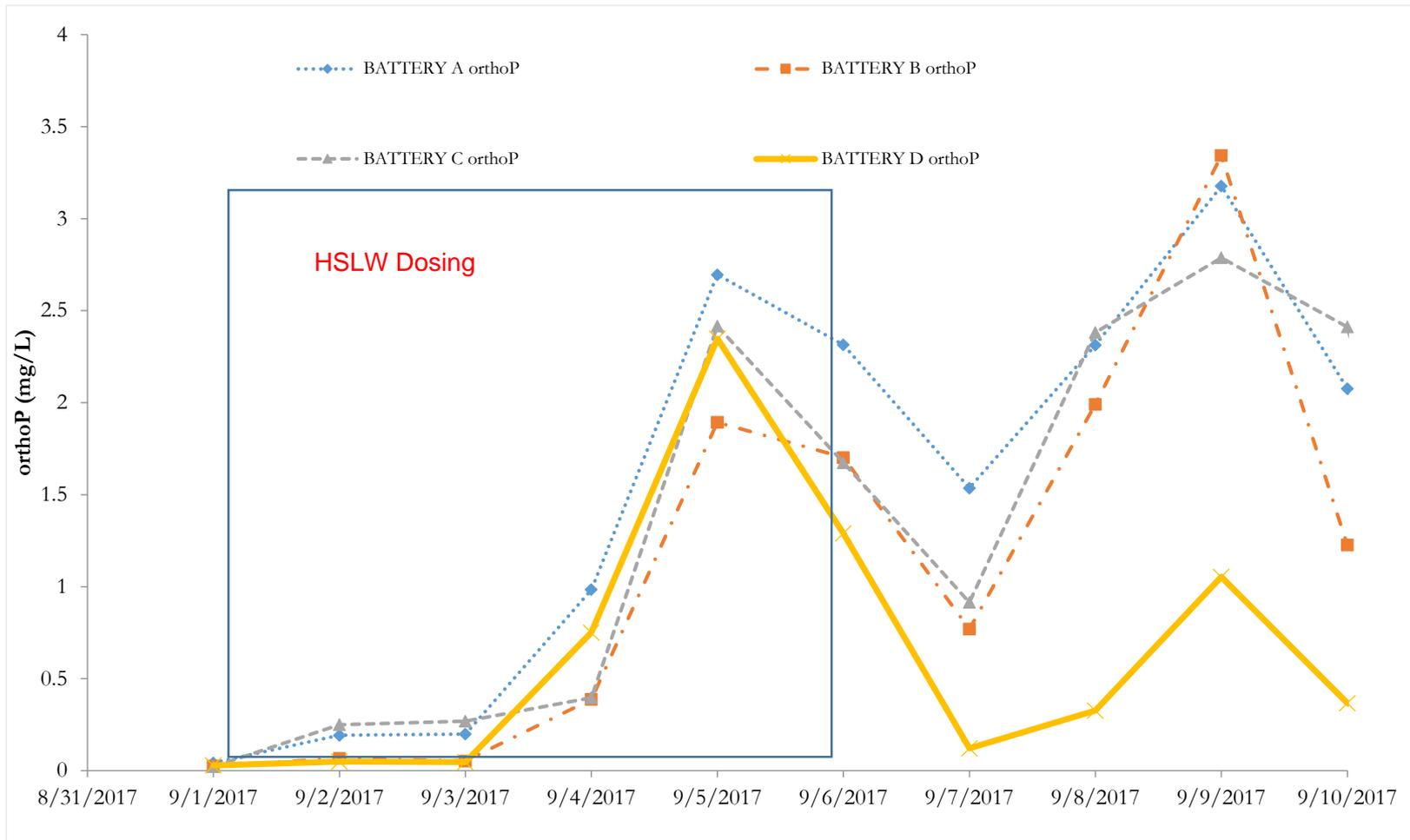
- Program started: August 23, 2017
- Trucks received: 344 trucks
- Receiving: Battery A frac tank and Blue Island Interceptor
- Storage volume: 21,000-gallon
- Carbon dosed: 38,962 lbs as COD





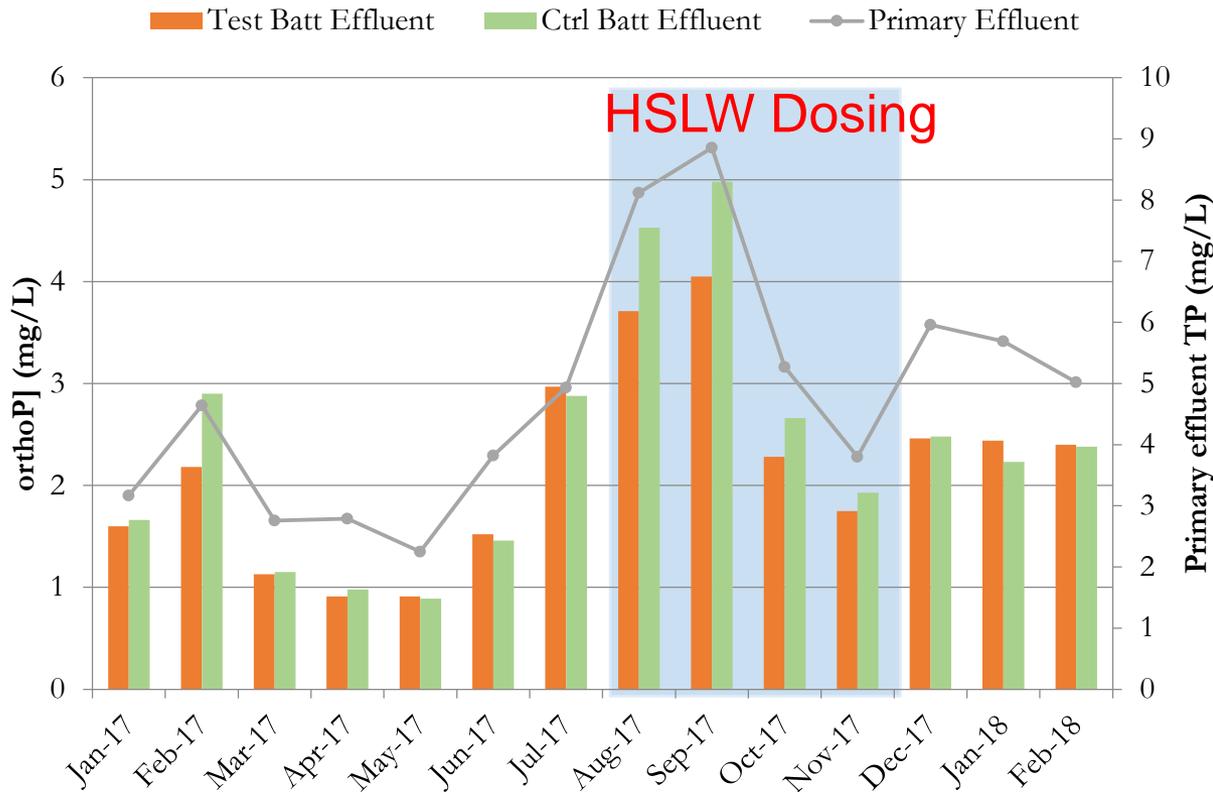
# Bio P Program-Pilot Design, Results, and Process Control at Stickney

- ❖ Consistent feed will be needed in order to see the effect on BioP performance in test Batt D
- ❖ Can be automated w/ COD and orthoP analyzers





# Bio P Program-Pilot Design, Results, and Process Control at Calumet



- Continuous dosing, however, at low rate with low strength HSLW
- Can dose @ dual points to both RAS and influent channels. Currently, to RAS channel
- Test battery effluent orthoP seems lower than ctrl during HSLW dosing periods, however, not statistically lower

❖ Need high strength HSLW to meet the carbon deficit at Calumet WRP and show improved P removal performance



# Bio P Program-Plant Monitoring for Inhibition and Pass Through

- **Stickney**
  - Westside Raw, Southwest Raw, Imhoff Effluent, Southwest Primary, final effluent, Digester Feed East, Digester Feed West and Biosolids
- **Calumet**
  - Influent, primary effluent, final effluent, digester feed and biosolids
- **Frequency**
  - Weekly, biosolids monthly
- **Parameters**
  - Arsenic, cadmium, copper, lead, nickel, zinc, chromium, mercury and cyanide
  - Selenium and Molybdenum in biosolids as well



# Bio P Program-Future full-scale application



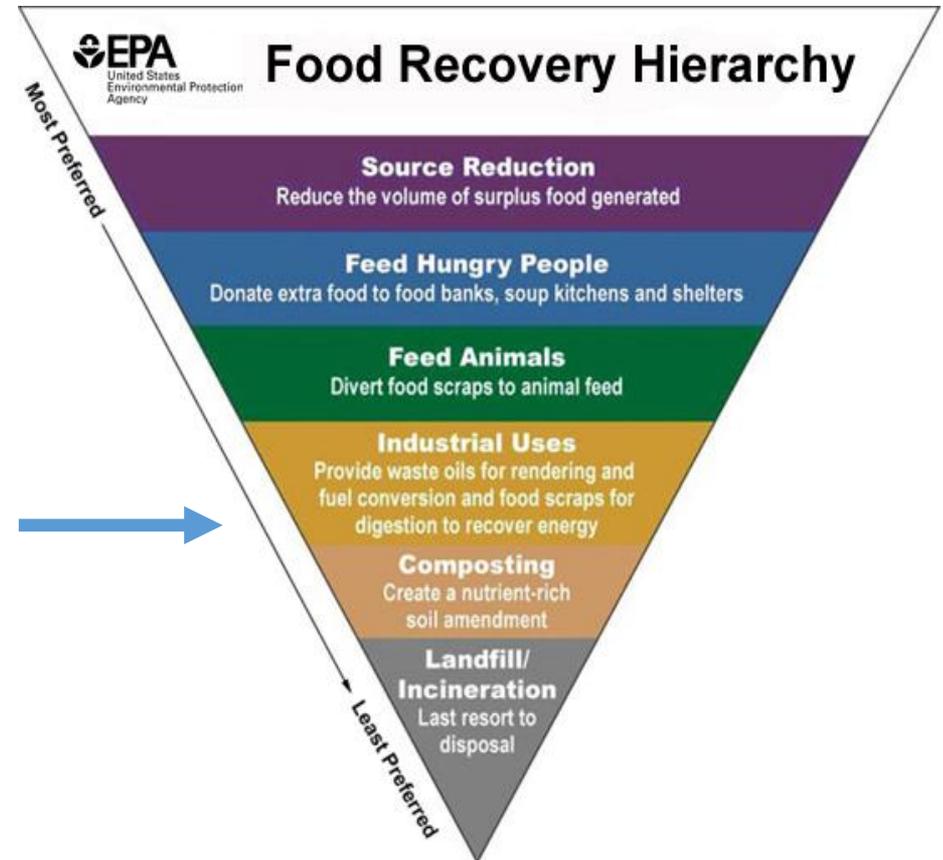
## Receiving Station at CWRP

- Designed with ability to meet the full carbon deficit for EBPR by pumping HSLW directly to primary effluent
- Repurposing 1 old primary settling tank, converting to 4 holding tanks (total volume roughly 500,000 gal)
- Covered, equipped with a mixing system, odor control, and pumps



# Benefits of a Biogas Program

- EPA Food Recovery Guidance, keeping food waste out of landfills
- Carbon rich materials from industrial and commercial sources
- Becoming standard throughout the industry





# Benefits of Biogas Program?

- Calumet and Stickney anaerobic digesters have excess capacity to accept alternative feedstocks for increased biogas production
- Use of biogas and increased biogas production were recently examined in a consultant Risk Assessment
  - Combined Heat and Power Generation
  - Renewable Natural Gas Pipeline Injection
  - Compressed Natural Gas Production
    - Vehicle fueling
- **Risk Assessment Recommendations**
  - **CWRP → CHP w/o outside HSLW**
  - **SWRP → RNG w/ OR w/o outside HSLW**



# Woodchips/Yard Waste Program

**BIO SOLIDS**

**Composting and the Resource Recovery Ordinance**



# Woodchips/Yard Waste Program - Recent Changes to IL Regulations

- Public Act 099-0067 passed in July 2015
- States that Exceptional Quality biosolids can “be used on land as a beneficial recyclable material that improves soil tilth, fertility, and stability...”
- And that Exceptional Quality biosolids are “a resource to be recovered...”
- But most importantly, “to encourage and promote the use of Exceptional Quality biosolids in productive and beneficial applications, to the extent allowed by federal law, Exceptional Quality biosolids shall not be subject to regulation as a sludge or other waste...”
- Allows for nearly unrestricted distribution of composted biosolids



# Exceptional Quality Biosolids – Production Methods





# Woodchips/Yard Waste Program – What are Composted Biosolids?

- 🌿 Humus-like material that provides large quantities of organic matter and improves nutrient retention of the soil
- 🌿 Biosolids compost has undetectable levels of pathogens and competes well with other bulk and bagged products available to homeowners, landscapers, farmers, and ranchers





# Woodchips/Yard Waste Program – Composted Biosolids as a Soil Amendment

**Low Quality Soil**



**EQ Biosolids Product**



+

=



**High Quality Soil**



# Woodchips/Yard Waste Program – Composting Advantages

## Advantages

- More consistent production process than air drying
- Less odorous final product
- No stockpiling restrictions

**Production process requires significant amount of bulking material (i.e. woodchips and/or vegetative material)**





# Woodchips/Yard Waste Program – City of Chicago IGA



- 🌿 District began pilot-scale composting in 2014
- 🌿 Woodchips received from the City of Chicago under an IGA
- 🌿 Resource Recovery Ordinance design to supplement material received through the IGA



# Woodchips/Yard Waste Program – RRO Requirements

## Woodchips

-  Defined as any wood derived solid material made by cutting or chipping larger pieces of wood
-  Shall be “processed to a size measuring less than 1.0 inch in two dimensions”
-  Must be brought in bulk (unbagged) form and be free of debris (i.e. glass, gravel, plastic bags, etc.)

## Vegetative Material

-  Defined as brush, grass clippings, and leaves
-  Must be brought in bulk (unbagged) form and be free of debris



# Woodchips/Yard Waste Program – Cost Information

## Prior to November 16, 2017

- 🍃 \$20 per ton delivery charge for woodchips and vegetative material
- 🍃 Program Director (Director of Maintenance and Operations) could authorize deliveries from a supplier on a provisional basis (180 days) at reduced or zero delivery charge
- 🍃 Significant interest in the program during the provisional period, but suppliers indicated they would re-evaluate participation in the program after provisional period due to cost

## After November 16, 2017

- 🍃 No charge for woodchips, \$10 per ton for yard waste



# Woodchips/Yard Waste Program – Application Process

**Material Acceptance Agreement**  
(Vegetative Material):  
Regular  Provisional

All of the unshaded portions of this Material Acceptance Agreement ("MAA") must be completely filled out by each Applicant seeking a Delivery Authorization for delivery of vegetative materials. By your signature below, you, individually or on behalf of the entity for which you sign, agree to comply with the criteria outlined in the Metropolitan Water Reclamation District of Greater Chicago's (the "District") Resource Recovery Ordinance and the Vegetative Material Resource Recovery Program. It is understood that you, or anyone delivering material to the District on your behalf, are independent and not employees of the District. You further certify that the description of the material below is a true and accurate representation of the vegetative material, and any changes to the material described below will be disclosed to the District for further review of material acceptability. If your Application is approved, the shaded portions of this MAA will be completed by the District, signed, and a copy will be returned to you. Only materials for which you have received a District signed copy of this agreement may be delivered. **A COPY OF YOUR INSURANCE CERTIFICATE, TRUCK HAULER IDENTIFICATION FORM, AND EMERALD ASH BORER COMPLIANCE AGREEMENT (WHERE APPLICABLE) MUST BE SUBMITTED ALONG WITH THIS APPLICATION.**

To be completed by APPLICANT:	FOR DISTRICT USE ONLY
Company Name (If applying as an individual, please indicate): _____	Delivery Authorization (DA) Number: _____
Company Address: _____ _____	Expiration Date: _____
Phone: _____ Fax: _____	Provisional Rate: _____

4) Please provide a short description of the Material: (e.g., Wood chips, grass, brush, or combination)  
\_\_\_\_\_

5) Estimated Total Quantity: (cubic yards or tons): \_\_\_\_\_

6) Delivery Frequency: (Daily, Weekly, Monthly): \_\_\_\_\_

7) Estimated Delivery Dates: (Specify dates or ongoing): \_\_\_\_\_

8) Billing Information (Address, FEIN or Tax Payer I.D. number, e-mail address, fax number, etc.):  
\_\_\_\_\_  
\_\_\_\_\_

9) Signature of Applicant's authorized representative:

Print Name and Title _____	Date _____
Signature _____	Email Address _____

*(For District Use Only)*  
Reviewed and approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
Program Director



Material Acceptance Agreement Application



Company Information



Description of Material (woodchips, grass, brush, etc.)



Estimated Total Quantity



Delivery frequency



Billing information (if delivering vegetative material)



Truck Hauler Identification Form



Certificate of Insurance





# Woodchips/Yard Waste Program – Composting Process

- 🌿 Dewatered biosolids and woodchips/vegetative material combined in a 1:3 ratio by volume
- 🌿 Monitoring: Temperature probes with data collection
- 🌿 Active Composting – 15 days at 55 degrees C (5 turns, 3 days at 55 degrees C between turns, for Class A)
- 🌿 Curing – 16 weeks
  - 🌿 Lowers phytotoxicity (VOAs), improves pH, lowers C/N ratio
  - 🌿 Ensures finished compost stability





# Woodchips/Yard Waste Program – Compost Screening





# Woodchips/Yard Waste Program – Summary

- 🍃 15,600 cubic yards of woodchips received under RRO (nine active suppliers)
- 🍃 92,000 cubic yards of woodchips received from City of Chicago IGA
- 🍃 2,705 cubic yards of vegetative material received
- 🍃 62,346 cubic yards of certified compost created

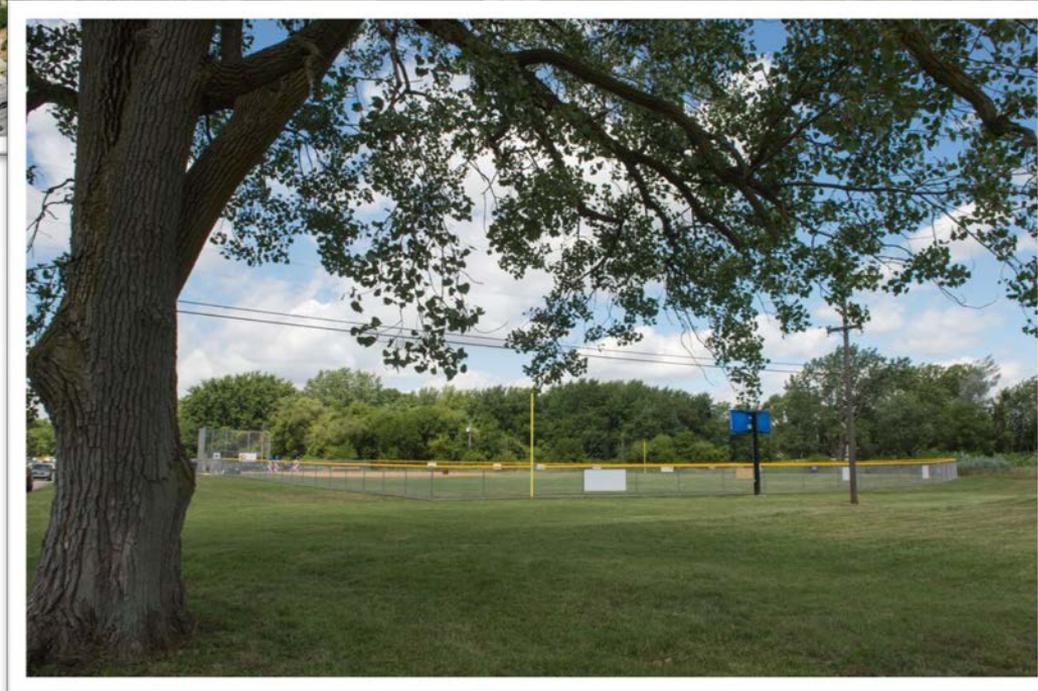
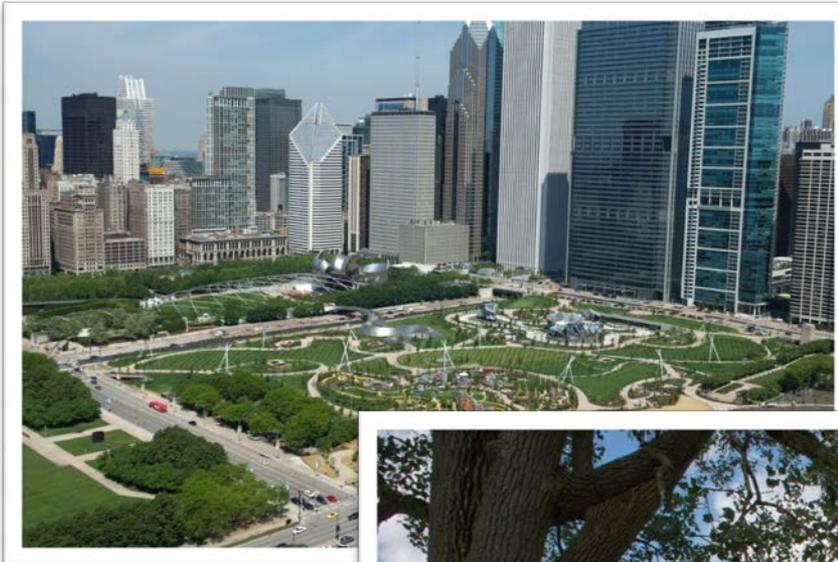


# Woodchips/Yard Waste Program – Composting Regulations

- Initially a pilot program under Controlled Solids Distribution permit (2015-SC-59620)
- Composting permits for Harlem Avenue and Calumet East Solids Management Areas issued by the IEPA in April 2017
  - HASMA: 2017-013-DE/OP
  - CALSMA: 2017-017-DE/OP
- Compost and air-dried biosolids registered as soil amendments in 2017



# Woodchips/Yard Waste Program – Compost Success Stories





# Effluent Reuse “Program”

- The District treats and discharges over 1 Billion gallons of water per day, on average, with virtually none of the water being reused or returned to Lake Michigan
- Treated effluent is of a quality sufficient for use in many commercial and industrial applications without further treatment
- Additional treatment, as needed, can make treated effluent water suitable for just about any non-potable application
- The vast majority of water usage today is for commercial, industrial, and agricultural uses, not for drinking water
- An estimated 5 MW of electricity are used for each million gallons of water used in the Chicago area, with half of that being used to treat the water to a potable quality and half to treat it after use



# Effluent Reuse “Program”

- The District’s initial attempt at establishing an effluent reuse system is being focused in the Calumet Water Reclamation Plant service area
- In 2014 the District issued a Request for Expression of Interest in order to solicit promising approaches to distribution and reuse of plant effluent along industrial corridors in vicinity of the Calumet WRP
- In response to the submittals, the District entered into agreement with Illinois American Water Company to evaluate the economic feasibility of an effluent distribution system



# Effluent Reuse "Program" - CWRP

## Concept Plan – Calumet WRP Non-Potable Water Reuse



### A Development Project for Beneficial Reuse of Effluent Water at the Calumet Water Reclamation Plant

GIS DEPARTMENT | CHICAGO METRO DISTRICT | 1000 INTERNATIONALE PARKWAY WOODRIDGE, IL 60517  
 DRAWN BY: SML DATE: 01-24-14 | Rev By CHS DATE: 11-18-16 | 1 inch = 2,000 feet

- Proposed Pipeline
- Proposed Pipeline
- Proposed Pipeline
- Potential Users
- MWRD - Calumet WRP

CONCEPT LEVEL ONLY

PROSPECTIVE INDUSTRIAL/COMMERCIAL USERS OF EFFLUENT WATER





# Effluent Reuse “Program”-Other Plants

## Treated Effluent to be Marketed by MWRD for Non-Potable Commercial / Industrial Uses

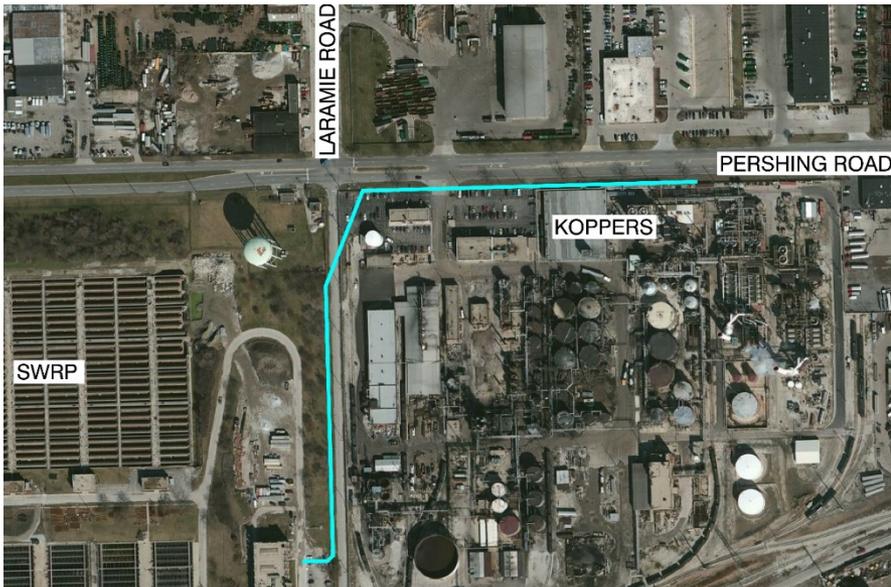


- INTREN is a utility company servicing the gas, electric, and storm water industries.
- Much of what is installed by INTREN is installed utilizing trenchless technologies like directional drilling, which requires water for drilling operations.
- INTREN has been using potable water for these operations as there was previously no source for high quality treated effluent.
- INTREN has made a commitment to the environment and will begin using treated effluent from MWRD facilities this year for their drilling operations.



# Effluent Reuse “Program”-SWRP

## Treated Effluent to be Marketed by MWRD for Non-Potable Commercial / Industrial Uses



- Koppers is a global producer of industrial products that is located immediately adjacent to the Stickney WRP.
- Koppers uses approximately 200M-300M gallons of potable water annually, most of which is used for non potable purposes.
- Koppers’ proximity to the SWRP makes it uniquely positioned to purchase treated effluent for use in its industrial processes.
- Once Koppers completes their ongoing plant expansion, they have committed to exploring the use of effluent water wherever possible.



# Conclusions

- **Open for Business**
  - RRO is live and we are taking HSLWs, vegetative material, and woodchips for our various programs
- **“Wastes” are being beneficially reused by the District to improve processes and products**
- **Through regulation and monitoring of these programs we are maintaining the integrity/performance of our plants and biosolids management areas**
- **Looking for partners**



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- Mark Kursell
- Brian Perkovich
- Ahmad Laban

- **Engg**

- Mwende Lefler
- Glenn Rohloff



# Questions?

**Joe Kozak ([kozakj@mwrdd.org](mailto:kozakj@mwrdd.org)) – bio P**

**Greg Yarnik ([yarnikg@mwrdd.org](mailto:yarnikg@mwrdd.org)) - permitting**

**Matt McGregor ([mgregorm@mwrdd.org](mailto:mgregorm@mwrdd.org)) – yard wastes**

**Carmen Scalise ([scalisec@mwrdd.org](mailto:scalisec@mwrdd.org)) - water**