Biosolids Management – The Perfect Storm

June 26, 2018

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GLWA
Great Lakes Water Authority

One Water, One Team, One Mission
The Great Lakes Water Authority: A New Era Begins

- **January 1, 2016** The launch of a regional water authority in Southeast Michigan.
- The City of Detroit, the counties of Macomb, Oakland, and Wayne, and the State of Michigan have officially united to form the Great Lakes Water Authority (GLWA).
- GLWA provides wholesale water and wastewater services to 127 municipalities in eight Southeastern Michigan counties, which is equivalent to approximately 3.9 million customers.

**GLWA Mission**
To exceed our customers’ expectations by utilizing best practices in the treatment and transmission of water and wastewater, while promoting healthy communities and economic growth.
About GLWA Wastewater System

- **3** Main Interceptors
- **9** CSO Facilities
- **5** Pump stations
- **1** WRRF
- **2.9 million** approx. people served
- **1,700 million** Gallons of treatment capacity per day
- **988** Square mile service area
- **181** Mile conveyance system with trunk sewers and interceptors
- **87** Member partners serving 76 individual communities
Water Resource Recovery Facility - Only one in the system!

The WRRF was originally constructed in 1940. Currently, serves the needs of 35% of the State’s population.

**WRRF Capacity:**
- 1700 MGD primary treatment
- 930 MGD secondary treatment
- 650 MGD average flow

Solids Disposal Requirements
- Annual Avg day - 450 dry tons
- Peak day – 850 dry tons

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Oakwood – Northwest Interceptor (12.75 ft.)

North Interceptor – East Arm (13.5 ft.)

Detroit River Interceptor (16 ft.)

GLWA
Great Lakes Water Authority
Raw Wastewater Pumps: 16 pumps
Pump Impeller Size Compared to Person
Primary Clarifiers: 12 rectangular (273 feet x 112 feet) and 6 circular (250 feet dia.)
Secondary Clarifiers: 25 circular (200 feet dia.)
Disinfection: (Up to twelve 90 Ton tank cars)
Gravity Thickeners: (12 circular tanks of 105 ft dia.)
Dewatering Belt Filter Presses: (22 at 48 dtpd)
Incineration: (8 MHI with 76.8 DTPD each)
RRO Disinfection – The Initial Challenge

NPDES Permit requires GLWA to complete construction of the Rouge River Outfall (RRO) Disinfection Project and place the facilities into full operation on or before April 1, 2019.

GLWA awards a Progressive Design-Build contract to deliver the RRO Disinfection Project.
RRO Disinfection – The Initial Challenge

1. Plan of Action to remove the deposited solids:
   - Construct temporary dewatering facility
   - Install 2 belt filter press rental units
   - Provide for sluicing, pumping, hauling and filtrate routing

2. Total volume removed and associated cost and time (duration)

3. Schedule implications of this removal process vs permit requirements
Conduit Inspections – Sediment Identified
Deposited Solids in the Conduits
Setting the Stage – the Storm is Forming

- Complex-II Incineration Fire
- Complex-I Incineration Decommissioning
- Biosolids Dryer Facility Performance Testing
- Regulatory Requirements for Solids Inventory & Disposal
Setting the Stage – the Storm is Forming

The Complex II Incineration Facility undergoing Clean Air Act-mandated upgrade for Maximum Achievable Control-Technology (MACT) compliance suffers a Major fire on March 4, 2016 destroying sludge conveyance, incinerators, and control equipment.
Damaged Conveyors at Complex-II Incineration
Fire Damage at Complex-II Incineration
Fire Damage at Complex-II Incineration
Fire Damage at Complex-II Incineration
Setting the Stage – the Storm is Forming

• Complex I Incineration Facility was in the process of being retired.

• Operation of this Facility would be a violation of the Clean Air Act (CAA) mandated upgrade for Maximum Achievable Control Technology (MACT) pursuant to the Sewer Sludge Incinerations (SSI) rules.
In addition to the NPDES permit and the CAA requirements, GLWA was operating under an Administrative Consent Order (ACO).

The ACO required the WRRF to maintain average 10 day solids dewatering, conveyance, and disposal capacity of 850 dtpd, and average solids inventory of less than 750 dtpd.
If that weren’t enough to contend with...
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Another project addressing requirements pursuant to the NPDES permit, the ACO, the Renewable Operating Permit, (ROP) and the Clean Air Act (CAA) was the construction of the Biosolids Dryer Facility (BDF)

The BDF receives thickened and blended sludge, provides dewatering and drying, and produces pelletized Class-A exceptional quality material suitable for land application. The BDF is the critical component of the 20-year Long-Term Solids Disposal Plan
If that weren’t enough to contend with...

- The BDF has a contractual requirement to provide an annual average disposal capacity of 200 dtpd, with a firm capacity of 316 dtpd, and a total capacity of 420 dtpd.

- Acceptance of the BDF was, in part, dependent of successfully passing a series of performance tests, culminating in a demonstration of 5 continuous days (120 continuous hours) with all 4 process trains in operation (420 dtpd).

- On a routine dry weather day, influent solids loading at this time of year was about 280 - 300 dtpd, not sufficient to support a 5-day continuous operations performance acceptance test of the BDF.

- Demonstration of contract performance was dependent on the WRRF delivering not less than 420 dtpd for a minimum of 5 continuous days.
Summarizing

- RRO Disinfection Project encounters ~10,000cy of deposited solids
- Complex II Incineration and Dewatering suffers catastrophic fire
- Complex I Incineration being shut down- Operation will be a violation of the CAA
- The ACO solids dewatering, conveyance and disposal capacity of 850 dtpd
- The ACO also requires average solids inventory less than 750 dtpd
- The BDF acceptance testing has a requirement for a 5-day test at 420 dtpd
- Dry weather solids loading at this time of year averages only 280 -300 dtpd
Turning Challenges into Opportunities

Ponder On This!
Developing an Action Plan

First –

• Devise an approach to pump the slurry under controlled conditions back to the head of the plant

• Use on-line monitoring of solids concentration, flow and loading rates to ensure that pumping would not adversely affect the plant processes

• Suspending pumping operations during wet weather events to avoid excessive solids loading and associated operational and regulatory compliance issues

• Verify that the solids removal process will not adversely affect the scheduled completion of the RRO Disinfection project
Developing an Action Plan

Second –

• Using the deposited solids that were pumped to the head of the plant to supplement the normal WRRF solids loading

• Thereby ensuring that there would be a continuous source of solids (in excess of 420 dtpd) that would feed the BDF and

• Allowing for scheduling of the 5-day performance test to demonstrate the ability of the process equipment to meet contractual requirements.

• As well as having a reliable continuous source of solids should the test need to be extended or re-run.
Solids Removal Set-up in Progress

- Pre-dewatering sludge level (about 8')
- Dam north of SFE pumps
- Workers bringing additional piping
Solids Removed from the Conduits
Closing and Summary

The performance testing was able to be conducted without any concern whether there would be sufficient solids; the BDF is now operating at the contractual process rates.
June 5, 2017

Mr. Steve Weis
Michigan Department of Environmental Quality
Cadillac Place, Suite 2-300
3035 West Grand Boulevard
Detroit, Michigan 48202

Re: Permanent Closure of Incinerator Unit Nos. 1, 3, 4, and 5

Dear Mr. Weis:

In conformance of 40 CFR 60.5121, the Great Lakes Water Authority permanently decommissioned the remaining Incinerator Unit Nos. 1, 3, 4, and 5 in Incineration Complex-I of the Water Resource Recovery Facility (WRRF) on June 1, 2017. This concludes the complete decommissioning of all the incinerator units in Complex-I at WRRF.

If you have any questions or concerns, you may contact me at (313) 297-4301.

Sincerely,

Majid Khan
Director – Wastewater Operations

MKMD/md

cc: Sue McCormick  Suzanne Coffey  William Wolfson
Lavonda Jackson  Luther Blackburn  Wilhelmina McLemore
Paul Schlessner  Richard Munz  Annette Vines
Melvin Dexter  Chris Vanpoppelen  Daniel Alford
Closing and Summary

The Complex II Incineration facility fully returned to service in April 2017, to comply with MACT emission requirements.
Closing and Summary

New overhead crane compliant with codes and energy saving LED lighting
Dedicated and Committed Team
Mission Accomplished!

• GLWA has consistently maintained compliance throughout, with both the NPDES permit and ACO solids handling and disposal capacity requirements

• The RRO Disinfection project is proceeding on schedule

• GLWA and the WRRF not only survived the perfect storm….we took advantage of the opportunity and made it work for us!