

# CITY OF BANGOR WWSL

ODOR FROM INDUSTRIAL DISCHARGE  
CAUSES SCHOOL TO CLOSE

A CASE STUDY



# Proposed Agenda Today

- Introduction to Case Study
- The Village's available facilities
- The Industrial Park - inspections
- Boom! You've been hit
- Tracking, Detection, Halting it
- Chapter 2
- Lessons Learned
- Questions and Discussion



# Outline of a Rural System

- Population = 1885; 760 REUs
- Wastewater Stabilization Lagoons (WWSL)

*Design Flow 360,000gpd in 2022*

*Actual Flows 348,000gpd in 2002*

<i>Residential</i>	<i>137,000 gpd</i>
<i>Industrial/Commercial/Schools</i>	<i>87,000 gpd</i>
<i>Infiltration/Inflow</i>	<i>120,000 gpd</i>

- NPDES Permit, seasonal discharge

*... with significant industrial & commercial flows*



## Bangor WWSL



- Upgraded – \$1.9M USDA subsidized funding

- Aeration Capacity Installed at over 150% BOD5 Demand
- Design for longer term biodegradation, pickle waste, BOD30
- Mechanical aspirating aerators + facultative ponds
- Over 220 days Storage



Simple & Effective

# Outline of a Rural System

- NPDES Permit Requirements

Parameter	Monthly Limits
Discharge Periods	March 1 - May 31
	October 1 – December 31
	No Discharge during periods of significant ice cover on Maple Creek
Flow	Report
BOD <sub>5</sub>	30 mg/L
Suspended solids, Total	March – May: 70 mg/L
	October – December: 40 mg/L
Ammonia Nitrogen (as N)	Report
Phosphorus, Total (as P)	Report
Fecal Coliform Bacteria	200 cts /100 mL
pH (daily)	6.5-10 S.U.
Dissolved Oxygen (daily)	5.0 mg/L (min.)

- Protecting water quality of Maple Creek



# Industrial Pretreatment Program

- All the water mixes together at one place
- Residential, pickles, carwash, biodiesel, etc



Industrial  
Park Area



# Outline of a rural system

- Significant industrial & commercial flows (during design)

Name	Location	2001 Avg. Water Use (GPD)	Operations and Wastewater Source
Freestone Pickle co.	610 N Center St	16,300	Pickle Process, Domestic, Site Storm Water
Bangor Wash-N-Dry	107 E. Monroe St	12,550	Laundry mat, Domestic
Bangor Plastics, Inc.	719 Washington St.	6,610	Boiler, Cooling, Domestic
KRF & Co. Beacon Services	308 Class St	2,600	Domestic
Haas Car wash	818 W. Monroe St	1,660	Car wash
Getman Corporation	6998 Getman Corp	1,190	Domestic

- **New Industrial User: Michigan Biodiesel**

- Attractive business re Energy Production
- “no process wastewater will be discharged to WWSL”
- “we have a holding pond and offsite treatment”
- “just a sanitary sewer connection, **not possible** to discharge the process wastewater into the sewer”



## Planning, Agreements

- Meetings and assurances “*no discharge to City*”
- Construction of Biodiesel Plant, Holding Pond

Until...

- City Lagoon WWTF ***turns black***
- City WWTF influent samples still increasing from 2,260 to 5,860 mg/L COD!!
- Over 17,000 lbs COD loaded that day !!
- Pond1 494 mg/L Pond2 397 mg/L and rising
- Active enforcement by City
  - Sampling each industry for 5 consecutive days 24hr
  - Corrective Action Requirements



# Industrial Pretreatment Program

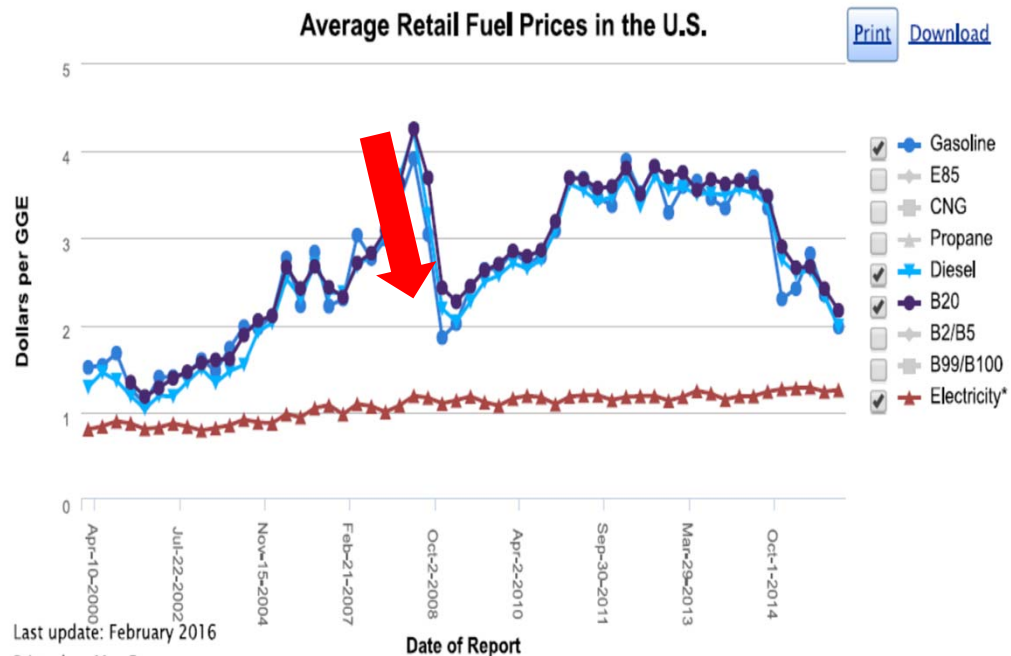
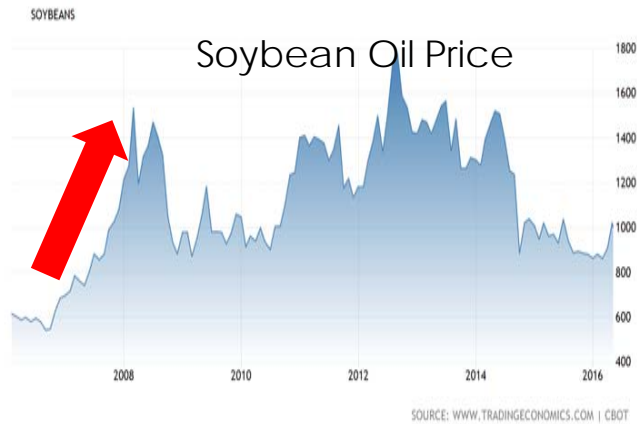
- Political Momentum Builds with State \$\$\$ Subsidies on the story
- City is proud to host this tech. link between agr. + energy

Granholm joined with Michigan Department of Agriculture Director Mitch Irwin, Senator Mark Schauer (D-Battle Creek), the City of Albion, Sheridan Township, the Corn Marketing Program of Michigan, **Michigan BioDiesel**, and Kelly Fuels to celebrate the first E85 and biodiesel pumps in Albion.



# Industrial Pretreatment Program

- This shouldn't matter for your IPP, right?




- The *Biodiesel Story* ran out of money

## Industrial Pretreatment Program

- Biodiesel waste (glycerin)
  - Now stored in drums and tanks onsite.
  - The company apparently no longer had enough money on hand for proper disposal
- Company contacted the City for permission to discharge a small amount daily.



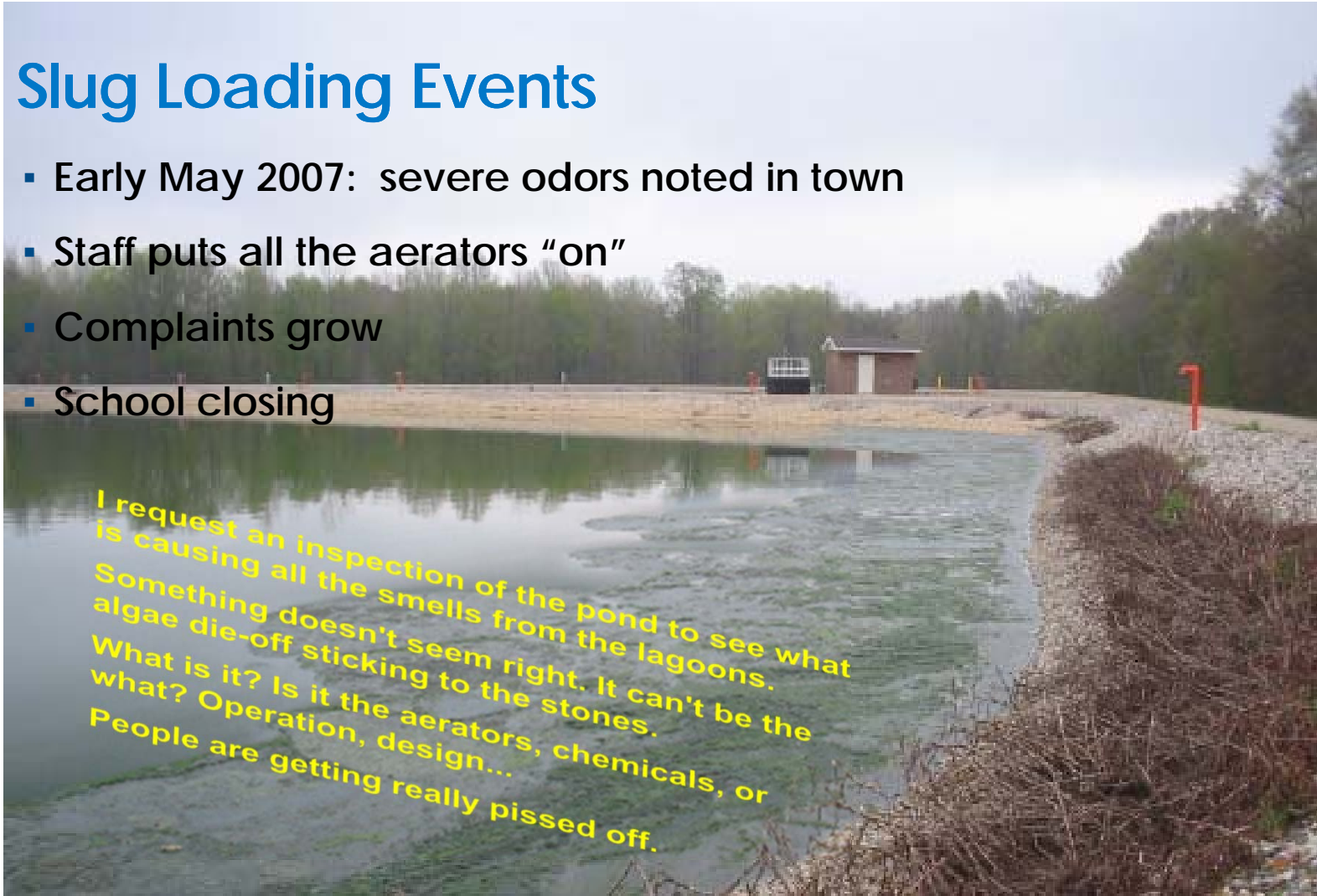
## Industrial Pretreatment Program

- 2May Supt indicated that MRWA had tested and determined BOD5 of industrial discharge 151 mg/L  
 $0.003\text{MG} \times 8.34 \times 151 \text{ mg/L} = 3.8\#/ \text{day}$   
 $0.03\text{MG} \times 8.34 \times 151 \text{ mg/L} = 38\#/ \text{day}$   
... no big deal, right?
  - City decided to accept 2000 gal of wastewater from Biodiesel plant.
  - Early May - discharges began
- 

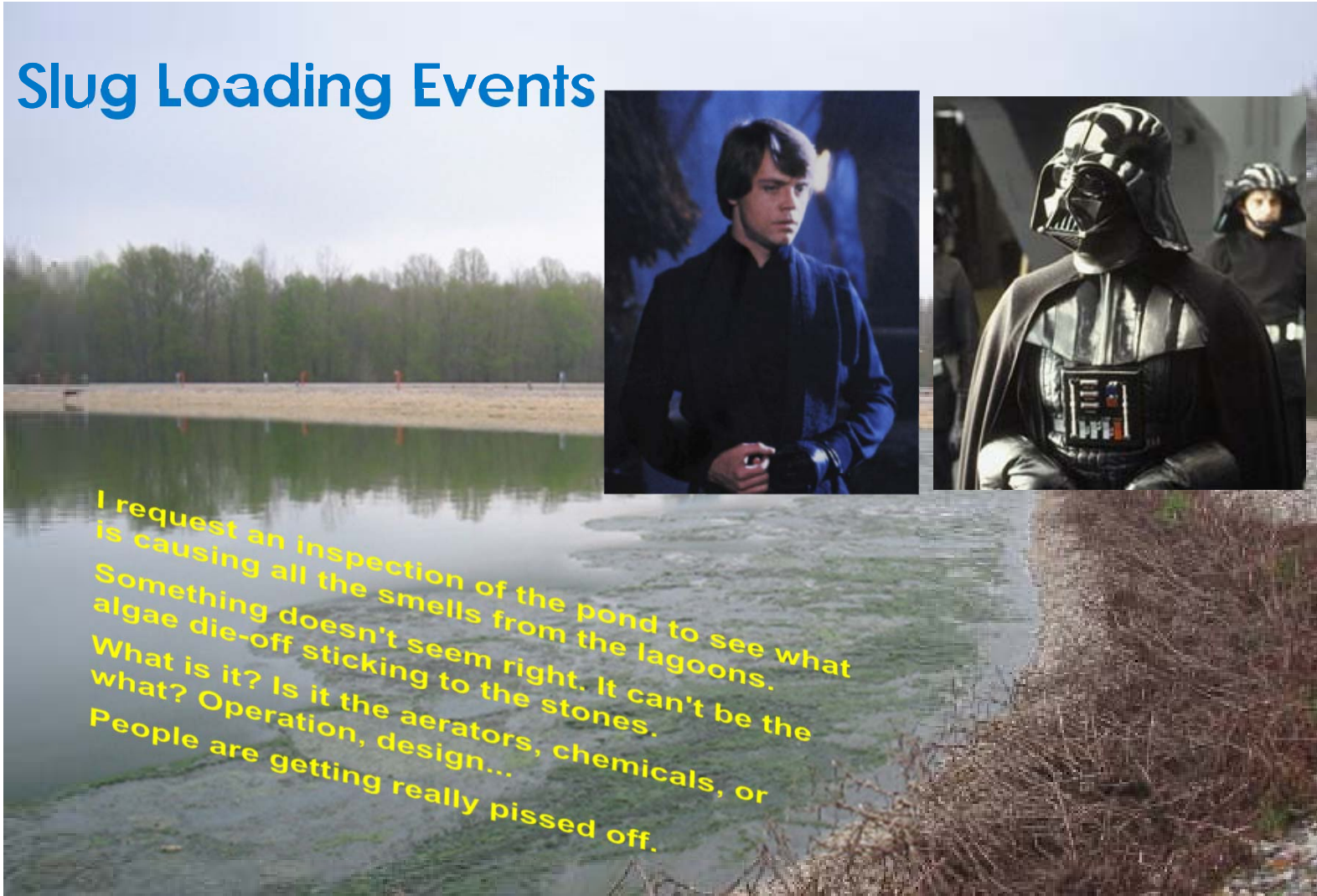
## Slug Loading Events

- Early May 2007: severe odors noted in town
- Staff puts all the aerators "on"
- Complaints grow
- School closing

I request an inspection of the pond to see what is causing all the smells from the lagoons. Something doesn't seem right. It can't be the algae die-off sticking to the stones. What is it? Is it the aerators, chemicals, or what? Operation, design... People are getting really pissed off.




# Slug Loading Events



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## Chapter 1 – Slug Loading

- City Lagoons stay *black & 'stink'!*
  - More information coming in, report by former Plant employee - Midnight dumping
  - Ponds have all aerators active, oxygen demand overwhelms the supply
    - WWTF has operable 150% of full load aeration capacity due to expected pickle plant discharges
  - Pervasive odor generated
  - Enforcement continues, legal
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# Chapter 1 – Slug Loading





# The BIG Hit

- 15,000 to 30,000 gal glycerin dumped
- Samplers in place,
- AFTER 5 DAYS ... data indicates
  - influent BOD: 2360 mg/L
  - Pond 1 BOD: 500 mg/L
  - Pond 2 BOD: 450 mg/L



**LABORATORY DETAIL REPORT**

Client: Bangor, City of      KAR Project No. : 072064  
Date Reported : 05/21/07

Project Description : Analysis of three aqueous samples.

Sample ID : "Pond 1"  
Sampled By :  
Sample Date : 5/21/2007  
Sample Time : 0955  
Date Received : 5/21/2007  
Sample Type : aqueous  
KAR Sample No. : 072064-01


Test	Result	Units of Measure	Method	Analyzed	Analyst	Comments
COD	538	mg/L	EPA 810.4	5/21/2007	BLF	

## Slug Loading Events

- 14May received 30,000 gal glycerin waste from industry.
- 14May City started recirculating flow from Pond #2 to #1 using their trash pump.
- All seven Lagoon #1 aerators running.



## Slug Loading Events

- 18May City begins sodium nitrate add'n to transfer manhole Pond #1 / #2. Advised to begin spreading by boat, very slowly, into Pond #2.
  - 18May dissolved oxygen (DO) Lagoon #1 and #2 = 0.3 mg/L
    - Recycle halted from Pond #2 to #1.
    - Monitor DO in Pond #1 to let it come back up to at least 2 mg/L, do not over stress the biology we still have
    - Then begin recycle for a few hours, closely monitoring DO.
- 

## Slug Loading Events

- 16-20May recycling water from pond 3 for re-treatment
- 21May Supt shut off the recycle, DO had not come up  
Spread out 20 bags, 50# each, of sodium nitrate
- 22May D.O. 0.54mg/L falling to 0.43 mg/L 23May  
COD, BOD, CBOD sampled influent, ponds 1, 2
- Supt. would like to use 25HP boat motor to add air.
- Deodorizer: faxed information on the chemical
- Bio-augmentation: Supt. interested
- Test air quality?

## Response

- "Do not want to over stress the biology we still have alive so, closely monitor the DO."
- 18May found out that glycerin was mixed 1:1 with water, therefore 15,000 gallons pure glycerin was received at WWSL!!
  - THAT'S A LOT
- Technical review of properties of glycerin:
  - 1 pound of oxygen to treat 1 pound of glycerin.
  - ~ 125,000 pounds of oxygen required.
- Seven 15 HP aerators produce 2.0# O<sub>2</sub>/HP hour ea
  - $7 \times 15 \times 2 = 210 \# \text{ O}_2/\text{hr}$ , or 5,040 lbs. O<sub>2</sub>/day.
  - $125,000 \# / 5,040 = 25$  days to supply enough air for the glycerine
- (Designed for 908# BOD<sub>5</sub>/day; 140 days wastewater in 1 day)



## Response


- Estimate the oxygen demand for existing municipal WW, and calculate “how long?”
- Supt requested that Freestone Pickle reduce their discharges for the time being. They are on-board with this for about two weeks.



## Response – Treatment Strategy – May 18


- Run COD on contents of pond No. 2. We know volume of pond No.2, calculate air requirement for pond.
- Pond #3 is empty. Transfer an amount to pond #3 that should not cause it to go septic. Load at less than 35pounds/acre/day.
- Finish emptying Pond #4. Fill Pond #4 at less than 35#/acre/D
- Consider: Bioaugmentation of aeration pond
- Consider: Effects of sodium nitrate, use boat and slowly spread over the lagoon.

*Lagoons Approaching 'Normal' Operation July*



## Chapter 2 – Oops?

12 months after dumping event:


- About 1 week after inspection visit
  - Bangor code enforcement officer noticed discharge from drain into the ditch, with sheen and yellow coloring like Magnesol, floating down the ditch and into stream to Maple Creek
  - Facility manager “didn’t know where it was coming from”. Traced it back to a black tubing supposed to go underneath industrial holding pond. Contamination was escaping.
- 




## Chapter 2 – Oops?



## Chapter 2 – Oops?

- Later the manager returned noting “ all drains in the plant run out and into the small tube.”
  - City requested that the Biodiesel plant halt the discharge(s) immediately.
  - Back in the woods were areas where discharge was bright orange with thick coating, a location of historic discharge.
  - That plant manager was fired, another hired.
  - Cautious City relationship ensued ... Illicit discharges may resume if City is not looking.
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## Action Items

- MI BioDiesel will ensure no high strength process wastewater is discharged to City wastewater collection and treatment system.
  - MI BioDiesel will reimburse the City for these expenses.
  - MI BioDiesel will reimburse continuing expenses related to the discharges of high strength wastewater, including sampling and laboratory.
  - MI BioDiesel will install flow proportional sampling facility that complies with State and Federal Regulations.
  - MI BioDiesel will continue increased efforts to ensure that discharges of high strength process wastewater to the City and nearby environs will not occur
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## Lessons Learned:

(Lack of) Money can change everything

- Stopper the openings - Even cleanouts
- Early & comprehensive validation of key details
- Question everything; within reason
- Don't believe BOD for industrial waste
- Consult with experts before accepting a non-domestic waste.
- The (political) "Force" may be  
against you

Questions?





**FLEIS & VANDENBRINK**

**DESIGN. BUILD. OPERATE.**

**Rich Grant, PE | Fleis & VandenBrink | May 10, 2016**