Minutes
Nov. 6, 2015

The Wastewater Advisory Committee to the MWRA met at the MAPC conference room, 60 Temple Place

Attendees/Contributors:

WAC: Taber Keally (chair), , Beth Miller (vice-chair), Mary Adelstein, Craig Allen (by phone) Wayne Chinouard, Karen Golmer, Karen Lachmayr, Jim Pappas, Martin Pillsbury, Stephen Greene, Elie Saroufim Dan Winograd

Guests: Dave Duest (MWRA), Gary Broberg (Practical Applications), Lexi Dewey (WSCAC)

Staff: Andreae Downs (WAC)

FUTURE MEETING DATES/TOPICS

NEXT: Friday, **Dec. 4, Stormwater Planning**

VOTES:

October minutes approved
After discussion, comment letters on Molybdenum and EPA pharmaceutical rules were approved.

PRESENTATIONS & DISCUSSION:

David Duest: A Tale of Two Treatment Plants: Deer Island vs. DC Water/ Blue Plains

The two plants both serve roughly the same population (2+ million), and have the same plant size—153 acres (DC), 160 (DI)

DC water originally built 1953, first substantial expansion 1983

DC—370mgd, max capacity 1.1 bgd
DI—361 mgd, max capacity 1.3bgd

DI only secondary treatment plant.
DC has to also treat for nutrients—Nitrogen & Phosphorus

Sludge Treatment—

DI anaerobic digestion since 1968, 1991 enhanced the process-class A biosolids & pelletizing

DC water lime-stabilized all sludge, huge quantities and lots of truck traffic. Last year added cambi pre-treatment and anaerobic digestion—all reduces sludge volume and gets them a Class A biosolid. Before that, they were landfilling sludge. Do not pelletize, belt-pressed. DI biosolids are more marketable.

Green Energy:

DI using digas since 1968, at least for heat. 1988 added engines & generated power. New plant, included heat & power. Also added hydro, wind and solar. Now at 29% green energy vs demand.

DC until recently had nothing—no beneficial re-use. But now they have digas, they are using combined heat & power, which we are looking at for DI. DC Water's system produces more electricity. DC Water's hope is to get to 30% of its own power need.

Basic Plant Statistics (continued)

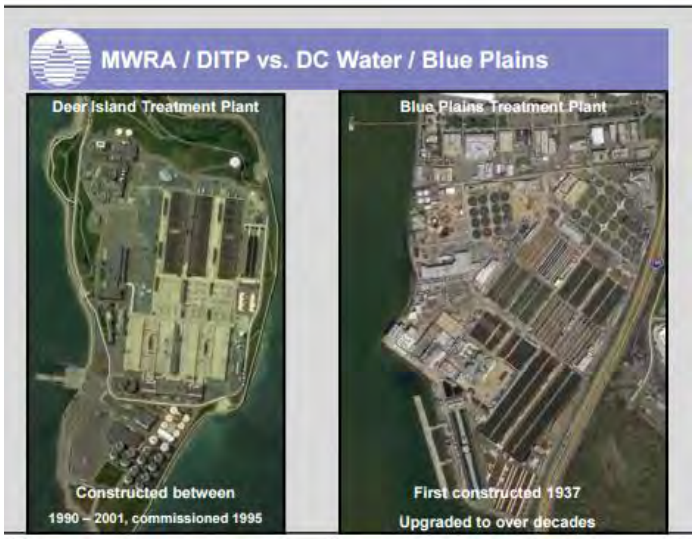
Parameter	MWRA	DC Water
Sludge Treatment	Anaerobic Digestion – then thermal drying – Class A Biosolids – since 1991)	Limed Stabilized (Class B biosolids thru 2014), **Cambi** Slg Pre-treatment + Anaerobic Digestion & thickening (Class A biosolids 2014)
Green Energy	Digas utilization since 1968, plus Hydro, Wind & Solar (29%)	Digas utilization started in 2014. (30% of demand)
Digestion Performance	250 dtpd in, 100 dtpd out 62% VS Destruction	340 dtpd in, 130 dtpd out 60 % VS Destruction
Prim Slg vs. Biological Slg	70:30	50:50
Digas Utilization	Bottom Cycle – Boilers then Steam Generators - 50 klbs/hr steam required - 3.4 MW electricity	Top Cycle – Gas Turbines with Duct Burners - 47.5 klbs/hr steam required - 10-13 MW electricity
Plant Energy Demand	16.8 MW 4.9 MW or 29% by renewables	37 MW hope for 30%

DI averages 16MW of power (if added pellet process, ca. 25MW), DC averages 37MW. That's because of the nutrient removal, which is essentially secondary treatment multiplied by 3. If DI had nitrification/denitrification, it would add another 8MW of power. Add in cambi, and that skyrockets their usage.

DD mentioned last year a project to replace the combined heat & power units on DI. Now the plan is to switch entirely, not in stages, to an electric-first unit: $80m cost, but 6-7 year payback.

Hydro has a 10 year payback, Wind 10-15, and solar 50-75 without subsidies.

You can see DC water has almost no space left.



They thought about egg-shaped digesters, like DI, but the cost was astronomical. It wasn't competitive and would have taken too much space. Decided to go with cambi, and that way only needed to build 4 circular digesters.

With cambi, sludge doesn't have to remain in the digesters as long. DI will be 21 days, in a cambi process is 10 days.

DI takes in ca 250 dry tons. DC water 340 dry tons. The advanced treatment creates more solids. Getting about the same amount of volatile solids. But we are producing a little more digester gas.

DI—70% is primary treatment solids, which is highly digestible.

Part of DC Water's space problems are the repeated addition of new technologies, which made it harder to expand and find room for new technologies.

DI was designed all at once, and in every case space was the deciding factor—so there's a lot of reserve space and public space. MWRA decided against the circular clarifiers that DC water uses, because although they are slightly more efficient, they can't be stacked. Both primary and secondary clarifiers are stacked. Get double the capacity that way.

DI also went with pure oxygen activated sludge process for the biology portion of secondary treatment, while DC water uses ambient air oxygen, so need a lot more space for secondary, nitrification and de-nitrification.

Comparing Process flow:

DC Water has a more complicated process because they are doing triple the secondary treatment—after secondary, they take the ammonia and nitrify it. Then they convert it to nitrogen gas. Add ferrous chloride to precipitate out the phosphorus, and then filter. So there are a lot more steps for them, but that's because it's a freshwater discharge into an already-impaired waterway. Their nitrogen discharge is about 2% of the total load to that waterway—the rest is non-point-source, but are still required to go more stringent.

For us, because of all the background and discharge monitoring, we've proven there's no impact to the receiving waters, which should help delay the push to nitrogen treatment at DI, but eventually we will get it.

DC's primary sludge goes to gravity thickening, just like ours. In secondary, they push a lot of compressed air through their biological sludge, float it and skim it off the top, wheras we use enhanced gravity (centerfuges). Now also using the cambi process.

Since digestion & cambi, they have cut their sludge production in half.

Residuals—DI produces excess heat, which if we had the space to pelletize, we could use in that process. Instead it gets wasted.
DC—primary sludge gets mixed with biological sludge. Cambi is a thermal hydrolosis process. First they bring it up to 14-15% solid, then it goes to the reactor, with 250psi high-pressure, high-temperature, 300 degrees F, steam pushed directly into that reactor. Huge energy demand associated with that. It's a batch process with three tanks. Each batch takes a ½ hour. Then taken to digestors. Try to recapture the heat.
From digestion, biogas goes to the gas turbines that produce electricity first. Steam goes to cambi process. Have to buy natural gas for heating the rest of the plant, including the digestors.
Cambi is a pre-treatment. It bursts the cell, makes the material more accessible to digestion.

DI looked at secondary pre-treatment options. The one that seemed most cost-effective went belly-up, unfortunately.
Ultimately, their effluent is much cleaner than ours, because they have a stricter permit. But we don't impact the waterway.

Q: are the biosolids and their content different?
A: They are pretty similar.

Q: can you compare the cost of operations?
A: Their energy costs are a lot more than ours, unit rates also. Even producing 30% of power, they are more than twice what we are for electricity. DC staffing is a little higher than ours since they don't have the same level of automation. They are close to 350 and we are at 232.

Q: what are their water/sewer rates?
A: I haven't looked at that.

Q: so can you compare the cost/gallon of treatment?
A; I don't have that off the top of my head.
Q: that would be interesting to know.

Q: do they have a better publicist? Strikes me that DI has a great story that hasn't been publicized.
A: a lot of noise because of the recent switch. We put out a lot of information when we first opened. We are well known in the industry for being one of the model plants to go after.

We do talk about it. For the 30th anniversary, Fred Laskey is trying to put out all the benefits of MWRA over the 30 years.

KG—volunteered to write an article.

San Francisco—has almost the same set up as DI. Moving to cambi process and combined heat & power. Treat about half as many gallons/day and have about half the population.

Q: What about adopting combined heat & power at DI?
A: The scheme that we have, installed in 1990, is reliable, efficient from a heat perspective, and could run for 50-60 years. We didn't know how much solids we would produce, the heat and gas numbers, we didn't know what the eggs would do.
So we are going do to a whole evaluation and life-cycle cost analysis. If it's more cost effective to switch to a new technology, then let's do it. If we did this with co-digestion, payback would be close to 5 years, without co-digestion closer to 7, and that's without subsidies. But it's a 3-4 year design process; 3-5 years for construction, ca $80m project.

EXECUTIVE DIRECTOR'S REPORTS:

Draft comment letters to DEP on Mo in biosolids and EPA on pharmaceutical waste:

Mo letter: WAC decided to remove the comments on Phosphorus and instead Andreae will research whether the Department of Agricultural Resources rule limiting Phosphorus in fertilizer affects MWRA pellets and how to comment, with a possible comment letter draft for the December 4 meeting.
Martin Pillsbury cautioned that the restriction was an important piece of the solution to Phosphorus contamination of fresh water, particularly for fertilizers applied to turf and yards, rather than agriculture.

Pharmaceutical waste letter: WAC made further edits to the draft

WAC voted to approve both letters as edited, with a final draft to be circulated via email to ensure that all edits are included before sending & posting to WAC's website.

CHAIRMAN'S REPORT:

Stephen Greene outlined the origins of the Advisory Board's letter to WAC and WSCAC. Andreae noted that the original request/offer was no longer on the table. WAC members expressed disappointment at any decline in communications and coordination between the two committees, and Taber said he would call Advisory Board staff to suggest that relationship continue.