UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

September 9, 2021

Mr. Dale G. Mullen
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Email via dmullen@wtplaw.com

Dear Mr. Mullen:

This letter is in response to your letter of September 2, 2020, requesting an applicability determination by the U.S. Environmental Protection Agency (EPA) for a biosolids gasification unit designed by Ecoremedy, LLC (Ecoremedy) and proposed for construction at the wastewater treatment facility of the City of Edmonds, Snohomish County, Washington. Specifically, your letter requested that EPA make a determination regarding applicability of 40 CFR Part 60, Subpart LLLL – Standards of Performance for New Sewage Sludge Incineration Units (SSI NSPS) – to the gasifier system proposed by the City of Edmonds, Washington. You assert that the SSI NSPS does not apply to this facility because it uses gasification, rather than incineration, to treat sewage sludge.

In relevant part, the SSI NSPS apply to sewage sludge incineration units, as defined in Subpart LLLL. 40 CFR 60.4770(b). As discussed in more detail later in this letter, sewage sludge incineration units are units "combusting sewage sludge." Based on the information provided in connection with your request and as discussed later, EPA concludes that the Ecoremedy gasifier unit as proposed would not combust sewage sludge as defined in the pertinent regulations and that the SSI NSPS would not apply to the biosolids gasification unit that is proposed for construction at the wastewater treatment facility of the City of Edmonds, Snohomish County, Washington because the unit would not be an SSI unit as defined in 40 CFR 60.4930. *See* 40 CFR 60.4770(b). This determination is based on the technical information Ecoremedy provided to show the specific

gasification unit is not currently covered under the SSI rules.[1] If any changes are made to the unit or the manner by which is operated, it may require a new determination of applicability.

The Ecoremedy Biosolids Gasification Unit

In your September 2, 2020, letter, you assert that SSI units, as defined by Subpart LLLL, must combust sewage sludge. You further assert, again as defined by Subpart LLLL, that sewage sludge does not include gases of any kind. Accordingly, you submit that units that only combust gases do not combust sewage sludge and, therefore, are not SSI units.

With respect to Ecoremedy's gasifier unit, you generally contend that the unit combusts only syngas and that the unit is designed so that no combustion or burning of any solid, semi-solid, or liquid can occur. You emphasize that "only syngas . . . is combusted – not biosolids." You also state that the sludge is converted to syngas in an "oxygen-deficient environment." More specifically describing the gasifier unit you state, in part:

> Ecoremedy's proprietary gasification technology converts biosolids to renewable thermal energy and recycled beneficial products suitable for land application as a stand-alone fertilizer, fertilizer blending agent, soil conditioner, and/or a renewable fuel product. The gasification process begins with a process of converting biosolids into feedstock through a mixing and drying process. The feedstock is entered into the gasifier and brought to a high temperature in an oxygen deficient environment. This causes the feedstock to break down into synthetic gas ("syngas") while ensuring that combustion cannot occur. The gasification process is flameless; the point of gasification is to prevent, not achieve, combustion. Next, residual solids such as ash and char are removed. The syngas is then sent to an oxidizer where air is introduced, combusting the syngas and creating thermal energy. The gases then move through a drum dryer, where they dry incoming biosolids. It then enters a cyclone, which removes particulate matter, before being sent to a wet scrubber for sulfur dioxide and odor treatment.

On September 30, 2020, in response to your request for an applicability determination, EPA requested additional information from Ecoremedy. You sent another letter dated November 17, 2020 (via email), which substantially reiterated your September 2, 2020, description of the gasifier unit. Also, Ecoremedy provided additional information on November 17, 2020, January 19, 2021, February 2, 2021, May 20, 2021, June 9, 2021, June 10, 2021, June 11, 2021, and August 3, 2021.

[1] As you note in your letter to us, EPA has issued other applicability determinations for similar gasification and/or pyrolysis sources. Importantly, such EPA determinations are specific to the existing SSI NSPS regulations addressing sewage sludge combustion units and do not rule out the applicability of regulations for gasification units issued by EPA in the future. We have limited information on the emissions from gasification and/or pyrolysis sources. For that reason, we have begun a process to request additional information about these processes and their associated emissions. Please refer to https://www.govinfo.gov/content/pkg/FR-2021-09-08/pdf/2021-19390.pdf. This may result in a future standard that could apply to and require additional controls for the facility owned by the City of Edmonds. The information gathering, and potential rulemaking process will likely take some time to complete, and we do not currently have enough information to predict the outcome.

According to information provided by Ecoremedy, the gasification process proposed is a continuously moving, horizontally configured, updraft gasification technology that mimics mini-updraft gasifiers in succession as the fuel bed travels over zones provided with limited air from under the grate. From the supporting information depiction, the gasification system proposed is comprised of a lower and upper chamber correspondingly referred to as the gasifier and oxidizer. There is also a rotary drum dryer physically and operationally connected to the oxidizer and gasifier.

Based on information provided by Ecoremedy on the proposed emission units, we have summarized our understanding of the process as follows.

Sludge is put in the rotary drum dryer. Initially, a natural gas burner is used to provide heated air to the dryer containing the sludge. Dried sludge from the dryer is mixed with wet sludge and fed to the gasifier, where, at least initially, another natural gas burner is used to preheat the gasifier prior to introducing the sludge mix to the chamber. Once heated, the sludge mixture breaks down in the gasifier, which creates its own heat through exothermic reactions and, at this point, the natural gas burner initially used for the gasifier chamber is no longer needed. Along with heat, syngas is also created in the gasifier and the heat and syngas are drawn into the oxidizer. As the heat and syngas from the gasifier enters the oxidizer, enough air is added ("overfire") to combust the syngas to maintain the temperature of the oxidizer chamber without the need for natural gas. Heat is generated in the oxidizer from the combustion of the syngas and the heat is drawn into the dryer to dry the incoming sludge, thereby eliminating the need for the further use of natural gas to externally heat the dryer. Once the process reaches this stage, combustion of the syngas in the oxidizer is self-sustaining and provides the high temperature heat necessary for the gasifier and oxidizer and the rotary drum dryer, without any supplemental heat inputs from natural gas burners.

We understand that, in its initial startup, the rotary drum dryer may be operated independent of the gasifier and oxidizer for several days to produce the needed dried sludge to create the fuel necessary for startup of the gasifier. In addition, the dryer will be operated by itself when the gasifier and oxidizer are down for maintenance. When the dryer is operated by itself, a natural gas burner is used continuously to provide all the heat necessary to dry the incoming sewage sludge.

The additional information provided by Ecoremedy included information relating to your assertion that the gasifier is an "oxygen-deficient environment." The controls on the amount of air in the gasifier include the fan design which limits the total amount of preheated air available for the gasification process and the air distribution system which apportions air by zones according to the processing stage of the organic matter in the sludge. The additional information provided by Ecoremedy also indicated that no overfire air is added to the gasifier. However, overfire air is added to the thermal oxidizer to ensure complete combustion of the syngas in the thermal oxidizer.

Subpart LLLL Applicability Criteria and Determination

Subpart LLLL applies to new "SSI units" that are not otherwise exempt. 40 CFR §60.4770. The request contends that the Ecoremedy gasification unit does not meet the definition of an SSI unit.[2]

"Sewage sludge incineration (SSI) unit" is defined in 40 CFR §60.4930 as:

> an incineration unit combusting sewage sludge for the purpose of reducing the volume of the sewage sludge by removing combustible matter. Sewage sludge incineration unit designs include fluidized bed and multiple hearth. A SSI unit also includes, but is not limited to, the sewage sludge feed system, auxiliary fuel feed system, grate system, flue gas system, waste heat recovery equipment, if any, and bottom ash system. The SSI unit includes all ash handling systems connected to the bottom ash handling system. The combustion unit bottom ash system ends at the truck loading station or similar equipment that transfers the ash to final disposal. The SSI unit does not include air pollution control equipment or the stack.

"Sewage sludge" is defined as:

> solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incineration unit or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

In addition, in publishing the final Subpart LLLL, EPA described an SSI unit as "an enclosed device or devices using controlled flame combustion that burns sewage sludge for the purpose of reducing the volume of sewage sludge by removing combustible matter." 76 FR 15372, 15376 (March 21, 2011).

Based on all the information provided in connection with your request for an applicability determination, we conclude that Subpart LLLL does not apply to the proposed Ecoremedy gasification unit for the City of Edmonds because the unit is not an "SSI unit." It is not an SSI unit, as defined in 40 CFR §60.4930, because it does not combust sewage, also as defined in section 60.4930.

A key part of the definition of sewage sludge describes the state of the material as "solid, semi-solid, or liquid residue." A key part of the definition of an SSI unit, is an incineration unit "combusting sewage sludge." There appears to be no question that the Ecoremedy gasification unit receives sewage sludge. As detailed in your September 2, 2020, letter which states that the unit

[2] The request does not question or dispute that the gasification unit is or would be a new unit. The request also does not make any question or raise any claim about the application of any of the exemptions in 40 CFR § 60.4789. Accordingly, those issues are not addressed here and it is assumed that the gasification unit in question is or would be a new unit and that it is not otherwise exempt.

will be constructed at a wastewater treatment facility in Edmonds, Washington and further explains that "biosolids," after some drying and mixing, are fed into the gasifier. We are satisfied from the information provided that the biosolids to be fed into the gasifier are sewage sludge.

You further describe that the sewage sludge that is fed into the gasifier is not combusted, and, indeed, that "combustion cannot occur." As previously described, an SSI unit is an incineration unit "combusting sewage sludge." Accordingly, if the gasification unit does not combust the sewage sludge that is fed into it, it is not an SSI unit. In general, there are two main phases to the processes that occur after the sewage sludge is fed into the gasifier: first, the sewage sludge in the gasifier is subjected to heat (and also generates heat through an exothermic reaction), where the solid, semi-solid or liquid sludge material is reduced and where gases, including syngas, are generated and second, the syngas is fed from the gasifier into the oxidizer, where it is, as you concede, combusted.

Addressing, first, the second phase of the process—the admitted combustion of the syngas derived from the sewage sludge, we conclude that this phase is not "combusting sewage sludge." Although there is combustion, the syngas derived from the sewage sludge is not, itself, sewage sludge nor a "material derived from sewage sludge." As previously described, sewage sludge is "solid, semi-solid, or liquid residue." The syngas, although derived from sewage sludge, is gaseous, not solid, semi-solid, or liquid. The initial, primary definition of sewage sludge does not mention gases, but only solids, semi-solids or liquids. "Material" derived from solids, semi-solids, and liquids, in our view was intended, here, only to include solids, semi-solids, and liquids, not gases.[3]

As to the first phase of the process the sewage sludge is converted to feedstock through mixing and drying and fed into the gasifier where an oxygen-deficient environment is maintained to prevent combustion. Inside the gasifier, under high-temperature, feedstock decomposes and produces syngas. Ecoremedy has confirmed that the gasification process is flameless, and the gasifier prevents combustion by limiting the airflow into the gasifier.[4] Therefore, we believe the gasifier does not use controlled flame combustion of sewage sludge, and is not an SSI.

This response was coordinated with the Office of General Counsel and the Office of Enforcement and Compliance Assurance and is based on the information provided by Ecoremedy and its counsel. EPA may alter this determination in accordance with applicable regulations, new

[3] *See*, e.g., applicability determination for Max West Environmental Systems, dated December 19, 2013, which explains EPA's view that "[t]he definition of sewage sludge is expressly limited to the "solid, semisolid, or liquid residue generated during the treatment of domestic sludge in a treatment works.' Since syngas is a gas, and not a solid, semisolid, or liquid, it does not meet the definition of sewage sludge in the SSI EG rule (even though it is derived from sewage sludge)."
https://cfpub.epa.gov/adi/index.cfm?fuseaction=home.dsp_show_file_contents&CFID=126652990&CFTOKEN=98981573&id=FP00004

[4] *See*, preamble to March 21, 2011, final rule which describes an SSI unit as "an enclosed device or devices using controlled flame combustion that burns sewage sludge for the purpose of reducing the volume of sewage sludge by removing combustible matter." *See* 76 FR 15372.

information, or other good cause. If you have any additional questions, please contact Nabanita Modak of my staff, at (919) 541-5572 or by email at: *Modak.Nabanita@epa.gov*..

Sincerely,

Michael Koerber for

Peter Tsirigotis
Director

cc: Dave Mooney, President, Ecoremedy, LLC via email dmooney@ecoremedyllc.com
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