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COUNCIL COMMITTEE ITEM SUMMARY REPORT

MEETING DATE:	**NOVEMBER 24, 2020**
TO:	**PUBLIC WORKS AND FACILITIES COMMITTEE**
FROM:	**ALDEN RAMOS; WASTEWATER LEAD**
AGENDA ITEM TITLE:	**RECEIVE REPORT AND PROVIDE DIRECTION TO STAFF CONCERNING BIOSOLIDS**

BACKGROUND AND OVERVIEW:

On April 2, 2020, the new AeroMod wastewater activated sludge process began discharging. The process is comprised of two separate process trains connected by a selector chamber. Each train has first and second stage aeration basins, an aerobic digester, and a final clarifier. Air supplied by blowers and compressors complete all functions of the process with no moving parts other than valve solenoids. This process is far more effective at reducing target pollutants from the effluent. This higher quality effluent results in greater volumes of waste biosolids that need to be dewatered and hauled away. Currently the Wastewater Plant sends out biosolids for beneficial reuse as fertilizer to agricultural fields for feed crop. On May 18, 2020, the plant was ready to start dewatering from its aerobic digesters. Initially, representatives from AeroMod had set a target of 80,000 to 100,000 gallons per week that would need to be removed from the digesters. Soon after dewatering operations started, it was clear that this volume was not sufficient to keep up with removal rates. From June to August, the volume being dewatered had increased to 185,000 gallons per week. From August to mid-October, the plant peaked at 199,000 gallons. The average during this time was 182,000 gallons per week. While the volume needed to be dewatered is currently on the decline, we have still been dewatering around 140,000 to 190,000 gallons per week. The volume of sludge being dewatered is approximately 2-2.5 times more tonnage than the old system.

The old system used anaerobic digestion which translates to “in the presence of zero oxygen”. The sludge was heated via propane boilers to 98 degrees for around 60 days, a process which removes a large amount of volume through biological volatile solids reduction. The byproduct of that system was methane gas which needs to be flared to reduce greenhouse gas emissions.

The new system provides aerobic digestion which requires oxygen injection for biological reduction of solids volume. This process takes 10-20 days and its byproduct is inert

nitrogen gas. The compounding effect of more material being removed from the effluent and the aerobic digestion process being less effective at reducing organic solids volume is the cause of the current greater tonnage and odor.

Both the new and old dewatering systems were able to easily reduce solids to 15-20%. An interesting characteristic of the aerobically digested biosolid is that it appears to be able to dry significantly quicker than the anaerobic biosolids could on the drying beds. Previous data from the old process provided a maximum percent solid to 18%. The aerobic biosolids that were produced between May 18, 2020 and August 21, 2020 were further dried on drying beds until October 1, 2020 when it was hauled away. During that time the quantity of solids was increased from ~20% to approximately 70%. During the winter this extra drying is not possible. The greater the percent solids, the cheaper it is to haul it off due to the lower water content (i.e. lower weight).

Between mid-May and August 2020 (95 days), staff sent 1,749,000 gallons of sludge to the belt press. This sludge is approximately 2% solids. The belt press is able to turn this sludge into a 20% solid. If no further drying was available at this point it would weigh 730 tons and cost $84,000 to haul. Luckily we were able to achieve ~ 68% percent solids from evaporation on the drying beds aided with regular mixing. This reduced the weight of the sludge to 215 tons with a new cost of $24,700. If this sludge was able to be dried to 100% it would be 146 tons and cost around $17,000 to haul. We will only be able to achieve this amount of drying during the summer months. The cooler temperatures and rain through winter will stop any further drying thus increasing disposal cost.

It is staff's understanding that the excessive odor occurs when the biosolids are between 40% - 55% dry. That is the point in which the ammonia compounds in the biosolids start to evaporate. Mixing the piles when the biosolids are in this range releases these vapors more readily and increases the smell.

SUMMARY:

Staff is seeking direction from the Public Works and Facilities Committee to decide on the options available to assist with handling biosolid quantities and reduction of smell in an effort to reduce additional costs associated with the daily operations and management of the City's Wastewater Treatment Plant.

RECOMMENDATION:

Staff recommends the construction of a solar drying greenhouse to achieve high level percent solids throughout the year due to their covered design. Staff foresees a solid content of 50-60% during the winter, and over 70% during the summer by means of a solar drying greenhouse. The Huber proposal claims that 70-90% solids are possible however, unlikely do to our sizing constraints. The greenhouses have 18 +/- ventilation fans to circulate the air. They also have automatic sludge turning arms to continuously mix the biosolids during the day, which is supposed to reduce the smell by drying the biosolid quickly and making the release continuous instead of all at once like with our current drying bed mixing. This process may also have the ability to produce a class A biosolid. This system is estimated to require ~ 73,000 kWh/yr, which is a little more than the new plant uses per month.

ALTERNATIVES:

Thermal dryers and belt dryers -

These are guaranteed to produce 80-90% solids year round, produce a class A biosolid product, and take up significantly less space than the greenhouse. The down sides are that they cost about the same or more as a greenhouse but also require a building to put it in which is not included in the quote, they use large amounts of propane/natural gas, and they require significantly more labor to maintain. Rio Del, our sister plant, has a thermal dryer and they have a hard time maintaining their boiler. The City's unit would need to be 2-3 times bigger than theirs. Staff has been told that they are not a 'green' option and it can be more difficult to get grants.

Electro Osmosis Dewatering system -

These advertise 40-60% solids, have a fairly small footprint, cost less than half that of the greenhouse or thermal dryer, and would work with our current belt press configuration. The negatives, are that if we are only able to achieve 40% solids that is not a lot of bang for the buck. This technology is only available from one company and is extremely new. When staff last talked to them, they had completed some pilot programs in the US but had no permanent installations completed. This system runs the biosolid between an anodic drum and a cathodic belt and applies a voltage. The voltage pushes the water out of the belt and retains the solids. This system requires our sludge to have optimal ionic charge characteristics in order to be efficient. I am currently scheduling to send them a sample for testing.

ATTACHMENTS:

1. Electro Osmosis: https://www.elode.co/elode
2. Huber Technology Proposal