Elizabeth Terranova

From: Brian Potter <brianp@mxiinc.com>
Sent: Friday, October 6, 2023 4:51 PM
To: Elizabeth Terranova
Cc: Candace Justice; Rees Burt
Subject: [EXTERNAL] Re: 82-1020/981211: Dynamic Recycling, LLC

Follow Up Flag: Follow up
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Rees and I were just able to meet today. Please see the answers below:

From: Elizabeth Terranova <Elizabeth.Terranova@tn.gov>
Sent: Tuesday, October 3, 2023 1:27 PM
To: Brian Potter <brianp@mxiinc.com>
Cc: Candace Justice <Candace.Justice@tn.gov>; Rees Burt <rburt@aertn.com>
Subject: 82-1020/981211: Dynamic Recycling, LLC

Dear Mr. Potter,

Working with the Johnson City Field Office and Compliance Validation, there have been some questions and concerns that have come up during their external review.

1. The Division would like the facility to retest Source 01 under 40 CFR 60 NNN for the following:
    a. Vent condenser temperature, TRE value, and Minimum flow level

    This is due to the temperature of 130 F is based on a letter to the Division (dated August 26, 2019) and not from a performance test. The provisions of 40 CFR 60.665(g)(2) requires that the baseline temperature be set during the performance test. Unless the facility can come up with this baseline from data recorded during the performance test, a retest is required.

We understand this question comes from the Johnson City Enforcement Field Office, not the Permitting Division. As such, we understand why this is being brought back into question four years after the resolution. If our explanation and reasoning below are insufficient, it may be prudent to set up a meeting between Dynamic, permitting, and enforcement to revisit the details of the established agreement.

Our organization has conducted three performance tests to establish these values while working closely with the TDEC during each performance test. The first performance test was conducted to measure the minimum flow level. The second and third performance tests were conducted to establish TRE values.

In deference to the vent condenser temperature, due to the low flow of noncondensable gas (approx. .010 scmm), the vent condenser temperature reading is that of the ambient air plus any solar radiation that may affect the 2-inch diameter stack. To this end, the temperature of the vent during a stack test measurement depends almost entirely on the day's atmospheric conditions, which can have a much more comprehensive range than the allotted 11-degree differential in the NSPS standard. Due to this practical technicality not envisioned in the NSPS, we unorthodoxly used the performance test data to establish the vent condenser temperature.

Combining the low flow measured during the performance test and sound engineering estimation rationale concerning heat transfer, we proposed the 130-degree ceiling temperature. This temperature is 40 degrees below the boiling point of ethanol at ambient conditions and 30 degrees above peak summer temperatures for the Bristol, Tennessee, region. As such, we submit that we have used the performance test to establish this value while accounting for the practical limitations of the performance test and the temperature measurement given the extremely low flow.

We would also like to highlight that all performance tests demonstrated an extremely low quantity of emissions released from the source orders of magnitude below the AP-42 factors we used to determine the source's total emissions.

2. Clarification of the process flow and Vent Condenser-02. Based on the application, VC-02 looks to be a second emission point at the facility, but does not match the process diagram which shows this exhausting back into the system. A comment from a member of the Compliance Validation team: "If there is truly a second vent condenser exhaust it must be tested unless they can meet the low flow exemption."

   We submit that Source 04 meets the definition of a distillation operation and is subject to NSPS Subpart NNN. We understand that a performance test will be needed to show compliance. To be clear, the WFE process vents through a main condenser, the noncondensable gases will the go through the liquid ring vacuum pump. From the discharge of the pump the noncondensable gases will deposited in the LRVP seal pot and the seal pot vents through the vent condenser to a detonation arrestor outlined on the P&ID. Upon reviewing the P&ID the equipment supplier does make it appear that Dynamic will have a connection to there. We believe it will be below the limit for the exemption. However, if it proves not to be, we will conduct a full stack test for TRE value and record vent temperatures. However, we submit that we will most likely have a similar issue to Source 1. The flow will be so low that the vent temperature will be ambient temperature plus any solar radiation.

4. Can PES 04 operate independently of PES 01?

   These are separate sources that can operate independently, assuming Source 2, facility air, and facility cooling are all operational.

5. A question came up about the WFE input rate. In the application, the stated design is 1804 lb./hr., but the cover sheet has 210 gal/hr., where are the values and how are they doing the conversion? I know from the calculations that the 210 gal/hr. is the production rate, but the Division wants to better understand the input rate.

   We confirm the WFE is designed to produce 210 gph (output rate). The stated design of 210 gph is based on the surface area of the WFE and normal running conditions (i.e., clean feedstock, high EtOH content, etc.). We want to point out that emissions are calculated, and compliance is determined by production rate (e.g., tons of ethanol produced), not by the input rate. When working with the design team, we thought expressing unit design in those terms was more beneficial.

Our estimation of input rates was derived from 210 gallons of ethanol produced, which weighs approximately 1389 lbs. Ethanol feedstock can have an average concentration of 55 – 99% ethanol. Outliers do exist, but this is a reasonable estimate for typical operations. We used the middle value of 77% EtOH concentration here. Assuming the typical relative density of feedstock (sunscreen) is slightly greater than water, as shown in the submitted SDSs, we project a difference of 421 lbs. approximately 23% of the theoretical input. But the input rate will be the weight of the ethanol produced (estimated at 210 gallons per hour) plus the weight of the nonvolatile component. There are no emissions from the nonvolatile component, so the input rate does not affect emissions.

We recognize that the input rate is merely an approximation, and we do not want limits or think a limit on input rates is beneficial for compliance as the input is dependent on the nonvolatile fraction of the feed and the output is the volatile fraction where the emissions from the source are derived (the vent). Does this seem reasonable to the Division, or would another protocol for estimating be recommended?

6. Will any fermentation equipment remain for Source 01 or is it being repurposed for the WFE?

The former fermentation tanks make up the three tanks associated with Source 04. The pumps and valves related to the fermentation area are not operational but are still bolted to the concrete floor.

7. When will the facility obtain documentation of the input limit for Source 01 that they mentioned during the 9/11 site visit?

I apologize, as I do not recollect a commitment for documentation on input rates for Source 01 during the 9/11 meeting. We understood that the action items and deliverables from the meeting centered around VVa compliance issues and the outstanding NOV.

As discussed in our earlier response concerning the input rate for Source 04, this is a complex metric due to feedstock variance. Furthermore, given the highly customized configuration of Source 01, we do not have engineering design information that would readily supply such data on input rate. There is no data plate or manual that provides this information.

Also, similar to the discussion of Source 4, the emissions related to Source 1 are associated with the production of the volatile component, not the nonvolatile element that is part of the input to yield the volatile component. Furthermore, most of the load on the condensers of Source 1 is actually from reflux, not takeoff. Therefore, the input rate does not have much of a relationship to emissions from the source. However, if TDEC is set on establishing an input limit, we could consider the two pumps feeding the distillation system (P-101 and P-102 on the P&ID and VVa listings). We can take the pump curves from these units or conduct a site-specific test to determine hourly pump capacity.

Please let me know if you have any questions or comments and I will be happy to help!

Sincerely,

TN Department of Environment & Conservation

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