City of St. Petersburg
Committee of the Whole
Meeting of May 31, 2018 @ 2:30 p.m.
City Hall - Room 100

A. Call to Order – Council Chair Lisa Wheeler-Bowman

B. Discussion Item

a. Injection Wells – current use, regulatory restrictions, permitting requirements and proposed future use – Jacobs Engineering, Inc. and ASRus, LLC

b. Bio-Solids to Energy Project – Contractor and Consultant Summery Update - Claude Tankersley together with:

1. The Haskell Company
2. Brown and Caldwell
3. Black and Veatch Corporation
4. AECOM Technical Services, Inc.
5. Carollo Engineers

C. Next Meeting – To be determined

D. Adjournment
CITY COUNCIL AGENDA
NEW BUSINESS ITEM

TO: Members of City Council

DATE: January 17, 2018

COUNCIL DATE: February 1, 2018

RE: Referral to Committee of the Whole

ACTION DESIRED:

Respectfully requesting a referral to the Committee of the Whole to have representatives from FDEP and Jacobs Engineering, Inc., provide a report regarding the current use, regulatory restrictions, permitting requirements and proposed future use of injection wells in St. Petersburg.

Brandi Gabbard, Council Member
District 2
CITY COUNCIL AGENDA
NEW BUSINESS ITEM

TO: Members of City Council

DATE: May 11, 2017

COUNCIL DATE: May 18, 2017

RE: "Referral to a Committee of the Whole - Bio-Solids to Energy Project
Update to include presentations from the Contractor and Consultants"

ACTION DESIRED:

Respectfully requesting a referral to the May 31, 2018 Committee of the Whole for an update of the Bio-Solids to Energy Project with presentations from the following:

- The Haskell Company
- Brown and Caldwell
- Black and Veatch Corporation
- AECOM Technical Services, Inc.
- Carollo Engineers, Inc.

The presentations are to include a summary update on the project together with an update on the major biosolids treatment facilities to be constructed as set forth in the January 7, 2016 City Council agenda backup (shown below):

- Demolition of existing obsolete structures and equipment
- 1560KW combined heat and power gas powered electrical generator
- Tow (2) primary clarifiers
- Flow splitter facility
- Two (2) refurbished gravity belt thickeners
- Two (2) digesters
- Generator waste heat to biosolids digesters heat recovery system
- Fats, oil and grease receiving station that uses primary clarifier odor control system
- Dewatering facility with two screw presses with odor control
- Electrical and boiler building
- Facilities for the cleaning of biogas to pipeline quality natural gas
- Odor control facilities

Ed Montanari, Council Member
District 3
Injection Well Program Overview

City of St. Petersburg, City Council's Committee of the Whole
May 31, 2018
Current Use of Injection Wells
The City is **the only major utility** in the Tampa Bay area that has abandoned surface water discharge of treated effluent.

All water directed to the injection wells has undergone secondary treatment and high level disinfection. Raw sewage is not directed to the wells.
Provide a backup to the reuse system

Wet weather events require peak flow disposal

Approximately 50% of flow goes to the wells on an annual average basis
CURRENT USE

Injection Well Usage Varies by Season
Subsurface Characteristics of Injection Wells

Inject well below USDW

Not Injecting Raw Sewage
The City has 14 Injection Wells with combined capacity of 260 MGD

**NWWRF**
- IW-1 Installed 1984, 20 MGD
- IW-2 Installed 1984, 20 MGD
- IW-3 Installed 2017, 22 MGD

**NEWRF**
- IW-1 Installed 1978, 13 MGD
- IW-2 Installed 1977, 13 MGD
- IW-3 Installed 1977, 13 MGD

**SWWRF**
- IW-1 installed 1976, 15 MGD
- IW-2 Installed 1977, 15 MGD
- IW-3 Installed 1977, 15 MGD
- IW-4 Installed 2017, 22 MGD
- IW-5 Installed 2018, 22 MGD
- IW-6 Installed 2017, 22 MGD

**AWWRF**
- IW-1 Installed 1986, 24 MGD
- IW-2 Installed 1985, 24 MGD
- Usable by SWWRF, NEWRF, NWWRF
Regulatory Restrictions
& Permitting
Requirements
Wells have been in use since 1977
REGULATORY RESTRICTIONS

24 Counties in Florida affected by 2010 New UIC Rule
REGULATORY RESTRICTIONS

- Completed into a salt water zone beneath any USDW (Total Dissolved Solids >10,000 mg/L)
- Rely on geology to protect the aquifer
- Do not allow upward migration into an USDW
- Have monitor wells to look for changes in water quality
### Subsurface Characteristics of Injection Wells

- **Inject well below USDW**
- **Monitor Above Injection Zone**

#### Diagram:

<table>
<thead>
<tr>
<th>Aquifer</th>
<th>Lithology</th>
<th>Monitor Well</th>
<th>Typical Injection Well</th>
<th>Geologic Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surficial Aquifer</td>
<td>Sand</td>
<td></td>
<td></td>
<td>USDW Undifferentiated Sands and Clays</td>
</tr>
<tr>
<td>Intermediate Confining Unit</td>
<td>Clay</td>
<td></td>
<td></td>
<td>USDW Peace River Formation</td>
</tr>
<tr>
<td>Upper Floridan Aquifer System</td>
<td>Limestone</td>
<td></td>
<td></td>
<td>USDW Tampa Member of the Arcadia Formation</td>
</tr>
<tr>
<td>Limestone and Dolomite</td>
<td></td>
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</tbody>
</table>

#### Notes:
- Depth Below Land Surface in Feet (Approximate):
  - Surficial Aquifer: $0 - 200$ feet
  - Intermediate Confining Unit: $200 - 400$ feet
  - Upper Floridan Aquifer System: $400 - 800$ feet
  - Limestone and Dolomite: $800 - 1200$ feet

- Range of Injection Zone:
  - $630'$

- Injection Zone:
  - $1115'$

- TDS (Total Dissolved Solids): $35,000$
REGULATORY RESTRICTIONS

Class I municipal disposal wells in specific areas of Florida can continue using their wells provided they:

✓ Have a pretreatment program
✓ Treat to at least secondary treatment standards
✓ Provide high-level disinfection (HLD)
✓ Must not cause endangerment to an USDW

New Federal Rule Revision Allows Continued Injection in Florida
PERMITTING REQUIREMENTS

High Level Disinfection is Required for Public Access Reuse in Florida

- Total Suspended Solids ≤ 5 mg/L
- Chlorine residual ≥ 1.0 mg/L leaving WRF
- Fecal coliform undetected in 75% of samples (max of 25 cfu)
- Florida standards are protective of public health
- Backup storage or disposal is required for “off-spec” water
Back-Up Storage

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>STORAGE CAPACITY</th>
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<tbody>
<tr>
<td>NEWRF</td>
<td>18.0 MG (two storage tanks 10 MG &amp; 8 MG)</td>
</tr>
<tr>
<td>NWWRF</td>
<td>10.0 MG (two storage tanks 5 MG &amp; 5 MG)</td>
</tr>
<tr>
<td>SWWRF</td>
<td>15.0 MG (two storage tanks 10 MG &amp; 5 MG)</td>
</tr>
</tbody>
</table>

TOTAL 43 Million Gallons

Off spec storage/retreatment is practical for short periods of time & low flow scenarios

Need a BMP for unavoidable off-spec events
Proposed Future Use of Injection Wells

- Continue to utilize injection wells for disposal of excess reclaimed water
- Maintain firm capacity for injection wells at each WRF
- Typically 40 years useful life – original wells may require replacement
• Surface water discharge is detrimental, regardless of level of treatment

• Unique geology, with no potable water supplies underlying the City

• Injected water is of very high quality, meeting most drinking water standards

• Among largest urban reuse systems worldwide; Injection Wells provide the necessary wet weather backup
Questions
Biosolids Program Update

City of St. Petersburg, City Council's Committee of the Whole
May 31, 2018
Biosolids Projects

Status
Southwest Water Reclamation Facility

March 2016

Preconstruction Photo

“Old” 1955 Plant to be demolished

Existing Solids Units to be Replaced
Southwest Water Reclamation Facility

May 2018

Current Biosolids Program Progress
Two Digesters

Structures complete
Equipment installed
Work on-going to complete mechanical piping, electrical, instrumentation, handrail, and stairs
Completion scheduled for November 2018

SWWRF May 2018

Engineer = Brown & Caldwell
Digester Control Enclosure

Foundations complete
Electrical room masonry complete
Process equipment installation nearing completion
Work on-going to complete – mechanical piping, Motor Control Center, electrical, instrumentation, painting, and doors
Heat exchangers installed
Yard piping of hot water supply and return underway
Completion scheduled for December 2018

Engineer = Brown & Caldwell
Batch Tanks

Concrete structure complete

Equipment platform structure nearing completion

Work on-going to complete – equipment installation, mechanical piping, roof system, exterior insulation, protective coatings, electrical and instrumentation

Completion scheduled for November 2018

Engineer = Brown & Caldwell
Two Refurbished Gravity Belt Thickeners

Refurbished GBT is installed

Relocation of NWWRF GBT is currently scheduled for August 2018

Work on-going to complete – mechanical, electrical, instrumentation, painting, and building mansard changes

Completion scheduled for October 2018

Engineer = Carollo
Odor Control Facilities

Concrete structure complete

Odor Control Equipment to be installed June 2018

Work on-going to complete – mechanical piping & equipment, electrical and instrumentation

Completion scheduled for November 2018

Engineer = Brown & Caldwell
Biogas Upgrade System

Construction of BUS system underground infrastructure and concrete foundations scheduled to begin in June 2018.


12. Gas Storage Tank (steel tank) scheduled to start in June, with anticipated completion by December 2018.

6. Flare system scheduled to start in June, with completion anticipated by November 2018.

Engineer = Brown & Caldwell
Two Primary Clarifiers

Primary Clarifiers and Covers - construction complete and mechanism tested

Work on-going to complete – stairs, handrails, odor control piping, and final electrical

Completion scheduled for September 2018

Engineer = Brown & Caldwell
Dewatering Facility with Two Screw Presses & Odor Control

Dewatering facility is complete
Commissioned and placed into service in March 2018
Temporary relocation of Lime Stabilization system (to maintain Class A Biosolids) was completed in April 2018

Engineer = AECOM
Flow Splitter Facility

Primary Clarifier Splitter Box and Headworks by-pass constructed and turned over to City on August 15, 2017. Work on-going to complete protective coatings, odor control, instrumentation, handrail, walk platform and electrical prior to wet season. Completion scheduled for September 2018.
1560KW Combined Heat and Power (CHP) Gas Powered Electrical Generator

Gas generator and enclosure installed

Refurbished Albert Whited generator and enclosure installed

CHP equipment and piping installation ongoing

Completion scheduled for September 2018

Engineer = Black & Veatch
SWWRF May 2018

Electrical & Boiler Building

Electrical Building is nearing completion

HVAC system and ductwork installation complete

Work on-going to complete electrical and instrumentation

Boiler install scheduled for June

Completion scheduled for September 2018

Engineer = Black & Veatch
FOG Receiving Station
City directed Haskell in May 2018 to construct FOG station in new location to minimize operational problems
Construction of the FOG station has not started
Schedule for completion – TBD

Engineer = Brown & Caldwell
How do these processes work together?
Updated Economic Analysis

Present Worth Savings forecasted over 20 years
1. Consolidate Biosolids to SWWRF
   - from NEWRF, NWRF, and SWWRF

2. Purchase NG to run the new CHP engine
   - to create power and heat for the SWWRF

3. Receive Fats, Oils & Grease (FOG)
   - to increase biogas production by 11-12%
   - to generate "tipping fee" revenue

4. Create a Renewable Product
   - City to build public fueling station & distribution line
   - NG created and transported to City Fleet Fueling Station
   - Excess NG to be sold to the public through a public rapid-fill station
   - Create Renewable Energy Credits (RINs) as a result of using NG in vehicles

January 2016

Assumptions

$31M savings over 20 years
2016 Biosolids Program Schematic

- The GMP was based upon the following assumed uses for the biogas:
  - Selling 100% RNG resulted with $31M PW savings from selling RINS
  - Selling RNG used by City Fleet and the DRAFT VERSION
Options reviewed for delivering rNG

- Construct City Fueling Station at SWWRF
  - Concerns with City becoming a gas distributor
- Use Tube Trailers to transport compressed gas to Fleet
  - Deemed too risky – option not pursued
- Send rNG to TECO pipeline for Fleet to draw off
  - Discussions remain on-going with TECO

Logistics reviewed for using FOG

- Individual haulers to bring FOG to SWWRF
- Off-site FOG collection/processing facility
- Commercial contractor to haul FOG to SWWRF
- FOG is a different RINs qualified material
Core Biosolids Program

without RINs without FOG

Using all the treated digester gas on-site to power the CHP could provide an estimated $XX million in 20-year Present Worth savings.
Benefits of the Core Biosolids Program

1. Replaced Aging Infrastructure
   - Majority of the biosolids equipment at NEWRF, NWWRF, and SWWRF had exceeded their useful life

2. Complied with Biosolids Regulations
   - Class B biosolids were no longer viable with new regulations
   - Class AA biosolids reduce disposal costs by improving flexibility and reducing compliance requirements at agricultural sites

3. Improved Digestion Process
   - Improved quality and reduced the total volume of biosolids requiring disposal

4. Reduced Annual O&M Costs
   - Annual Savings is between $1.5M and $2M (not including FOG, RIN, or rNG revenue)

5. Reduces City’s Carbon Footprint
   - Converting from electricity to natural gas power will reduce greenhouse gas emissions

Even without producing a renewable energy product, the Biosolids Program could save $xx million of present worth costs over 20 years
6. Beneficial Use of the Biogas Renewable Fuel
   - City Sanitation is in the process of converting fleet to run on CNG (or on the City’s rNG) and further reduces the City’s carbon footprint.

7. Creation of Renewable Energy Commodity
   - This credit further reduces operation costs.

By producing a renewable energy product, the Biosolids Program could save the City $xx million of present worth costs over 20 years.
Enhanced Biosolids Program

**using RINs no FOG**

Using a portion of the treated digester gas to produce renewable energy could provide $xx million in 20-year Present Worth savings.
8. Beneficial Use of the FOG

- FOG could be collected by commercial hauler(s) and transported to the SWWRF FOG Receiving Station.
- Would increase biogas produced from 9.9 MMBTUs to 11.2 MMBTUs
- FOG portion of rNG is considered a D5 commodity valued much lower than traditional biogas rNG (D3 commodity)

By producing a renewable energy product and incorporating FOG, the Biosolids Program could save the City $xx million of present worth costs over 20 years
Enhanced Biosolids Program

**using RINs using FOG**

Using a portion of the treated digester gas to produce renewable energy could provide $xx million in 20-year Present Worth savings.
Next Steps
EXCEL TOOL FOR DISCUSSION PURPOSES

Decision Regarding Present Worth Assumptions
Biosolids Program

City's Next Steps

• **Contract Solicitation for 3rd Party Operation and Maintenance**
  - for CHP and BUS systems

• **Continue TECO Discussions**

• **Direction Whether to Pursue RINs Program**
  - Establish RIN sale process
  - Complete EPA Registration as a RIN provider
  - Solicitation of RIN Verification Contract

• **Commissioning of the Biosolids to Energy Project**
  - approximately June 2019
Questions