Fremont Water Reclamation Center
Challenges and Successes

BRIEF HISTORY

CHALLENGES
1. PRE-CONSTRUCTION
2. CONSTRUCTION
3. START-UP
4. DAILY OPERATION

SUCCESSES
Fremont, Ohio

- Population of Service Area is Approximately 25,400
- Covers Approximately 8.3 Sq. Miles
- Approximately 75 % Combined Sewer System
Why build a New Facility???

Reduce Combined Sewer Overflows (CSO)
COMBINED SEWER OVERFLOWS in Fremont, Ohio

- Fremont’s sewer system is approximately 75% combined.

- An average of 1 billion gallons of combined sewage is discharged to the Sandusky River every year.

- An average of 70 events occur per year.
Why build a New Facility???

- Engineer’s estimate based on life cycle costs was $1.4 million less to build new than renovate old and bring up to code.

- Build new with today’s technology and specifications to treat 24 MGD rather than hope the old would meet NPDES requirements.

- Better position the City for future growth and regulations.
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Why build a New Facility???

- Allowed the City to build a facility with Biological Nutrient Removal (BNR) for phosphorus and nitrogen removal.
- Important for the health of Lake Erie
- Allowed the City to utilize structures from the old facility for the new ATAD biosolids process
BENEFITS TO COMMUNITY AND ENVIRONMENT

- Help to Reduce CSOs to the Sandusky River
- Biological Nutrient Removal
  - Help with algae blooms in Lake Erie
Pre-Construction

Landlocked - Limited Area to Build
Pre-Construction

- Equipment Acquisition
  - Bidding process
  - Lowest bid is not always best for project
  - How do you know you are getting the best value and spending the publics money wisely
  - When to accept alternates???
Construction

Location next to Sandusky River
Construction

- Material and equipment storage
Construction Utilities

Had to keep old facility operating during construction

Water lines very old and fragile
Construction Utilities

Work around underground utilities of old facility

7/2/2015, Yard Pipe, installing raw sewer forcemains 24" & 3" DIP under exist. plant lines.
Construction Weather Impacts

Cold weather and snow

Wet weather events – flooding

Wind storm – July 2015
Construction

Use of Old Structures

Sequencing of construction activities
- Must meet permit at all times

Structural integrity of old structures

Must accommodate hydraulic grade line of project
GRIT OVERLOADING

- MAIN 48" SEWER TO PLANT HAD ONLY SEEN FLOWS TO ~10 MGD AND WAS NEVER CLEANED IN 52 YEARS OF SERVICE.

- NEW WRC WAS STARTED AT THE END OF FEBRUARY 2016, DURING A RAIN EVENT AND IMMEDIATELY REACHED FLOWS OF 24 MGD +

- EXCESSIVE GRIT LOADING EXPERIENCED AS MAIN SEWER WAS SCOURED WITH INCREASED FLOWS TO PLANT.

- INUNDATED INFLUENT PUMP STATION AND GRIT SYSTEM CAUSING NEW PLANT TO BE TEMPORARILY SHUT DOWN FOR CLEANING.
GRIT OVERLOADING
A20 BLOWERS

- BLOWER MANUFACTURER LOCATED IN ITALY, MANUALS WERE “LOST IN TRANSLATION” AND VERY DIFFICULT TO UNDERSTAND.

- COMMUNICATION ISSUES BETWEEN ENGINEER AND MANUFACTURER CAUSED BLOWER CONFIGURATIONS TO BE INCORRECT.

- WRC WAS DOWN FOR 18+ HOURS AND HAD TO DIVERT INFLUENT FLOW TO SAND ROAD POND.

- HOWEVER, VENDOR WAS EXTREMELY HELPFUL AND WENT ABOVE CALL OF DUTY TO RECTIFY THE ISSUES.

- COMPANY WAS BOUGHT BY GARDNER-DENVER AND THEY HONOURED ALL WARRANTIES AND WERE VERY PROFESSIONAL.
COMMUNICATION FAILS

- Multiple disruptions to facility as various vital pieces of equipment would randomly turn off, inoperable.

- WRC staff new to SCADA and advanced electronics, “stone age to space age” learning curve compounded problem.

- Finger pointing begins. Designer, installer, programmer, etc.

TERTIARY FILTER BUILDING

- Building was part of 1988 upgrades, was repurposed as it was in good condition. Upgraded sand filters to disc filters.

- Disc filters designed to treat maximum flow conditions of 24 MGD, but flow would breach bypass gate during high flow.

- Investigated filters to see if they are meeting specs. Found that not all flow was reaching the filters.

- Found discrepancy between 1988 as built as 3” grout layer in channel not accounted for.

- Lesson learned, don’t always believe as built drawings.
A20 MONITORING SENSORS

- During pre-construction WRC staff researched several types of monitoring equipment: sensors, meters, analyzers.

- Only one manufacturer provided everything to meet specifications to operate the new plant.

- Learning curve: rather intense maintenance and calibration schedule experienced. 21 total individual meters/sensors in A20 system.

- Freezing problems experienced with in-line monitoring systems. Constant flow needed for metering, -20 deg temps

- Over design?? Overkill?? Alternatives now available.
CONSISTANT ORGANIC LOADING FEEDING BNR PURPOSE IS CRITICAL FOR PROPER OPERATION, ESPECIALLY PHOSPHORUS REMOVAL.

CONSTANT COMMUNICATION WITH INDUSTRIAL USERS HAS BEEN CRITICAL TO ENSURE CONSISTANT FLOWS TO WRC.

WRC HAS SEEN FLUCTUATIONS IN PHOSPHORUS REMOVAL DURING INDUSTRIAL DOWN TIMES: EXTENDED HOLIDAYS, PLANT SHUT DOWNS.

INDUSTRIAL USERS INFORM WRC STAFF OF ANY SHUT DOWNS AND PRODUCTION SCHEDULE WELL IN ADVANCE OF ANY EVENT.
ELECTRICAL ISSUES

- MAIN PROBLEM EXPERIENCED AT WRC WAS LOOSE WIRES IN VARIOUS LOCATIONS. WHY??

- PERHAPS SIMPLE OVERSIGHTS?? ELECTRICAL WORK WAS PERFORMED BY A SUB-CONTRACTORS SUB-CONTRACTOR AND SO ON.

- FOUND THAT AN APPRENTICE WAS WIRING SEVERAL LOCATIONS. DURING CONSTRUCTION, BUSINESS WAS DOING WELL AND A LACK OF SKILLED ELECTRICIANS WAS EXPERIENCED.

- ONE LOCATION IN PARTICULAR WAS VERY PROBLEMATIC, WIRE WAS PULLED OUT TO INSPECT AND A MAJOR KNICK WAS FOUND.
WET WEATHER FLOW

- Learning curve while dealing with flows peaking 6x at times during low flow conditions. Operator attention critical.

- WRC was designed with step feed gate for flows over 15 MGD, learning how to modulate flows through both passes for greatest treatment efficiency.

- Grit system operation issues as one cell can treat 15 MGD.

- Tertiary filters and hydraulics through building.
H2S VS. CENTRIFUGES

- RAS BUILDING HOUSES BOTH DEWATERING AND THICKENING CENTRIFUGES AND POLYMER MIXING SYSTEMS.

- THICKENED SLUDGE AND CENTRATE SUMPS ALSO IN BUILDING. SUMPS ARE SEALED, BUT NOT COMPLETELY AIR TIGHT.

- CONTROLS IN BOTH CENTRIFUGES EXPERIENCED SEVERE CORROSION AND ATMOSPHERIC SENSOR SHOWED EXCESSIVE LEVELS OF H2S.

- BOTH SUMPS WERE FITTED WITH PROPER EXHAUST TO OUTSIDE ATMOSPHERE TO PREVENT H2S BUILDUP IN BUILDING.
What did we learn???

1. Make sure you and staff stay engaged with the design and construction process
2. Obtain 3D renderings of all structures
3. Get best possible information on existing site
4. Have realistic expectations
5. Look at the big picture – sewer grit situation
6. Inspectors have expertise in certain disciplines, try to take steps to fill in the voids
7. Realize there is going to be a learning curve and that you will have to adjust as lessons are learned
8. Murphy’s Law cannot be avoided so relax and deal with situations as they present themselves
Successes
Plant Performance

CSO Reduction

Yearly Average

- 2011-2015
  - 1513 MG 29 events
- 2016
  - 610 MG 21 events
- 2017
  - 191 MG 14 events
- 2018
  - 116 14 events
## Successes

### Plant Performance

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<tr>
<th></th>
<th>WPCC</th>
<th>Fremont</th>
<th>Fremont WRC</th>
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<tbody>
<tr>
<td></td>
<td>Data from 2012 - 2015</td>
<td>Data from March 2016 – August 2018</td>
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<tr>
<td>Average Flow (MGD)</td>
<td>4.778</td>
<td>7.282</td>
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<tr>
<td>Peak Flow (MGD)</td>
<td>9.158</td>
<td>24.990</td>
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<tr>
<td>Avg NH3 (mg/l)</td>
<td>1.41</td>
<td>0.53</td>
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<tr>
<td>Avg NO3 &amp; NO2 (mg/l)</td>
<td>3.09</td>
<td>0.70</td>
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<tr>
<td>Avg TKN (mg/l)</td>
<td>2.1</td>
<td>&lt;2.0</td>
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<tr>
<td>Avg TP (mg/L)</td>
<td>0.29</td>
<td>0.17</td>
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## Successes

### Plant Performance

Reduction from previous facility:

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<tr>
<th>Parameter</th>
<th>Reduction</th>
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<tbody>
<tr>
<td>NH3</td>
<td>62%</td>
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<tr>
<td>NO3 &amp; NO2</td>
<td>77%</td>
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<tr>
<td>TKN</td>
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<tr>
<td>TP</td>
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QUESTIONS???????