Thermal Hydrolysis

This fact sheet addresses common questions about the **thermal hydrolysis system** that is being incorporated in the proposed project.

Purpose and Benefits of Process

This process pretreats sludge to make it more easily and more completely digestible by anaerobic digestion. The benefits of this process include:

- Increased destruction of sludge, which reduces the volume of sludge that needs to be transferred off-site. This significantly reduces the trucking costs and truck traffic to, from and within the WRF.
- By making the sludge more completely digestible, it allows for increased biogas production in the subsequent digestion process and therefore increases renewable energy production.
- It allows for reduction of pathogens to very low levels, which allows classification of the final product as a Class A biosolids. Class A biosolids can be legally used as fertilizer on farms, vegetable gardens, and can be sold to the public as compost or fertilizer.
- Decreased odor potential in the final biosolids product.

Additionally, the thermal hydrolysis pretreatment allows reduction of anaerobic digester volume, which reduces the capital and operational costs of the digesters.

Description of Process

Thermal hydrolysis is a preparation step for anaerobic digestion that uses pressure and heat to break the compounds in the sludge down into more readily digestible compounds, which allows quicker and more complete anaerobic digestion. Sludge, which is a byproduct of the wastewater treatment process, is screened, dewatered and fed into the thermal hydrolysis system. The thermal hydrolysis system heats the sludge in reactors (pressure rated tanks) by injecting saturated steam into the tanks. This steam mixes and heats the sludge to approximately 330 degrees Fahrenheit. The sludge is held at this temperature for 20-30 minutes before being depressurized, cooled and then pumped into anaerobic digesters.

What Process Modifications will be made?

The thermal hydrolysis system will be an addition to the site rather than a modification of an existing structure. The entire existing biosolids system at the Franklin WRF is past its useful life and is being replaced with the proposed new biosolids process. The thermal hydrolysis system is one component of the new system. The thermal

hydrolysis system consists of several tanks and pumps, connecting piping, and wiring and controls. These components will be assembled on a skid at the factory and shipped as one unit to the site where it will be set on a covered concrete slab. A separate skid mounted system called the foul gas skid (described further below) will also be assembled in the factory and shipped as one unit to the site where it will be set on the covered concrete slab.

Is the process a potential odor source? Is the process odor controlled?

The thermal hydrolysis system is a series of completely contained, pressure tanks and pipes with no normal release to the atmosphere. The only potential release to the atmosphere would be through pressure relief valves or rupture disks, which are safety features. However, it is very unlikely that a pressure relief valve would be triggered to open and it is even less likely that a rupture disk would be opened. Triggering either of these safety mechanisms would require sequential failure of operating controls as explained below:

1. The system controls monitor and maintain the operating pressure in the tanks.
2. The system includes high pressure switches, which are set at a level well above operating pressure. If for some reason the system controls failed to maintain the operating pressure and the system pressure rose to the high pressure switch level, the pressure switch would be activated, which would cause the system to shut down.
3. If for some reason the system did not shut down and pressure continued to rise, the pressure relief valve would open up.
4. If for some reason the pressure relief valve did not open, the rupture disk would pop out to relieve the pressure.

The process gas skid receives waste gases from the first tanks in the thermal hydrolysis system. The gases are essentially steam with various odorous gases entrained. The process gas skid cools the waste gases and then pumps the gases to the anaerobic digesters which are also contained systems. Although the process gas skid is completely enclosed, faint odors have been observed near process gas skids at other thermal hydrolysis installations. However, the observed level of odor has been isolated to the immediate vicinity of the skid and would not be enough to be detected at the property lines.

Does the process include equipment that has the potential to create noise? If so, is there any noise control provided?

The thermal hydrolysis system has pneumatic valves, pumps, small air compressor, and steam injectors, all of which make noise. However, the noise levels generated by this equipment will be significantly lower than that generated by existing equipment. For example, the proposed thermal hydrolysis system will have three 5 HP pumps and one 10 HP air compressor operating intermittently outside. Meanwhile, there are six 100 HP and three 150 HP surface aerators currently continuously operating in a location much closer to the property line. Additionally, the entire system will be housed under a canopy that has side skirts, which will dampen the already small noise production outside of the THP pad area.

Will the process modification change the look and feel of the site?

The thermal hydrolysis system will be located outdoors adjacent to the proposed Solids Processing Building. The entire system will be covered by a steel canopy with side skirts, making it only possible to see the bottom portion of the system. The thermal hydrolysis system is part of the larger Biosolids upgrade, which includes a new biosolids facility. The facility includes new buildings and tanks, all of which are designed to match the existing look and feel of the site.

Will the process modification change the safety of the site?

The thermal hydrolysis system does not use any chemicals, nor does it generate any explosive gases. The system does use steam for heating and mixing sludge in medium pressure vessels. The vessels will meet ASME Boiler and Pressure Vessel Code, and are required to be inspected annually by an ASME certified third party to ensure structural stability. The vessels will be rated well above the relief valve and rupture disk pressure settings. As indicated above, an unlikely sequence of failures of the redundant safety provisions would have to occur to even get to the pressures that would trigger the relief valve or rupture disk.