Confirmatory Performance Test Plan

RED-Rochester, LLC
Rochester, New York

Multiple Hearth Incinerator System

June 10, 2020
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</tr>
<tr>
<td>E095XX-770-004F</td>
<td>Secondary Combustion Chamber Instrument Controls</td>
</tr>
</tbody>
</table>
I - Introduction

RED Rochester, LLC (RED) operates a multiple hearth incinerator (MHI) at the Eastman Business Park facility in Rochester New York (EPA ID No. NYD980592497). The MHI is subject to requirements of the hazardous waste combustor (HWC) maximum achievable control technology (MACT) rule, 40 CFR Part 63, Subpart EEE, and is operated in accordance with the terms and conditions of the Title V Permit (DEC Permit # 8-2699-00126/00001). The MHI is included in the Title V air permit for RED operations at Eastman Business Park as Emission Source 09503 under Emission Unit U-00008.

A Comprehensive Performance Test (CPT) was performed on July 17 - 19, 2018 to demonstrate the ability of the Multiple Hearth Incineration System (MHIS) to meet the final performance standards stated in 40CFR Part 63 Subpart EEE and to set appropriate permit conditions required to operate this unit. The final CPT report and final Notification of Compliance Status (NOC) (10/15/2018) demonstrated that under worst case operating conditions the dioxin/furan emissions were less than 2% of the standard (measuring only 0.0062 ng/TEQ/dscm @ 7% O₂ against the standard of 0.4 ng/TEQ/dscm @ 7% O₂).

RED must conduct a Confirmatory Performance Test (CT) to demonstrate compliance with the dioxin/furan emission standard when the MHI operates under normal operating conditions; and conduct a performance evaluation of continuous monitoring systems required for compliance assurance with the dioxin/furan emission standard. The testing must commence between 18 and 31 months of the commencement of the previous CPT, so test commencement must be between January 17, 2020 and February 17, 2021. The plan is to conduct the CT in the fall of 2020 (tentatively scheduled to commence on Sept 15, 2020.)

The CT will be conducted in a manner that meets the CT requirements contained in 40CFR63.1207. This plan proposes to conduct testing under normal operating conditions, including normal feed rates of sludge and chlorine as required. The test data will be used to demonstrate compliance with the dioxin/furan standard in 63.1219, the final replacement standards for hazardous waste incinerators, which is listed below.

40CFR63.1219(a) Emission limits for existing sources. You must not discharge or cause combustion gases to be emitted into the atmosphere that contain:
(1) For dioxins and furans:
(ii) Emissions in excess of 0.40 ng TEQ/dscm, corrected to 7 percent oxygen, for incinerators not equipped with either a waste heat boiler or dry air pollution control system.

The test will consist of monitoring the operating conditions with the installed instrumentation and sampling the stack gas stream in order to demonstrate compliance. RED proposes to conduct all testing within normal operating limits for all regulated parameters in both the multiple hearth and the associated air pollution control equipment. Three test runs will be conducted.
Detailed descriptions of waste analysis and waste feed to the MHI and the engineering design of the MHIS including the Air Pollution Control Equipment (APCE) are available in the Comprehensive Performance Test Plan (submitted August 21, 2017 with revisions on January 2, 2018).

Section II of this plan is organized in parallel with the required content of the CT plan as outlined in 63.1207(f)(2). The general requirements contained in 63.7(c)(2) are addressed as part of the sampling and monitoring procedures in Section II, subsection v.

Section III describes the requirements for submittal of the Notification of Compliance subsequent to the completion of the CT.
II. Required Content of the Plan (63.1207 (f)(2))

63.1207(f)(2)(i) Normal Carbon Monoxide Operating Level

Requirement: 63.1207(f)(2)(i) A description of your normal hydrocarbon or carbon monoxide operating levels, as specified in paragraph (g)(2)(i) of this section, and an explanation of how these normal levels were determined.

63.1207(g)(2) Confirmatory performance testing. You must conduct Confirmatory performance testing for dioxin/furan under normal operating conditions for the following parameters:

(i) Carbon monoxide (or hydrocarbon) CEMS emissions levels must be within the range of the average value to the maximum value allowed, except as provided by paragraph (g)(2)(v) of this section. The average value is defined as the sum of the hourly rolling average values recorded (each minute) over the previous 12 months, divided by the number of rolling averages recorded during that time. The average value must not include calibration data, startup data, shutdown data, malfunction data, and data obtained when not burning hazardous waste.

(v) The Administrator may approve an alternative range to that required by paragraph (g)(2)(i) of this section if you document in the CT plan that it may be problematic to maintain the required range during the test.

The average rolling hourly average CO concentration corrected to 7% oxygen was calculated from the average value for each minute that the MHI was operating normally between Mar 1, 2019 and February 29, 2020, the latest data available when the CT plan development was initiated. No data was included when not operating. Note that the MHI was not operating about ¾ of the time, with extended time operating, followed by longer times not operating. Calibration data and startup/shutdown data were also removed as required. For determining startup and shutdown, CO values were excluded when the waste feed was below 500 lb/hr (about 10% of the average feedrate). The annual average concentration corrected to 7% oxygen value for this timeframe was 0.5 ppmv.

Per 63.1207(g)(2)(i), the CO emission level during the test must be between 0.5 ppmv and 100 ppmv (the maximum value per the HWC regulations and the latest NOC dated 10/15/2018), unless an alternative range is approved by the Administrator per 63.1207(g)(2)(v). Standard operating practice at the MHI is designed to ensure good combustion, which minimizes CO. Since the MHI CO emission levels are normally very low, it will be difficult to ensure operating levels will be above 0.5 ppmv during any one hour test run if normal good combustion operating practices are followed, since under good combustion operation, values will be below this average value about half the time and above this value about half the time. Any attempt to elevate CO artificially is poor operating practice, increasing emissions, and creating some instability in the operating conditions. Therefore RED is proposing to operate the MHI normally...
with standard good combustion practices which minimize CO during the test period and will not aim to elevate the CO level to ensure it is above 0.5 ppmv. The average CO RHA will be less than 100 ppmv as required by the permit, and is expected to be well below the 100 ppmv maximum, as is typical of normal operations, and as allowed under 63.1207(g)(2)(v).

63.1207(f)(2)(ii) Normal Operating Parameter Levels

Requirement: 63.1207(f)(2)(ii) A description of your normal applicable operating parameter levels, as specified in paragraph (g)(2)(ii) of this section, and an explanation of how these normal levels were determined.

63.1207(g)(2) Confirmatory performance testing. You must conduct Confirmatory performance testing for dioxin/furan under normal operating conditions for the following parameters:

(ii) Each operating limit (specified in 63.1209) established to maintain compliance with the dioxin/furan emission standard must be held within the range of the average value over the previous 12 months and the maximum or minimum, as appropriate, that is allowed, except as provided by paragraph (g)(2)(v) of this section. The average value is defined as the sum of the rolling average values recorded over the previous 12 months, divided by the number of rolling averages recorded during that time. The average value must not include calibration data, startup data, shutdown data, malfunction data, and data obtained when not burning hazardous waste.

63.1209(k) Dioxins and furans. You must comply with the dioxin and furans emission standard by establishing and complying with the following operating parameter limits. You must base the limits on operations during the comprehensive performance test, unless the limits are based on manufacturer specifications.

(1) Gas temperature at the inlet to a dry particulate matter control device.

(2) Minimum combustion chamber temperature.

   (i) For sources other than cement kilns, you must measure the temperature of each combustion chamber at a location that best represents, as practicable, the bulk gas temperature in the combustion zone. You must document the temperature measurement location in the test plan you submit under §§63.1207(e) and (f);

(3) Maximum flue gas flowrate or production rate.

   (i) As an indicator of gas residence time in the control device, you must establish and comply with a limit on the maximum flue gas flowrate, the maximum production rate, or another parameter that you document in the site-specific test plan as an appropriate surrogate for gas residence time, as the average of the maximum hourly rolling averages for each run.

(4) Maximum hazardous waste feedrate.

   (i) You must establish limits on the maximum pumpable and total (pumpable and nonpumpable) hazardous waste feedrate for each location where waste is fed.

   (ii) You must establish the limits as the average of the maximum hourly rolling averages for each run.
The average Hearth #3 Temperature, Secondary Combustion Chamber (SCC) Temperature, Flue Gas Flowrate, CO, and Waste Feedrate were calculated using the operating data from 3/1/2019 through 2/29/2020 by averaging all the one minute average values. Calibration data and startup/shutdown data were removed as required. For determining startup and shutdown, values were excluded when the sludge feedrate was below 500 lb/hr. (about 10% of the average sludge feedrate).

Per 63.1207(g)(2)(ii), the operating parameter levels during the test must be between the following limits shown on Table 1 below:

### Table 1 – MHI CT Operating Limits

<table>
<thead>
<tr>
<th>Operating Parameter</th>
<th>Lower Limit</th>
<th>Basis</th>
<th>Upper Limit</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas temperature at the inlet to a dry particulate matter control device, carbon injection parameters, carbon bed parameters, D/F inhibitor parameters</td>
<td>Not Applicable to MHI because there is not a dry particulate control device, carbon injection, carbon bed, or D/F inhibitor injection</td>
<td>Not Applicable to MHI</td>
<td>Not Applicable to MHI</td>
<td>Not Applicable to MHI</td>
</tr>
<tr>
<td>Minimum combustion chamber temperature</td>
<td>1502 °F RHA</td>
<td>NOC, dated 10/15/2018</td>
<td>1575 °F RHA</td>
<td>12 Month Average Value</td>
</tr>
<tr>
<td>Minimum SCC temperature</td>
<td>1600 °F RHA</td>
<td>NOC, dated 10/15/2018</td>
<td>1655 °F RHA</td>
<td>12 Month Average Value</td>
</tr>
<tr>
<td>Maximum flue gas flowrate</td>
<td>7,034 ACFM RHA</td>
<td>12 Month Average Value</td>
<td>12,963 ACFM RHA</td>
<td>NOC, dated 10/15/2018</td>
</tr>
<tr>
<td>Maximum hazardous waste feedrate</td>
<td>5125 lbs/hr RHA</td>
<td>12 Month Average Value</td>
<td>8,965 lbs/hr RHA</td>
<td>NOC, dated 10/15/2018</td>
</tr>
</tbody>
</table>

* The MHIS has only one waste feedstream that consists of a combination of dewatered wastewater sludge and dewatered wastewater grit, which is fed to the #1 hearth. The sludge is the primary component. The dewatered sludge is 70 - 85% water although it has the appearance and handling characteristics of a solid and not that of a liquid or wet sludge. The grit is added to the feed conveyor when it is available and fed in combination with the sludge. The grit is a small fraction of the total feed and is never fed without the sludge. Sludge and grit...
are fed to the conveyor simultaneously and represent the total (pumpable and nonpumpable) hazardous waste feedrate.

As established in the approved Comprehensive Performance Test plan and the subsequent Notification of Compliance, the combustion chamber temperature is determined as the hottest average temperature from two hearths, # 3 and # 4 hearth. Locations for the thermocouples for these two hearths and for the secondary Combustion Chamber were chosen by the designer of these combustion systems to best represent the temperature for each of the hearths and the secondary combustion chamber. Note that there are two thermocouples in hearth # 3 that are averaged to determine the hearth # 3 temperature. There are also two thermocouples in the secondary combustion chamber that are averaged to determine the secondary combustion chamber temperature. The specific locations of the hearth thermocouples are presented below in Table 2 - Thermocouple Locations and the attached Drawing Number 095XX-770-003M. The specific locations of the secondary combustion chamber thermocouples are presented below and the attached Drawing Number 095XX-770-004F.

Table 2 - Thermocouple Locations

<table>
<thead>
<tr>
<th>Hearth #</th>
<th>Thermocouple Tag</th>
<th>Location</th>
<th>Insertion Length a</th>
<th>P&amp;I Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>TE-943N, TE-943S</td>
<td>North side &amp; south side elev. 89' 8&quot;</td>
<td>25.5&quot;</td>
<td>095XX-770-003</td>
</tr>
<tr>
<td>4</td>
<td>TE-944</td>
<td>NW quadrant elev. 85' 2&quot;</td>
<td>25.5&quot;</td>
<td>095XX-770-003</td>
</tr>
<tr>
<td>SCC</td>
<td>TE-1021A, TE-1021B</td>
<td>SCC outlet elbow, approx. elev. 90' 0&quot;</td>
<td>22.5&quot;</td>
<td>095XX-770-004</td>
</tr>
</tbody>
</table>

a Insertion lengths may vary from 22" - 30".

63.1207(f)(2)(iii) Normal Chlorine Operating Level

**Requirement:** 63.1207(f)(2)(iii) A description of your normal chlorine operating levels, as specified in paragraph (g)(2)(iii) of this section, and an explanation of how these normal levels were determined.

63.1207(g)(2) Confirmatory performance testing. You must conduct Confirmatory performance testing for dioxin/furan under normal operating conditions for the following parameters:
(iii) You must feed chlorine at normal feedrates or greater.

**Chlorine Feedrate Calculation**

The chlorine feedrate to the MHI (lbs/12 hr) is a calculated value that is a function of two measured parameters, the chlorine content of each batch of sludge and the sludge mass loading rate to the MHI as follows:
\[ F_{cl} = C_{cl} \times \left(\frac{2.2E-06}{2.2}\right) \times F_{sl} \times 12 \]

Where:
- \( F_{cl} \) = Chlorine feedrate to the MHI (lbs Cl/12hr)
- \( C_{cl} \) = Chlorine concentration of the sludge (mg Cl/kg sludge)
- \( \frac{2.2E-06}{2.2} \) = Conversion factor from mg Cl/kg sludge to lb Cl/lb sludge
- \( F_{sl} \) = Sludge feedrate to the MHI (lbs sludge/hr)
- 12 = 12 Hours

The chlorine content of the sludge is determined monthly from a 12-hour grab composite in accordance with the Waste Analysis Plan which is part of the Part 373 Hazardous Waste Management Permit for Eastman Business Park (DEC Permit # 8-2614-00205/00104). The frequency and sample collection methods are included in Table C-1 and the sample analysis method is included in Table C-2 of the Waste Analysis Plan. The sludge feedrate is measured continuously while the MHI is operating.

During the dioxin/furan stack sampling, one 3-hour composite sample will be collected during each test run (3 samples total). Grab samples will be collected at half hour intervals (at approximately \( t = 0, 0.5, 1, 1.5, 2, 2.5 \) and 3 hrs). These seven (7) grabs will be composited into one composite sample for each run. Each of the three samples will be analyzed for chlorine as specified in Table C-2 of the Part 373 Hazardous Waste Management Permit for Eastman Business Park (DEC Permit # 8-2614-00205/00104).

**Determination of the Normal Chlorine Concentration**

Consistent with the methodology for determining operating parameter limits for the Confirmatory Test and NYSDEC requests for the previous CT, RED evaluated the chlorine concentration data for the most recent 12 month period available when the CT plan work commenced (Mar 1, 2019 – Feb 29, 2020). Based on these data, the average chlorine concentration was 491 mg/kg. The average sludge feedrate as shown in Table 1 above was 5,125 lbs/hr RHA.

Using the average sludge chlorine concentration of 491 mg/kg and an average sludge feedrate of 5,125 lbs/hr, which will be the minimum for the CT, the minimum chlorine feedrate is 30 lbs/12 hrs. During the CT, total chlorine will be determined from the quantity of chlorine in the sludge plus additional chlorine added after the sludge is sampled. The additional chlorine will be added as NaCl at 60 lb/12 hr of NaCl (36 lb/12 hr Cl) to ensure the total Cl feedrate is greater than the 30 lb/hr average Cl feedrate. The total feedrate during the CT is expected to fall within the range of 53 lb/12 hr and 112 lb/12 hr. This lower limit of this range is calculated from the minimum expected sludge concentration and the minimum expected sludge feedrate. The upper limit is calculated the same way except using maximum values as shown in the table below. This range is adequately above the annual average of 30 lb/12 hr (CT minimum) and well below the permit limit of 296 lb/12 hr.
### Concentration

<table>
<thead>
<tr>
<th>Concentration of Cl in sludge (mg/kg)</th>
<th>Concentration Basis</th>
<th>Sludge Feedrate (lb/hr)</th>
<th>Sludge Feedrate Basis</th>
<th>Cl added as NaCl (lb/12 hr)</th>
<th>Total Cl Feedrate (lb/12 hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Values</td>
<td>272</td>
<td>minimum value last 12 months</td>
<td>5125</td>
<td>CT minimum (average of last 12 months)</td>
<td>36</td>
</tr>
<tr>
<td>Maximum Values</td>
<td>904</td>
<td>maximum value last 12 months</td>
<td>7000</td>
<td>Maximum expected during CT (although below permit maximum)</td>
<td>36</td>
</tr>
</tbody>
</table>

#### 63.1207(f)(2)(iv) PM Control Device Cleaning Cycle

**Requirement:** 63.1207(f)(2)(iv) If you use carbon injection or a carbon bed, a description of your normal cleaning cycle of the particulate matter control device, as specified in paragraph (g)(2)(iv) of this section, and an explanation of how these normal levels were determined.

This is not applicable because the MHIS does not use carbon injection or a carbon bed. However RED will operate the WESP normally, which includes a cleaning cycle every 2 hours. This will ensure at least one cleaning cycle during each D/F test run which will be 3 hours.

#### 63.1207(f)(2)(v) Sampling and Monitoring Procedures

**Requirement:** 63.1207(f)(2)(v) A detailed description of sampling and monitoring procedures including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis.

### Sampling Procedures

This section describes the procedures that will be followed during the field sampling of the CT program. Throughout the overall program, sampling, analysis and monitoring procedures will be in accordance with all applicable Federal and State protocols including QA/QC directives. Unless otherwise stated, all methods will be from 40 CFR 60, Appendix A. Any deviations that occur from the specified protocols will be fully documented in the Notification of Compliance.

The CT program will entail conducting three flue gas dioxin/furan test runs at normal operating conditions as defined previously. A summary of the sampling activities planned follows:
### Flue Gas Sampling

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sampling Method</th>
<th>Sample Containers (per run)</th>
<th>Analytical Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCDD/PCDF</td>
<td>RM23</td>
<td>3-250mL amber glass, XAD trap sealed in Teflon and wrapped in aluminum foil</td>
<td>PCDD/PCDF</td>
</tr>
</tbody>
</table>

A summary of the number of field samples and quality control samples for dioxin/furan follows:

<table>
<thead>
<tr>
<th>Flue Gas Field Samples</th>
<th>Duplicates</th>
<th>Audit Sample</th>
<th>Field Blanks</th>
<th>Trip Blanks</th>
<th>Matrix Spikes/Dup.</th>
<th>Lab Control Samples</th>
<th>Program Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

### Sampling Location

The exhaust stack sampling location is shown in Figure 1, Sampling Location. This location is the same as the location during the Comprehensive Performance Test. A diagram of the MHI exhaust stack, along with gas sampling locations, is shown in Figure 2, Multiple Hearth Incinerator Exhaust Stack, Sampling Ports & Monitoring. The stack is 42 inches in diameter. Figure 3 also includes a cross sectional area of the stack showing the sampling points to be sampled by the various trains during a run. The sampling locations and points were determined in accordance with 40 CFR Part 60 Appendix A, Methods 1 and 2. Sampling will be conducted at 8 points on each traverse for a total of 16 sampling points during a run.

### Flue Gas Sampling

The flue gas sampling shall consist of running a single sampling train to collect the required emissions test data. The sampling train for the dioxin/furan sampling will be identical to the sampling train used during the Comprehensive Performance Test. Once a sample probe is inserted into the stack, the open space around the probe will be filled to as great an extent as possible with a packing material. Towels will be utilized to fill this open space in order to eliminate in-leakage of ambient air into the stack flue gas. A brief description of the activities that will be performed in running the sampling train and the CEMS is provided in the next two subsections.

### Method 23 PCDD/PCDFs

The DEC approved use of Method 23 instead of SW-846 Method 0023a for the 2018 CPT at the MHI. This method is proposed again for the reasons discussed below.

Additionally, it is also proposed to use acetone and toluene instead of acetone, toluene and methylene chloride for container 2 rinses due to carcinogen concerns. This modification to Method 23 was approved by EPA for use in incinerators as ALT052 on February 24, 2009.
**63.1207(f)(1)(xv)**

**Requirement:** 63.1207(f)(1)(xv) If you request to use Method 23 for dioxin/furan you must provide the information required under §63.1208(b)(1)(i)(B);

§63.1208(b)(1)(i) (B) Method 23, provided in appendix A, part 60 of this chapter, after approval by the Administrator.

(1) You may request approval to use Method 23 in the performance test plan required under § 63.1207(e)(i) and (ii).

(2) In determining whether to grant approval to use Method 23, the Administrator may consider factors including whether dioxin/furan were detected at levels substantially below the emission standard in previous testing, and whether previous Method 0023 analyses detected low levels of dioxin/furan in the front half of the sampling train.

(3) Sources that emit carbonaceous particulate matter, such as coal-fired boilers, and sources equipped with activated carbon injection, will be deemed not suitable for use of Method 23 unless you document that there would not be a significant improvement in quality assurance with Method 0023A.

RED believes the MHI meets the requirements for the use of Method 23 because previous testing has shown that the levels of dioxin were well below the requirement. As shown in Table 3, the levels during all the previous tests used for MACT compliance were less than 2% of the dioxin/furan (D/F) standard. This confirms that not only were total D/Fs well below the standards, but very low levels were found in both the front and back halves of the sampling train. This means there will be no significant difference in results if the additional funds are spent to analyze the front half separately to improve the precision. Additionally, the MHI is not the type of source, coal burning or carbon injection, likely to have a lot of carbonaceous material that would be found in the front half. The MHI has a highly efficient secondary combustion chamber that combusts any carbonaceous material coming from the multiple hearth, and the MHI was demonstrated to have a high DRE level in the previous DRE testing (>99.999%) and low particulate emissions (<26% of the standard) for all previous compliance tests.
## Table 3 - Comparison of Standards to MHI Test Results

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Units</th>
<th>Standard (63.1219)</th>
<th>MHI 2001 Trial Burn-Data in Lieu of CPT</th>
<th>2008 MHI CPT</th>
<th>2011 CT</th>
<th>2013 CPT</th>
<th>2015 CT</th>
<th>2018 CPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/Fs</td>
<td>ng/DSCM TEQ@7%O2</td>
<td>0.4 for wet APCE</td>
<td>0.0034</td>
<td>0.0062</td>
<td>0.0019</td>
<td>0.0035</td>
<td>0.0009</td>
<td>0.0062</td>
</tr>
<tr>
<td>D/Fs</td>
<td>Fraction of standard</td>
<td>.009</td>
<td>.016</td>
<td>.005</td>
<td>.009</td>
<td>.002</td>
<td>.016</td>
<td></td>
</tr>
</tbody>
</table>

A Method 23 train (identical to the sampling train used during the Comprehensive Performance Test) will be used for the collection of PCDD/PCDF. A schematic of the Method 23 sampling train is shown in Figure 3. The sample train will consist of a heat-traced probe with a borosilicate buttonhook nozzle; an attached thermocouple and S type pitot tube. The glass probe will be maintained at a temperature of 250 °F +/- 25 °F. After the probe, the gas will pass through a heated glass fiber filter. Downstream of the heated filter, the sample gas will pass through a water-cooled module, then through a sorbent module containing the XAD-2 sorbent resin. The XAD module, which will be kept at a temperature below 20 °C, will be followed by a series of four impingers. The XAD inlet temperature will be monitored to ensure that the proper temperature is maintained. The first impinger, which will act as a condensate reservoir will be connected to the outlet of the XAD module and will be modified with a short stem so that the sample gas will not bubble through the collected condensate. The first impinger will be empty. The second and third impingers will each contain 100 mls of HPLC Grade or better water and the fourth impinger will contain a pre-weighed amount of silica gel. All connections within the train will be either glass or Teflon; no sealant greases will be used. The impingers will be followed by a pump, a dry gas meter, and a calibrated orifice meter.

Sampling will be conducted isokinetically with readings of the flue gas parameters recorded at every sampling point during the traverse. In the event that isokinetic sampling cannot be maintained due to a high-pressure drop through the sampling train, the train will be shut down and the problem will remedied. In the event that steady operation cannot be maintained, or there are fluctuations in the monitored gas parameters, the testing will be suspended until these conditions are stabilized. Sampling will be conducted at sixteen (16) sampling points (eight (8) points on each traverse) for at least eleven (11) minutes per point to ensure that a minimum of two and a half (2.5) cubic meters will be collected during a run. Each of these runs will be a total of one hundred eighty (180) minutes long.

Leak checks on the sampling train will be conducted at the same frequency and following the same procedure as described for Method 23 above and will be subject to the same acceptance criteria. Prior to each test run, the nozzle will be plugged and the train will be leak checked at a
minimum vacuum of 15 inches Hg. If the leak rate exceeds 0.02 cubic feet per minute (cfm), the source
of the leak will be determined and repaired. The leak check will be repeated prior to the port change at
the highest vacuum seen during that half of the run. If the leak rate exceeds 0.02 cfm, the run will be
discarded. After the port change, the train will again be leak checked. Any leaks associated with the port
change will be located and repaired. After the run, the train will be leak checked at the highest vacuum
seen during the run. A leak rate of 0.02 cfm or less will indicate an acceptable run. The sample train
leak checks and leakage rate will be documented on the field test data sheet for each
respective run.

Following completion of each test run, the Method 23 train will be transported to a recovery
area on-site. Recovery will be conducted as prescribed in Method 23. An attempt will be made
to conduct the sample cleanup in an area out of the direct sunlight.

Continuous Emission Monitoring
The installed plant-site CEMS will measure CO and O₂ in the exhaust stack. A Performance
Specification Test (PST) will be conducted prior to the execution of the stack sampling part of
the CT. The Performance Specification Test is included as Appendix A. Utilization of the site
CEMS for gathering the CO and O₂ emissions data during the CT will eliminate the need for
additional instrumentation at the site and eliminate redundancy. The O₂ data from the site
CEMS will be used to correct CT emissions data to 7% O₂. The measured CT CO data will be
used as a component in calculating molecular weight of the stack gas for each CT run to verify
process emissions relative to proposed operating limits. A schematic of the site CEMS is shown
in the CEMS Performance Specification Test Plan. A daily zero and span check will be
performed on the CEMS to verify accuracy. The CEMS data will be considered equivalent to
method 10 and 3A based on the successful completion of the PST. Data from the CO & O₂
monitors will be recorded by the plant installed CEMS data acquisition system (DAS).

All calibration, drift and response time checks will be performed on the reference systems as
described in the applicable method (3A). The response time determined during the PST will be
used for the plant CEMS.

Sample Custody
As outlined in USEPA SW-846, Section 9.2.2.5, chain of custody forms will be used to trace the
possession and handling of all samples from time of collection through analysis. Sample
preservation and holding times will be:

<table>
<thead>
<tr>
<th>Flue Gas Measurement (parameter)</th>
<th>Preservation</th>
<th>Holding Time</th>
<th>Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCDD/PCDF</td>
<td>Cool 4 °C or On Ice</td>
<td>Extract 30 days, Analyze 45 days</td>
<td>Solid, Solid Adsorbent Organic Liquid, Aqueous a</td>
</tr>
</tbody>
</table>
For flue gas samples, solid matrix refers to particulate filter, solid adsorbent matrix refers to XAD, organic liquid matrix refers to various rinses, and aqueous matrix refers to the various solutions that the sampling trains are charged with.

Also, the following items will be utilized:

a) Sample Bottles - The samples will be collected and stored in amber glass containers and will be capped with TEFILON-lined closures.

b) Sample Labels - All sample containers will be labeled and will include a sample number, name of collector, date, time, place of collection, description, and associated hazard labels.

c) Sample Seals - All sample bottles will be sealed to prevent tampering prior to analysis.

d) Field Logbook - All samples will be logged into a field logbook, which includes all information required on the label and any necessary observations.

e) Chain of Custody Record - A chain-of-custody form will be filled out and will accompany all samples.

f) Sample Analysis Request Form - As part of the chain-of-custody form or on a separate form, each sample will have a sample analysis request sheet that accompanies the sample to the lab and explains which analyses are required.

g) Shipment of Samples - Samples will be marked showing the liquid level and carefully packed and shipped to prevent breakage, spillage, or tampering during shipment. Samples requiring refrigeration will be packed in an ice cooler.

h) Receipt of Samples - The laboratory will log in all samples received. Handling/receipt of samples will be recorded on the chain-of-custody form.

i) Laboratory Logbook - The laboratory will maintain a logbook, which contains information on the analytical run for each sample, which performed the analysis, and any pertinent observations.

In cases where data are being collected by continuous monitors (i.e., CO and O2,) charts will be labeled to identify the start and stop times of CT runs, and retained.

Glassware Preparation
Sample train glassware and sample containers will require specialized cleaning to avoid contamination of the sample from the collection containers or sampling equipment. Cleaning procedures for the sample train glassware is summarized below. Note that all bottle caps will be fitted with Teflon liners, which are cleaned in the same manner as the bottles themselves. Sample containers will be purchased pre-cleaned to specified EPA standards.

- Method 23 glassware and containers: hot tap water rinse, soapy water wash, tap water wash, DI water rinse, chromic acid rinse, hot water rinse, DI water rinse, acetone rinse, and air dry. XAD traps and filters will be pre-cleaned following the procedures outlined for PCDD/PCDF sampling under Method 23.

- Final rinses of sampling glassware will be conducted using organic-free DI water having equivalent quality ≥ ASTM Type II water (ASTM D1193-77).
Sample Media Preparation
All reagents to be used will be checked to minimize the probability of using contaminated solvents. This check will include the use of pesticide grade or better solvents from the same lot and the collection of the appropriate number of blanks. All filters will be desiccated and properly tare-weighed prior to use. The XAD traps and filters to be used in the PCDD/PCDF sampling trains will be supplied to sampling crews just prior to the field effort by the laboratory. The XAD traps and filters will be conditioned and be subject to QA/QC in accordance with the procedures in RM23.

Other Presampling Activities
Site set-up will be the final presampling activity. This task will involve moving the sampling equipment to the vicinity of the sampling area. During set-up, preliminary measurements will be taken to determine flue gas moisture and flow rate. Preliminary flue gas moisture will be determined in accordance with 40 CFR Part 60 Appendix A Method 4. Preliminary flow rate measurements will be conducted following 40 CFR Part 60 Appendix A, Methods 1 and 2. This data will be used to calculate the appropriate nozzle size and sample flow rates to be used to accomplish isokinetic sampling. A cyclonic flow check will be conducted during these preliminary measurements to verify the absence of cyclonic flow. The cyclonic flow check will be included in the Notification of Compliance.

Calibration Procedures and Frequencies
All sampling equipment will be calibrated as prescribed in the methods provided in 40 CFR Part 60 Appendix A, SW 846 Test Methods, applicable ASTM protocols and applicable guidance documents.

All sampling equipment to be used for this program will be calibrated prior to being mobilized to the site. Calibration procedures will follow guidelines provided in the EPA document entitled "Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods" (EPA-600/4-77-027b). All calibrations will be performed prior to and at the conclusion of the CT.

- **Probe Nozzles** - Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.025 mm (0.001 in). Make measurements at three separate places across the diameter and obtain the average of the measurements. The difference between the high and low values should not exceed 0.1 mm (0.004 in). Post-test check - inspect for damage.
- **Pitot Tubes** - measure for appropriate spacing and dimensions or calibrate in a wind tunnel. The rejection criteria are provided on the calibration sheet. Post-test check - inspect for damage.
- **Thermocouples** - Verify against a mercury -in-glass thermometer at three points including the anticipated measurement range. Acceptance limits are - impinger +/-2 °F, dry gas meter +/-5.4 °F and stack +/- 1.5% of the stack temperature.
• **Dry Gas Meters** - Calibrate against a wet test meter. Acceptance criteria - pre-test $Y_i = Y_i \pm 0.2$; post-test $Y = Y_i \pm 0.05Y_i$.

• **Balance** - Service and certify annually by the manufacturer. Prior to obtaining first weights confirm accuracy by placing a known S-type weight on the balance.

• **Calibration of Continuous Emission Monitors** - The site CEMS will be calibrated as prescribed in 40 CFR 60 Appendix A.

**Laboratory Equipment**

All laboratory equipment will be calibrated and maintained following the applicable method and National Environmental Laboratory Accreditation Certification (NELAC) requirements.

**Analytical Procedures**

This section describes the analytical protocols, which will be used to analyze the samples collected during the CT Program. Samples will be submitted to a NELAC Environmental Laboratory for analysis. The analytical summary for the CT follows:

<table>
<thead>
<tr>
<th>Flue Gas Field Samples</th>
<th>Duplicates</th>
<th>Audit Sample</th>
<th>Field Blanks</th>
<th>Trip Blanks</th>
<th>Matrix Spikes/Dup.</th>
<th>Lab Control Samples</th>
<th>Program Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

**Flue Gas Sample Analysis**

The flue gas samples will be analyzed for PCDD/PCDF by SW-846, Method 8290 with an Anticipated Detection Limits of 0.02 ng/m$^3$ for flue gas samples. The following subsection outlines the analytical procedure to be employed when analyzing the flue gas samples collected during the CT.

**PCDDs and PCDFs**

The concentration of PCDD/PCDF in the stack gas will be determined through the analysis of the PCDD/PCDF train sample using GC/MS procedures from SW-846 Method 8290. Collected samples will consist of separate containers for the acetone and toluene rinses, particulate filter, and the XAD resin wrapped in Teflon and packaged in aluminum foil. The samples will be extracted following the procedures delineated in Method 23 & 8290.

Analysis for 2,3,7,8-TCDD and TCDF and the tetra- through octa-chlorinated PCDD/PCDF homologues will be performed on the flue gas samples. Quantification of the following PCDD/PCDF will be performed using HRGC/HRMS procedures detailed in the Method 8290.

<table>
<thead>
<tr>
<th>PCDDs</th>
<th>PCDFs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,3,7,8-TCDD</td>
<td>2,3,7,8-TCDF</td>
</tr>
<tr>
<td>Total TCDD</td>
<td>Total TCDF</td>
</tr>
</tbody>
</table>
PCDDs
1,2,3,7,8-peCDD
Total PeCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-HxCDD
Total HxCDD
1,2,3,4,6,7,8-HpCDD
Total HpCDD
OCDD

Total PCDD

PCDFs
1,2,3,7,8-TeCDF
2,3,4,7,8-TeCDF
Total PeCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
2,3,4,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
Total HxCDF
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
Total HpCDF
OCDF

Total PCDF

Handling of Method Blanks
Method blanks with detected quantities for a specific congener are handled consistently with the broad guidelines in EPA’s National Functional Guidelines for High Resolution Superfund Methods Data Review, April, 2016. Except for OCDD/OCDF, results that are 5x the highest contaminated associated blank are reported as nondetect (U). Results greater than 5x are reported without qualification. For OCDD/OCDF, results that are 10x the highest contaminated associated blank are reported as nondetect (U) and results greater than 10x are reported without qualification. This approach is based on Section E 4 of the guidance.

Quality Assurance/Quality Control
Applicable Quality Assurance/Quality Control (QA/QC) protocols will be adhered to ensure the production of useful and valid data throughout the CT. The QA/QC checks and procedures described in this section represent an integral part of the overall sampling and analytical scheme.

In addition to the QA/QC procedures detailed in the following sections, the sampling crews will consist of skilled and experienced engineers, scientists and technicians.

Precision
Precision is defined as the degree of mutual agreement among individual measurements made under prescribed conditions. Precision goals are based upon laboratory control samples for the flue gas samples because co-located, concurrently operated sampling trains will not be utilized for the stack sampling. Instead, three sampling runs will be performed and a comparison of their results will ensure their validity.
Completeness
Completeness is defined as the percent of samples judged to be valid compared to the total number of samples collected. Completeness will be reported as the percentage of all measurements judged to be valid. Every attempt will be made to ensure that all data generated will be valid data. The objective is to have 100 percent of the data valid.

The following formula will be used to determine completeness:

\[ C = \frac{V}{T} \times 100 \]

where
\[ C \] = Percent Completeness
\[ V \] = Number of Measurements Judged Valid
\[ T \] = Total Number of Planned Measurements

Representativeness and Comparability
Representativeness is defined as "the degree to which data accurately and precisely represents the characteristics of a population, the parameter variations at a sampling point, process conditions, and environmental conditions."

Comparability is defined as "expressing the confidence with which one data set can be compared to another set of data collected under similar conditions". It is recognized that the usefulness of the data is also contingent upon meeting the criteria for representativeness and comparability. Wherever possible, reference methods and standard sampling procedures will be used. The representativeness QA objective is that all measurements be representative of the media and operation being evaluated. The detailed requirements for flue gas sampling for PCDD/PCDF given in the method that will be followed will ensure representative sampling of the gas stream.

The comparability QA objective is that all data resulting from sampling and analysis be comparable with other representative measurements on this or similar processes operating under similar conditions. The use of published sampling and analytical methods and standard reporting units will aid in ensuring the comparability of the data.

Internal Quality Control Checks
A summary of the QA samples to be collected for this program has been provided above. Quality control checks are performed to ensure the collection of representative samples and the generation of valid analytical results on these samples. These checks will be performed by the project participants throughout the program.

Data Collection and Sampling QC Procedures
QC checks for the process data collection and sampling aspects of this program will include, but not be limited to, the following:
1. Use of standardized checklists and field notebooks to ensure completeness, traceability, and comparability of the process information and samples collected.
2. Field checking of standardized forms by a second person to ensure accuracy and completeness.
3. Strict adherence to the sample traceability procedures outlined above in this CT Plan.
4. Submission of a field-biased blank sample.
5. Leak checks of sample trains before, during port change and after sample collection.

**Sampling Equipment QC Checks and Frequency**

Calibration of the field sampling equipment will be performed prior to and at the conclusion of the field sampling effort. Copies of the calibration sheets will be provided to the field team leader for on-site reference, and included with the project file. Calibrations will be performed as described in the EPA publication "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods".

Leak checks of the sample trains will be conducted in accordance with the protocol called out for each method. Leak checks will be conducted prior to, during port change and at the conclusion of sample collection.

**Sample Collection QC Checks**

Field blanks of reagents and collection media (deionized water, filters, impinger solutions, XAD traps etc.) will be placed in appropriately cleaned and sized sample containers in the field and handled in the same way as actual field samples, to provide a QC check on sample handling.

Sample collection QC checks will be as follows:

- One blank PCDD/PCDF train
- One PCDD/PCDF audit sample from EPA

**Laboratory Control Samples (LCS)**

Control Samples (LCS) - These samples are generated from spikes prepared independently from the calibration concentrates. The LCS is used to establish that an instrument or procedure is in control. An LCS is normally carried through the entire sample preparation and analysis procedure also.

**Quality Control of Sorbents**

The filters and XAD resin traps for the PCDD/PCDF train shall be provided to field crew by the contracted laboratory after having completed the required pre-cleaning steps.

The quality and cleanliness of the XAD will be verified by GC/MS. After the traps have been prepared, the laboratory will spike the XAD traps with the appropriate surrogate compounds. These surrogate compounds shall consist of a carbon 13 form of tetrachlorobenzene and five surrogate PCDD/PCDF compounds.
**Performance and System Audits**
The Quality Assurance Program includes both performance and system audits as independent checks on the quality of data obtained from sampling, analysis, and data gathering activities. Every effort will be made to have the audit assess the measurement process in normal operation. Either type of audit may show the need for corrective action.

**Performance Audits**
The sampling, analysis, and data handling segments of a project are checked in a performance audit. A different operator/analyst performs these audit operations to ensure the independence of the quantitative results. If requested by NYSDEC, audits such as PCDD/PCDF may be performed.

**System Audits**
A system audit is a qualitative review to ensure that the quality measures outlined in this CT Plan are in place. The Project Manager or his/her appointee will select projects representing different types of measurement activities for audit by the QA staff. This project may be audited under this policy and, if so, a written report will be submitted.

**Preventative Maintenance**
Preventive maintenance and calibration of equipment and instruments helps to assure accurate measurements from field and laboratory instruments.

All equipment that is scheduled for field use will be cleaned and checked prior to calibration. Once the equipment has been calibrated, sample trains are assembled and leak checked in order to reduce problems in the field. An adequate supply of spare parts will be taken to the field to minimize downtime from equipment failure.

The laboratories will calibrate and maintain their instrumentation in accordance with the instrument manufacturers’ specifications and appropriate methods as well as certifications prescribed by NYS.

**Data Reduction, Validation, and Reporting**
Specific QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in all projects.

**Field Data Reduction**
Standardized data sheets will be used to record field-sampling data. The data collected from each train will be reviewed in its entirety in the field by the Field Team Leader and at least one other field crewmember. Errors or discrepancies will be noted in a field notebook. The field team leader has the authority to institute corrective actions in the field. If necessary, the project manager will also be consulted for resolution if the situation warrants and the appropriate RED representative will be notified of the situation.
Laboratory Analysis Data Reduction
Analytical results will be reduced to concentration units specified by the analytical procedure, using the equations given in the analytical procedures. If units are not specified, data from the analysis of liquid samples will be reported in units of mg/l. Data from the analysis of solid samples will be reported as mg/Kg. Data from the analysis of gas samples will be reported as ug/ft3. This value will be calculated by dividing the total weight of the substance by the volume of the gas sampled.

If the method blank results meet the acceptance criteria, the analytical laboratory will report the sample results and the method blank results. If the method blank results do not meet the acceptance criteria and reanalysis is not practical, then the analytical laboratory will report the sample results, the method blank results and a discussion of the corrective actions taken by the lab.

Data Validation
Data validation is the process of filtering data and accepting or rejecting it on the basis of sound criteria. Supervisory and QC personnel will use validation methods and criteria appropriate to the type of data and the purpose of the measurement. Records of all data will be maintained, even that judged to be an "outlying" or spurious value. The persons validating the data will have sufficient knowledge of the technical work to identify questionable values.

Field sampling data will be validated by the Field Team Leader based on his or her judgment of the representativeness of the sample, maintenance and cleanliness of sampling equipment and the adherence to approved, written sample collection procedure.

Analytical data will be validated by the subcontractor laboratory QC personnel using criteria outlined in this CT Plan and applicable reference methods. Results from the field blank and laboratory internal QC samples will be used to further validate analytical results. QC personnel will review all subcontractor laboratory raw analytical data to verify calculated results presented. The following criteria will be used to evaluate the field sampling data:

- Use of approved test procedures
- Proper operation of the process being tested
- Use of properly operating and calibrated equipment
- Leak checks conducted before, during port change and after tests
- Use of reagents that have conformed to QC specified criteria
- Proper traceability maintained

The criteria listed below will be used to evaluate analytical data:

- Use of approved analytical procedures
- Use of properly operating and calibrated instrumentation
• Precision and accuracy achieved should be comparable to that achieved in previous analytical programs and consistent with the objectives stated in the CT Plan.

63.1207(f)(2)(vi) Test Schedule

Requirement: 63.1207(f)(2)(vi) A detailed test schedule for each hazardous waste for which the performance test is planned, including date(s), duration, quantity of hazardous waste to be burned, and other relevant factors.

RED plans to execute the CT following the approval of the CT Plan. Tentative dates for conducting the CEMS PST, CMS PET and the Stack Test program are shown in Table 4 below:

Table 4 – Planned Test Schedule Overview

<table>
<thead>
<tr>
<th>Test Plan Activity</th>
<th>Duration (days)</th>
<th>Tentative Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEMS Performance Specification Test</td>
<td>7</td>
<td>Between August 24 and September 22, 2020</td>
</tr>
<tr>
<td>CMS Performance Evaluation Test</td>
<td>5</td>
<td>Between August 24 and September 22, 2020</td>
</tr>
<tr>
<td>Stack Testing</td>
<td>2</td>
<td>September 23 - 24, 2020</td>
</tr>
</tbody>
</table>

Actual dates could be different depending on date of approval of the test plan, schedules of testing personnel, sludge loads, operating dates, weather and unforeseen issues. A final schedule will be communicated to the Agency following approval of the CT test plan.

Details on the specific activities and timing for the CEMS PST and the CMS PET are presented in the CEMS Performance Specification Test Plan and the CMS Performance Evaluation Test Plan presented in Appendix A and Appendix B, respectively.

A tentative schedule to conduct the stack test program is as follows:

Day 1  Test crew arrives on-site, participates in safety orientations and sets equipment to conduct test, RED completes final preparation activities for the CT.
Day 2  Conduct Runs # 1 and # 2.
Day 3  Conduct Run # 3.
Day 4  Pack and ship samples from the site and demobilize test equipment.

A detailed breakdown of each of the stack testing day is shown in Table 5 below:
### Table 5 – Detailed Testing Schedule

<table>
<thead>
<tr>
<th>Day</th>
<th>Clock Time</th>
<th>Hours</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 2</td>
<td>07:00</td>
<td>0</td>
<td>RED begins operating the MHI under the test operating and feed conditions</td>
</tr>
<tr>
<td></td>
<td>09:00</td>
<td>2</td>
<td>Run 1 begins</td>
</tr>
<tr>
<td></td>
<td>12:00</td>
<td>5</td>
<td>Complete Run 1, Recover Sampling Trains</td>
</tr>
<tr>
<td></td>
<td>13:00</td>
<td>6</td>
<td>Run 2, begins</td>
</tr>
<tr>
<td></td>
<td>16:00</td>
<td>9</td>
<td>Complete Run 2, Recover Sampling Trains</td>
</tr>
<tr>
<td></td>
<td>18:00</td>
<td>11</td>
<td>Depart Site</td>
</tr>
<tr>
<td>Day 3</td>
<td>07:00</td>
<td>0</td>
<td>RED begins operating the MHI under the test operating and feed conditions</td>
</tr>
<tr>
<td></td>
<td>09:00</td>
<td>2</td>
<td>Run 3 begins</td>
</tr>
<tr>
<td></td>
<td>12:00</td>
<td>5</td>
<td>Complete Run 3, Recover Sampling Trains</td>
</tr>
<tr>
<td></td>
<td>14:00</td>
<td>7</td>
<td>Depart Site</td>
</tr>
</tbody>
</table>

The test schedule presented in this table does not account for unforeseen test delays due to sampling or process equipment failure and inclement weather. Regardless of the cause for any test delay, normal testing procedures will be resumed at the earliest possible opportunity. Depending on the type and duration of any delay, a test run/condition may be resumed from the point the testing was delayed or from the beginning. Reasonable steps will be taken to avoid the possibility of test delays. However, if such delays do occur, an on-site decision will be made in cooperation with any Agency observer(s) regarding which re-start protocol will be followed.

### 63.1207(f)(2)(vii) Test Protocol

**Requirement:** 63.1207(f)(2)(vii) A detailed test protocol, including, for each hazardous waste identified, the ranges of hazardous waste feedrate for each feed system, and, as appropriate, the feedrates of other fuels and feedstocks, and any other relevant...
parameters that may affect the ability of the hazardous waste combustor to meet the dioxin/furan emission standard.

This section discusses the details of the CT execution. The operating conditions for which the unit will be tested represent the "normal" case in terms of waste feed composition, waste feed rates, combustion temperatures, combustion gas flow rates, thermal inputs, and APCE parameters as required by 40CFR63.1207(g).

As described in previous sections of this test plan, the CT Target Normal Operating Conditions are summarized in Table 6 below:

**Table 6 – CT Operating Target Ranges**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>0 ppmv</td>
<td>100 ppmv</td>
</tr>
<tr>
<td>Combustion Chamber Temperature</td>
<td>1502 °F RHA</td>
<td>1575 °F RHA</td>
</tr>
<tr>
<td>SCC Temperature</td>
<td>1600 °F RHA</td>
<td>1655 °F RHA</td>
</tr>
<tr>
<td>Flue Gas Flowrate</td>
<td>7,034ACFM RHA</td>
<td>12,963 ACFM RHA</td>
</tr>
<tr>
<td>Hazardous Waste Feedrate</td>
<td>5125 lbs/hr RHA</td>
<td>8965 lbs/hr RHA</td>
</tr>
<tr>
<td>Chlorine Feedrate</td>
<td>30 lbs/12 hr *</td>
<td>296 lbs/12 hr</td>
</tr>
</tbody>
</table>

*The wastewater treatment process results in dewatered sludge that tends to be homogenous. There are no special blending processes utilized. During the CT, the waste feed will consist of typical sludge and grit. Because there is only one waste feed to one location, there is no further breakdown of waste by type or feed location. Operating conditions for other combustion system operating parameters and the air pollution control system will be within the limits established by the current NOC. NaCl will be added as needed to achieve the minimum desired Cl concentration.

Up to approximately 15,000 scfm of combustion air is provided to the MHI by a 100 horsepower (hp) induced draft fan. Combustion air is provided to specific areas in the multiple hearth by a forced draft blower with a rating of 2500 scfm at 7" static pressure and 5 hp.

Commercially available natural gas is fed to the MHI at the rate of up to about 12,400 cfh at 3.5 psig. A maximum heat load of approximately 32 MMBTU/HR is available at the MHI. In the event of an automatic waste feed cutoff, natural gas will continue to be used to maintain the combustion temperature inside the hearth and the secondary combustion chamber above the permit limit for a duration of at least two hours and fifteen minutes to ensure that the sludge remaining in the hearth is burned out.

All other operating parameters will be maintained within permitted limits as established by the latest NOC.
63.1207(f)(2)(viii) Emission Control Equipment

Requirement: 63.1207(f)(2)(viii) A description of, and planned operating conditions for, any emission control equipment that will be used.

Flue gases leaving the Secondary Combustion Chamber (SCC) enter the Air Pollution Control Equipment (APCE) where particulates, metals and acid gases are removed in staged equipment consisting of: a quench chamber, a packed bed condenser/scrubber, an entrainment separator, a variable throat venturi, and a wet electrostatic precipitator (WESP). Design specifications for these devices are contained in Table 9 in the Comprehensive Performance Test Plan (submitted August 21, 2017 with revisions on January 2, 2018).

The hot flue gases from the SCC are first quenched to adiabatic saturation temperature in the quench. Quench water is once-through secondary treatment effluent. The quench water is continuously discharged from the quench bottom sump and returned to the wastewater treatment plant for treatment to prevent build-up of suspended and dissolved solids.

The Condenser, using once through secondary treatment effluent water, is a countercurrent flow packed scrubber equipped with a structured packing that resists build up and plugging. As gases pass through the packed section, they are sub-cooled and water vapor condensed. In the condensation process, fine particles are formed which further act as nuclei to promote the growth of larger particles which are more easily collected downstream by the Venturi Scrubber. The cooled gases exit the Condenser through a mist eliminator and enter the Venturi Scrubber.

The Venturi is an inertial impaction device where the gases containing particles are accelerated into the high velocity 'throat' area. At the throat, water injected from above is sheared into millions of droplets, which collide and encapsulate the gas particles. Particle collection efficiency is directly related or proportional to the pressure drop across the throat and it is inversely proportional to the size of the particle contained in the gas stream. As the gas flow varies through the scrubber, a damper in the throat can be manually or automatically modulated to maintain a constant pressure drop. The Venturi differential is calculated by the DCS once every second by subtracting the inlet pressure (PT 1097) from the outlet pressure (PT 1091). The scrubber water is supplied by the wastewater secondary treated effluent (STE), which makes up a recycle stream feeding the Venturi and the entrainment separator.

The gases and droplets containing particles exit the Venturi and enter into the Entrainment Separator where water droplets are separated from the gas stream and more secondary treatment effluent water is used to clean the separator. Liquid that drains into the sump below is recycled back to the Venturi. The pH of the recycled liquid is monitored. Suspended and dissolved solids build-up is controlled by a continuous blow down loop.

The gas stream from the Entrainment Separator is next passed through a wet electrostatic precipitator (WESP). The WESP is a final 'polishing' device that removes submicron particulate matter not captured by the Venturi. The particulate laden gas flows into the region between discharge and collecting electrodes. The particles are charged by high intensity corona. The
charged particles are then driven electrostatically to the grounded collecting electrodes. The collecting tubes of the WESP are periodically flushed with water to remove collected matter. The WESP drains, other APCE drains, and any equipment overflows, go to an existing sump where they are pumped back into the wastewater treatment plant for treatment.

The treated gas exits the WESP through an induced draft (ID) fan and a silencer in the discharge duct, and is dispersed to the atmosphere by a stack. The ID fan inlet damper is automatically adjusted to control the MHI draft. In addition, the draft can be controlled by changing the fan speed by the use of a variable frequency drive (VFD). The system is always under negative pressure.

A plume suppression burner reheats stack gases to approximately 175 deg F in order to create adequate gas exit velocity for dispersion. Reheating also minimizes plume formation. A differential pressure element mounted in the stack measures exhaust gas flow. Sampling ports are installed in the exhaust stack at rooftop and sub-roof levels.

As previously stated, during the CT, operating conditions for the air pollution control system will be within the limits established by the latest NOC.

Fugitive Emissions Control
Fugitive emissions to the atmosphere are controlled during normal operation by the negative draft maintained throughout the MHIS. An alarm for positive MHI pressure warns the operator in the control room if the process or system momentarily fails to maintain the desired negative pressure set point. In the event of the loss of negative draft, waste feed will be automatically cutoff. All equipment access doors, inspection openings, and the ductwork leading to the stack following the discharge of the ID fan are sealed with bolted flanges or otherwise secured.

63.1207(f)(2)(ix) Equipment Malfunction Shutdown Procedures

Requirement: 63.1207(f)(2)(ix) Procedures for rapidly stopping the hazardous waste feed and controlling emissions in the event of an equipment malfunction.

The Distributed Control System (DCS) includes an automatic waste feed cutoff (AWFCO) system that stops the hazardous waste feed when the control system records an operating condition outside the limits necessary to comply with permit conditions. The parameter Continuous Monitoring Systems (CMS) and the Continuous Emissions Monitoring Systems (CEMS) described in this plan are integrated with the AWFCO system. Each AWFCO parameter has an alarm and alarm message associated with it that audibly sounds and logs in the control room when the interlock set point for parameter is approached. The DCS compares the instantaneous and/or calculated rolling average values, depending on the parameter averaging time requirements, to the corresponding parameter interlock set point. Upon reaching an interlock set point, the DCS activates a shutoff command to stop the hazardous waste feed. In addition, an AWFCO will be initiated if the lower or upper range limits of any CMS instrument is exceeded during a one-
minute average. Additional AWFCO trips occur if any CMS instrument measurement DCS software is turned off or sends an invalid data input.

Waste feed will be stopped in the event of an emergency if the AWFCO procedures described above have not already automatically shut off the waste feed. If possible, the waste will be burned out at a controlled rate with natural gas. If that is not possible the following procedures shown in Table 7 will be followed (Note that there are two different sets of shutdown actions that can each be triggered by several parameters as shown):

**Table 7 – Shutdown Actions**

<table>
<thead>
<tr>
<th>SHUTDOWN PARAMETERS</th>
<th>SHUTDOWN ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Instrument air pressure &lt; 25 psig for 30 sec or 2. SCC Emergency Cap open.</td>
<td>1. Stop all waste feed and fuel to the MHI and SCC. 2. Maintain all water flows to the APCE.</td>
</tr>
<tr>
<td>1. ID fan loss due to loss of electric power or 2. Quench exhaust gas &gt; 250 F for 30 sec or 3. Hearth draft positive for 30 sec</td>
<td>1. Stop all waste feed and fuel to the MHI and SCC. 2. Shutdown ID fan. 3. Open SCC emergency cap. 4. Maintain all water flows to the APCE.</td>
</tr>
</tbody>
</table>

If the induced draft fan must be stopped, the emergency natural draft by-pass stack on the SCC will be opened. This stack is sufficiently tall to vent and disperse MHI gases directly into the atmosphere. This will prevent fugitive emissions from escaping either into the building or at ground level.

**63.1207(f)(2)(x) Other Information**

**Requirement:** 63.1207(f)(2)(x) Such other information as the Administrator reasonably finds necessary to determine whether to approve the confirmatory test plan.

This in not applicable because the administrator has not requested any additional information to date.
III – Notification of Compliance

Within 90 days of completion of the CT, RED will postmark a Notification of Compliance documenting compliance or noncompliance with the applicable dioxin/furan emission standard in accordance with the requirements in 63.1207(j)(2).
FIGURE 1. SAMPLING LOCATION

- HEARTH
- SECONDARY COMBUSTION CHAMBER
- VENTURI SCRUBBER
- QUENCH
- SCRUBBER CONDENSER
- WET ELECTROSTATIC PRECIPITATOR
- SUMP
- BURNER
- STACK
- ID FAN
- SILENCER
- FLUE GAS SAMPLE LOCATION
- PRIMARY COMBUSTION CHAMBER
- WASTE HEARTH
- ASH
- QUENCH BLOWDOWN
- SCRUBBER / CONDENSER BLOWDOWN
- VENTURI BLOWDOWN
- WESP BLOWDOWN
FIGURE 2. MHI EXHAUST STACK, SAMPLING PORTS AND MONITORING
FIGURE 3. METHOD 23 – PCDD / PCDF SAMPLING TRAIN
Appendix A

MHI Continuous Emissions Monitoring System Performance Specification Test
RED Rochester, LLC

CONTINUOUS EMISSION MONITORING SYSTEM
PERFORMANCE SPECIFICATION TEST PLAN

Prepared for:
RED-Rochester, LLC

Prepared by:
GHD
Rochester, New York 14650

March 20, 2020
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SECTION 1.0

PROJECT DESCRIPTION

1.1 Purpose

RED-Rochester, LLC (RED) operates a Multiple Hearth Incinerator (MHI). The MHI is a major component of the King’s Landing Wastewater Treatment Plant (KLWWTP) located on the Genesee River in Rochester, New York. RED is in the process of planning and conducting a confirmatory performance test to show compliance with the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) standards for the unit. The MHI includes a continuous emission monitoring system (CEMS) that monitors stack gas concentrations of carbon monoxide (CO) and oxygen (O₂). RED operates these monitors in accordance with the requirements outlined in 40 CFR Part 266 Subpart H Section 104 and Volume V of the Hazardous Waste Incineration Guidance Series, Guidance on PIC Controls for Hazardous Waste Incinerators, which is also consistent with the Performance Specification 4B in 40 CFR Part 60. As prescribed in these requirements, a Performance Specification Test (PST) must be performed on the CEMS to certify it for use.

RED has selected a contractor to conduct a PST to evaluate the operation of the O₂ and CO CEM system. The certification tests will be performed in accordance with the specifications cited in 40 CFR Part 60, Appendix B, Performance Specification 4B, “Specifications and test procedures for carbon monoxide and oxygen continuous monitoring systems in stationary sources” as required by the HWC MACT. The PST will include calibration drift, alternative relative accuracy (based on June 20, 2003 EPA approval of RATA alternative), absolute calibration audit, and response time tests. The test procedures and performance criteria specified in Performance Specification 4B are similar and as stringent to those specified in 40 CFR Part 266, Appendix IX, Section 2.0. Therefore, demonstrating compliance with Performance Specification 4B will be considered equal to demonstrating compliance with 40 CFR Part 266, Appendix IX, Section 2.0.
This test plan is intended to outline the procedures and the QA/QC objectives that will be followed during the CEMS PST. The contractor selected by RED will be responsible for conducting the calibration drift test utilizing procedures and data sheets as outlined in this plan. The same contractor will be responsible for reviewing the drift test data and conducting the alternative relative accuracy, absolute calibration audit and response time tests along with producing the final certification report. During all testing performed, the MHI will be maintained at greater than 50 percent of normal load.

1.2 Performance Specification Testing

Brief descriptions of the tests that will be performed during the PST are provided below. A summary of the performance criteria that will be demonstrated during the CEMS performance evaluation test is provided in Table 1.

1.2.1 Calibration Drift (CD)

The calibration drift (CD) test will be performed to demonstrate the stability of the CEM calibration over time. The CD is defined as the deviation of the CEM output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair or adjustment took place. If any adjustments are made to the CEM zero and/or calibration settings, the appropriate data will be recorded prior to performing the adjustment to allow for the calculation of the CD.

Following an initial calibration, the CO and O2 monitors will be challenged every 24 hours for 7 consecutive days with a low level (zero) and a high level (span) certified calibration gas. The calibration gas will be introduced into the sampling system as close to the sampling probe outlet as practical and will pass through all CEM system components used during normal monitoring. The CEM response for each "challenge" will be recorded when a stable reading is
obtained and subtracted from the respective reference value (calibration gas) to determine the CD. The CD of the CO monitor will be calculated using the following equation (eq 1-1):

$$\text{CD}_{\text{CO}} = \left( \frac{|R - A|}{S} \right) \times 100 \quad (\text{eq 1-1})$$

where:

- \(\text{CD}_{\text{CO}}\) = Percent calibration drift,
- \(R\) = Reference value of zero or high level calibration gas introduced into the monitoring system,
- \(A\) = Actual monitor response to calibration gas,
- \(S\) = Span of the instrument.

The CD of the O\textsubscript{2} monitor will be calculated using the following equations (eq 1-2):

$$\text{CD}_{\text{O}_2} = |R - A| \quad (\text{eq 1-2})$$

where:

- \(\text{CD}_{\text{O}_2}\) = Calibration drift,
- \(R\) = Reference value of zero or high level calibration gas introduced into the monitoring system,
- \(A\) = Actual monitor response to calibration gas.

To meet the specifications for the low range and high range CO monitors, the differences shall not exceed 3\% of the span (6 ppm and 90 ppm, respectively) for six out of seven consecutive test days. The CD for the O\textsubscript{2} monitor shall not exceed 0.5\% \text{O}_2 absolute on any of the designated seven days. Sample data sheets for the low CO, high CO and O\textsubscript{2} tests are provided in Exhibits 1-1, 1-2, and 1-3, respectively.

1.2.2 Absolute Calibration Audit (ACA)

The absolute calibration audit (ACA) test will be performed to document the accuracy and linearity of the monitoring equipment over the entire measurement range. The absolute
calibration audit is used to calculate calibration error (CE). CE is defined as the difference between the concentration indicated by the CEM and the known concentration of the EPA Protocol I calibration gas.

Each monitor will be challenged three non-consecutive times EPA Protocol I cylinder gases at three measurement points within the ranges specified in Exhibit 1-4. The calibration gases will be introduced into the sample system as close to the sampling probe outlet as practical and will pass through all CEM system components used during normal monitoring. The difference between the instrument response and the reference value (certified gas) will be calculated after each run and the resulting three differences will be averaged to determine the CE at each measurement point. The CE of the CO monitor will be calculated using the following equation (eq 1-3):

\[
CE_{CO} = \left| \frac{d_{avg}}{S} \right| \times 100 \quad (eq \ 1-3)
\]

where:

- \(CE_{CO}\) = Percent calibration error,
- \(d_{avg}\) = Mean difference between CEMS response and the known reference concentration,
- \(S\) = Span of the monitor.

The CE of the O2 monitor will be calculated using the following equation (eq 1-4):

\[
CE_{O2} = \left| d_{avg} \right| \quad (eq \ 1-4)
\]

where:

- \(CE_{O2}\) = Calibration error
- \(d_{avg}\) = Mean difference between CEMS response and the known reference concentration.

To meet the specifications for the low range and high range CO monitors, the CE shall not exceed 5% of the span value at all three measurement points (10 ppm and 150 ppm).
respectively for each range). The CE for the O₂ monitor shall not exceed 0.5% O₂ absolute at all three measurement points. Sample data sheets to be used during this test are given in Exhibits 1-5 and 1-6 for the CO and O₂ monitors respectively.

1.2.3 Response Time (RT)

The response time (RT) test will be performed to document the response rate of the monitoring equipment to a step change in the system input value. The RT is defined as the time interval between the start of an abrupt change in the system input and the time when the data recorder displays 95 percent of the final value. The response time test will determine the system upscale response time and downscale response time.

A zero level calibration gas will be introduced to the system as close to the sample probe as practical. After the system output has stabilized (no change greater than 1 percent of full scale range for 30 seconds), the zero gas will be turned off and a high level calibration gas will be introduced to the system. The time required to reach 95 percent of the final stable value at this new condition will then be determined (upscale response time). High-level calibration gas will then be turned off and the low level gas put back on. The time required to reach 95 percent of the final stable value at this condition will be determined (downscale response time). The entire procedure will be repeated three times to determine the mean upscale and downscale response times. The longer of the two mean values will be considered the system response time. The response time for either the CO or the O₂ monitor shall not exceed 2 (two) minutes. A sample data sheet to be used in this test is provided in Exhibit 1-7.

1.2.4 Alternative Relative Accuracy (ARA)

The relative accuracy (RA) test will be performed to assess the accuracy and to validate the calibration technique of the MHI CEMS. The B-95 MHI CO Monitors have been granted a
waiver for the RA due to low levels of carbon monoxide created during normal operation of the incinerator (per June 20, 2003 letter to Kodak from Randy Braun, Acting Chief, Monitoring and Assessment Branch, EPA, Region II.). The alternative RA involves performing a complete system check including light source, receiver, timing functions, data reduction, recorder, heaters, and filters. The Oxygen Monitors will be tested against a reference system to determine the RA of the oxygen measurement.

1.3 Project Organization and Schedules

1.3.1 Project Organization

Exhibit 1-8 shows specific duties of each team member. A RED representative will coordinate MHI operations and will be the communications link between MHI operations and personnel performing the PST.

1.3.2 Schedules

The following schedule is intended for conducting the PST on the MHI CEM system. The PST will be conducted within 45 days prior to the commencement of the of dioxin/furan stack sampling Confirmatory Test.

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0</td>
<td>Begin 7-day Calibration Drift Test</td>
</tr>
<tr>
<td>Day 1</td>
<td>Continue Calibration Drift Test</td>
</tr>
<tr>
<td>Day 2-6</td>
<td>Conduct Oxygen Relative Accuracy Test</td>
</tr>
<tr>
<td></td>
<td>Conduct Response Time Test</td>
</tr>
<tr>
<td></td>
<td>Conduct Alternative Relative Accuracy Test</td>
</tr>
<tr>
<td></td>
<td>Conduct Absolute Calibration Audit</td>
</tr>
<tr>
<td>Day 7</td>
<td>Continue Calibration Drift Test</td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td></td>
<td>Complete 7-day Calibration Drift Test</td>
</tr>
<tr>
<td>With CT Final report</td>
<td>Submit final report on the PST</td>
</tr>
</tbody>
</table>
## Primary CO Analyzer Calibration Drift Test Results

Test Dates:

Analyzer Make and Model: TECO Model 48i
Analyzer Serial Number: 0619317382

**Range : Low**
CEMS Data Channel: CD_CO_LO
CO Span: 200 ppmv

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Time</th>
<th>Calibration Value (ppmv)</th>
<th>Monitor Response (ppmv)</th>
<th>Absolute Difference (ppmv)</th>
<th>Percent of Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1</td>
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<td>6</td>
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<tr>
<td>7</td>
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</tr>
</tbody>
</table>

**Range : High**
CEMS Data Channel: CD_CO_HI
CO Span: 3000 ppmv

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Time</th>
<th>Calibration Value (ppmv)</th>
<th>Monitor Response (ppmv)</th>
<th>Absolute Difference (ppmv)</th>
<th>Percent of Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
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<td>2</td>
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<td>7</td>
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</tr>
</tbody>
</table>

Calibration Drift = \( \frac{\text{ABS(Monitor Response - Calibration Value)}}{\text{CEM SPAN}} \times 100 \)
Exhibit 1-2. Sample Data Sheet for Conducting the O$_2$ Calibration Drift Tests

Primary O$_2$ Analyzer Calibration Drift Test Results

Test Dates:

Analyzer Make and Model: Servomex Model 1440  
Analyzer Serial Number: 3517

CEMS Data Channel: O$_2$  
O$_2$ Span: 25 %bv

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Time</th>
<th>Calibration Value (ppmv)</th>
<th>Monitor Response (ppmv)</th>
<th>Absolute Difference (ppmv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2</td>
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<td>7</td>
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</tr>
</tbody>
</table>

Calibration Drift = (ABS(Monitor Response - Calibration Value))
### Exhibit 1-3. CEM Calibration Error Concentration Ranges for Tier I

<table>
<thead>
<tr>
<th>Measurement Point</th>
<th>CO, ppm</th>
<th>O₂, percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low Range</td>
<td>High Range</td>
</tr>
<tr>
<td></td>
<td>(0-200 ppm)</td>
<td>(0-3000 ppm)</td>
</tr>
<tr>
<td>1</td>
<td>0-40</td>
<td>0 - 600</td>
</tr>
<tr>
<td>2</td>
<td>60 – 80</td>
<td>900 - 1200</td>
</tr>
<tr>
<td>3</td>
<td>140 – 160</td>
<td>2100 - 2400</td>
</tr>
</tbody>
</table>

Source: Performance Specification 4B, 40 CFR Part 60 Appendix B
Exhibit 1-4. Sample Data Sheet for Conducting the CO Absolute Calibration Audit

RED-Rochester, LLC
B-95 MHI Continuous Emissions Monitoring System
480 Maplewood Drive, Rochester, New York, 14652
Absolute Calibration Audit
Carbon Monoxide Low Concentration Channel

Primary CO Analyzer
TECO Model 48i  Serial Number 0619317382

<table>
<thead>
<tr>
<th>Run Number</th>
<th>Monitor Response (ppmv)</th>
<th>Low (ppmv)</th>
<th>Mid (ppmv)</th>
<th>High (ppmv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-LOW</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>2-MID</td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-HIGH</td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-MID</td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-LOW</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-HIGH</td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-LOW</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-MID</td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-HIGH</td>
<td></td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean Difference Absolute: 0.00  0.00  0.00
Calibration Error (% of span): 0.00%  0.00%  0.00%

Result: The analyzer passed the Absolute Calibration Audit.
Audit performed by:

USEPA Protocol 1 Gases

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Cylinder #</th>
<th>Expiration Date</th>
<th>Concentration (ppmv)</th>
</tr>
</thead>
</table>

Pass/Fail Reference:
The pass/fail criteria reference is United States Environmental Protection Agency Performance Specification 4B, Specifications and Test Procedures for Carbon Monoxide and Oxygen Continuous Monitoring Systems in Stationary Sources, Section 4.4. "The mean difference between the CEMS and reference values at all three test points (see Table 1) must be no greater than 5 percent of span value for CO monitors and 0.5 percent for O2 monitors".
Exhibit 1-5. Sample Data Sheet for Conducting the O₂ Absolute Calibration Audit

RED-Rochester, LLC  
B-95 MHI Continuous Emissions Monitoring System  
480 Maplewood Drive, Rochester, New York, 14652  
Absolute Calibration Audit  
Oxygen Concentration Channel

**Primary O₂ Analyzer**  
Servomex Model 1440  
Serial Number 3517  

<table>
<thead>
<tr>
<th>Channel Span</th>
<th>Monitor Response (%)bv</th>
<th>Low (%)bv</th>
<th>Mid (%)bv</th>
<th>High (%)bv</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 %bv</td>
<td>1-LOW: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-MID: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-HIGH: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-MID: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-LOW: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-HIGH: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7-LOW: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-MID: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9-HIGH: 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Calibration Error (%O₂)**:  
0.00%  0.00%  0.00%

Result: The analyzer passed the Absolute Calibration Audit.  
Audit performed by:

**USEPA Protocol 1 Gases**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Cylinder #</th>
<th>Expiration Date</th>
<th>Concentration (%bv)</th>
</tr>
</thead>
</table>

**Pass/Fail Reference:**  
The pass/fail criteria reference is United States Environmental Protection Agency Performance Specification 4B, Specifications and Test Procedures for Carbon Monoxide and Oxygen Continuous Monitoring Systems in Stationary Sources, Section 4.4. "The mean difference between the CEMS and reference values at all three test points (see Table I) must be no greater than 5 percent of span value for CO monitors and 0.5 percent for O₂ monitors".
Exhibit 1-6. Sample Data Sheet for Conducting the Response Time Tests

Primary CO and O2 Analyzer Response Time Test Results

Test Date:

CO Analyzer Make and Model: TECO Model 48i
Serial Number: 0619317382

O2 Analyzer Make and Model: Servomex Model 1440
Serial Number: 3517

RESPONSE TIME DATA

<table>
<thead>
<tr>
<th>Run Number</th>
<th>CO Monitor Low</th>
<th>CO Monitor High</th>
<th>O2 Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time 95 %</td>
<td>Time 95 %</td>
<td>Time 95 %</td>
</tr>
<tr>
<td></td>
<td>(sec)</td>
<td>(sec)</td>
<td>(sec)</td>
</tr>
<tr>
<td>1- UPSCALE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2- DOWNSCALE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3- UPSCALE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4- DOWNSCALE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5- UPScale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6- DOWNSCALE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MEAN UPSCALE RT
MEAN DOWNSCALE RT
CEM RESPONSE TIME
(Average Minutes)

Low Cal Gas:
CO Upscale 95%: ppm
CO Downscale 5%: ppm

O2 Upscale 95%: %
O2 Downscale 5%: %

High Cal Gas:
CO Upscale 95%: ppm
CO Downscale 5%: ppm

Procedural Note: Response times were captured manually using a stopwatch.

Performance Specification: CEM RT ≤ 2 minutes
## Exhibit 1-7. Test Member Assignments and Responsibilities

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Team Leader</strong></td>
<td>Coordinate tests with RED and NYSDEC site personnel</td>
</tr>
<tr>
<td></td>
<td>Coordinate collection of CEMs data</td>
</tr>
<tr>
<td></td>
<td>Operate instrument system</td>
</tr>
<tr>
<td></td>
<td>Reduce data and prepare daily reports</td>
</tr>
<tr>
<td></td>
<td>Monitor CEMs calibration drift tests</td>
</tr>
<tr>
<td><strong>CEM Operator</strong></td>
<td></td>
</tr>
<tr>
<td>Monitor/Test</td>
<td>Performance Criteria</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td><strong>Carbon Monoxide Monitor</strong></td>
<td></td>
</tr>
<tr>
<td>Calibration Drift</td>
<td>≤ 3 % of span</td>
</tr>
<tr>
<td>Calibration Error</td>
<td>≤ 5 % of span</td>
</tr>
<tr>
<td>Response Time</td>
<td>≤ 2 minutes</td>
</tr>
<tr>
<td>Relative Accuracy</td>
<td>PASS</td>
</tr>
<tr>
<td><strong>Oxygen Monitor</strong></td>
<td></td>
</tr>
<tr>
<td>Calibration Drift</td>
<td>≤ 0.5 % O2</td>
</tr>
<tr>
<td>Calibration Error</td>
<td>≤ 0.5 % O2</td>
</tr>
<tr>
<td>Response Time</td>
<td>≤ 2 minutes</td>
</tr>
<tr>
<td>Relative Accuracy</td>
<td>≤ 1 Absolute % of the RM Mean</td>
</tr>
</tbody>
</table>

PS - Performance Specification, RM - Reference Method

* Original reference for performance criteria is Performance Specification 4B.
SECTION 2.0

FACILITY DESCRIPTION

2.1 Kings Landing Wastewater Purification Plant Overview

The KLWWTP site at Eastman Business Park is located at the base of the Genesee River gorge along the west bank. The primary function of the plant is biological treatment of process wastewater resulting from EBP site manufacturing operations. The treatment process begins with a “grit” removal system (GRS) where large debris is removed from the plant influent. From the GRS, the influent is directed to three primary treatment clarifiers, two aeration basins and trickling filters, then to three secondary treatment clarifiers where the activated sludge is removed to holding tanks. After the sludge reaches the holding tanks, polymer is added to condition the sludge to a density consistent with centrifuge dewatering requirements. The centrifuge reduces the water content of the sludge to about 80%. From the centrifuge, the resulting sludge cake is dropped to a link-grate conveying system, a vertical conveyor and then to a final link-grate conveyor and auger feed system located at hearth No. 1 MHI system. Grit is also fed to the MHI at a point in the link-grate conveyor between the centrifuge and the vertical sludge conveyor and the resulting combined stream is actually fed to the hearth.

2.2 MHI Description

The MHI, located in Building 95 of the facility, is a refractory lined 8-hearth unit (0-7) installed in 1975 and manufactured by Envirotech Corporation. The zero hearth, located at the top of the unit, is a non-feed hearth equipped with two series/size 6422 North American natural gas burners, two. Hearth levels 2, 3, 5 and 6 are also equipped with North American series/size 6422 burners, two burners/level.

Hearth levels 1 and 2 are commonly termed as drying levels. Levels 3, 4 and 5 are combustion hearths and levels 6 and 7 are termed as cooling hearths. Sludge/grit feed begins at hearth level-1 and cascades through the various drying, combustion, and cooling hearth levels to a
pneumatic ash collection system. The sludge proceeds from one hearth level to the next and its distribution across each hearth is accomplished with a rotating rabble arm. Depending on which hearth level the arm is located, the blades of the arm are pitched inward or outward to promote gradual sludge movement to the center or outside wall of the MHI. Also, the arm serves to break up the sludge allowing uniform heat distribution through the sludge layer.

2.3 Air Pollution Control Equipment

From the zero hearth, the exhaust gases are thermally treated in a secondary combustion chamber (SCC) and passed to a quench chamber where the gases are cooled, large particulate matter is removed and acid gases are removed. The gases are then passed through a counter-current condenser/absorber followed by a variable throat venturi scrubber where the majority of solid/gaseous pollutants are removed. Afterward the gases pass through an entrainment separator to remove pollutant-laden moisture and on to a wet electrostatic precipitator where the final pollutant cleanup phase occurs. From this point, the cleaned gas stream is drawn through an induced draft fan to a plume abatement burner and to a stainless steel (SS) exhaust stack which extends 70 feet above roof grade.
SECTION 3.0
CONTINUOUS EMISSIONS MONITORING SYSTEM DESCRIPTION

3.1 CEM System Overview

The MHI CEM is an extractive system designed to continuously measure CO and O₂ levels in the exhaust gases of the MHI. These measurements are made downstream of the air pollution control equipment before exiting to the atmosphere. Major components of the CEM system include an in situ sampling probe positioned in the MHI exhaust stack, a heated probe control box and sample transport line for maintaining the flue gas sample above dew-point, a sample conditioning system for cooling and drying the sample, a sample/system controller, and a CO and O₂ gas analyzer. The CEM system also includes a data acquisition system (DAS) for data collection, system control, and data reporting/storage. The DAS performs necessary calculations, system diagnostics, calibration commands, and identifies system alarm modes. A drawing of the CEM system is illustrated in Exhibit 3-1. Stored on-site is a Quality Assurance Project Plan designed specifically for the CEM system and its application at the MHI site.

3.2 Probe Description

The sample probe is comprised of a 3-inch SS pipe having an internal heating winding capable of maintaining probe components above moisture and acid dew-points, >300°F. Within the winding is a 1-inch sintered Inconel filter extending approximately two thirds along the center. Also, a SS calibration gas transport line is located between the winding and the filter that extends approximately three quarters down the length of the probe. The probe filter is intended to remove particulate matter ≥10 µm in size and performs the first step in cleaning/conditioning of the sample stream. The calibration line is designed to transport cylinder gases to the end of the probe, thus, allowing system integrity to be assessed starting at the probe tip. The probe is positioned on the mounting flange at a 4-degree downward slope to allow condensate to flow back into the process gas stream.
3.3 Probe Control Box & Sample Transport Line Description

The probe control box houses a surge tank that is utilized during probe blow-back cleaning procedures, a three-way ball valve to control the purge air flows, and a heater for maintaining control box components at approximately 80 °F. All electrical and pneumatic sample line junctions, located between the probe and the CEM control system, are contained within the control box.

Two sample lines are employed to convey the extracted stack sample from the probe to the CEM flow control system. The first and longest of these, measuring approximately 100′ in length, is a FURON Model #2262 bundled umbilical line located between the probe control box and the CEM flow control system. This line is comprised of an outer polyethylene protective jacket covering a layer of fiberglass insulation and thermal barrier containing five 3/8” TEFILON tubes, a ¼” copper tube, three thermocouple leads, a single heating element, and the electrical leads necessary to supply power to components of the sample probe and probe control box. Only two of the TEFILON tubes are utilized for CEM operation at one time, one for sample transport and the other for conveying calibration gas to the probe. The remaining three tubes are spares used only in the event of tube failure or future monitoring requirements. The copper tube is used to convey plant air at a rate of 5.0 scfm to allow blow-back of the sample probe. One of the three thermocouple leads is used for controlling temperature of the umbilical line spanning the flow controller and probe control box. The two remaining leads are used to regulate temperature of the umbilical line spanning the probe and probe control box and heater winding of the probe. The heating element travels the length of both umbilical lines and provides a thermostatically regulated heat source of ≥ 200 °F.

The umbilical line connect the probe and probe control box is approximately 5′ in length. This line is different in that it contains only two of the original three thermocouples leading up to the probe control box and two SS sample and calibration gas transport lines. Also, only two of the original power leads are utilized and are specific to probe heating. One of the
thermocouples is used to regulate probe temperature while the other regulates temperature of the line.

3.4 System Flow Description Within the Cabinet

A sample pump provides the motive force for drawing a sample stream from the exhaust stack, through a sample conditioning system, final particulate filter, sample flow control system, and continuous analyzers.

Sample conditioning is performed employing a thermoelectric Baldwin Environmental Model 5210 sample chiller. This unit utilizes the Peltier principle to cool a gas stream to a constant moisture dew point of 35 °F. Simply put, the Baldwin conditioner acts as a heat exchanger whereby heat is transferred from one ceramic or metallic surface to another using dissimilar semiconductor materials. Upon cooling the gas stream, water vapor is condensed and collected in a condensate removal system equipped with a peristaltic pump for water removal. Next, the gas stream passes through a filter assembly and then is monitored for vapor slip employing an electronic water breakthrough sensor.

The flow control system regulates sample stream, calibration gas, and purge air flows/pressures throughout the CEM system. A series of rotometers and pressure indicators are utilized to control sample stream and calibration gas distribution to each system analyzer and excess gas is vented to the atmosphere. The sample pump and conditioning, along with purge air and calibration frequencies, are monitored and managed by the ESC Model 8816 data logger.
3.5 Analyzer Descriptions

3.5.1 Carbon Monoxide Analyzers

Carbon monoxide (CO) is measured by a Thermo Environmental, Model 48i, NDIR, gas filter correlation (GFC) analyzer. A Backup CO monitor is also installed. This monitor is also a Thermo Environmental, Model 48i. Both analyzers are microprocessor based units having dual-range measurement capability. Design measurement concentration ranges are 0 - 200 ppm, low end, and 0 - 3,000 ppm, high end. The GFC technology utilizes an infrared (IR) energy source which is passed through a rotating CO and a nitrogen (N\text{2}) filter and narrow bandpass interference filter to a multiple optical pass cell. At this point, absorption of the radiated IR source occurs and remaining IR exits the cell to an IR detector.

The purpose of the CO gas filter is to produce a reference beam, which can’t be attenuated any further by CO in the sample cell. The N\text{2} gas filter produces an uninhibited measurement beam, which is easily absorbed by CO in the cell. By modulating the chopped IR source in this manner, an amplitude related to the CO concentration in the sample cell is allowed. Subsequently, the GFC provides a system which is not influenced by the presence of other gases such as CO\text{2} and is specific to CO only.

3.5.2 Oxygen Analyzers

Oxygen (O\text{2}) is measured using a Servomex Series 1440 unit, having a measurement range of 0%-25%. A backup Servomex 1440 series oxygen analyzer is also installed on the system. The measurement technology used in these units is based on magneto-dynamics. When sample gas is introduced, O\text{2} molecules are characteristically drawn to a magnetic field generated within the measurement cell. As O\text{2} molecules build and change in concentration, the partial pressure of the O\text{2} changes causing deflection of a dumbbell type micro-balance. An electromagnetic current is produced through a platinum wire surrounding the dumbbell which acts as a
feedback to provide a counter force equal to the deflection. As a result, the amount of pressure required to restore the dumbbell to its original state is proportional to the O₂ concentration in the sample cell.

3.6 Data Acquisition System Description

The MHI CEM uses an ESC data logger to collect data from the analyzers, control calibration gas solenoids, monitor system alarms, and communicate with the plant distributed control system (DCS). A Windows based PC is used to manage the data and configuration of the data logger. The ESC Datalogger calculates and stores all data for calibration drift, as well as correcting CO to 7% O₂. The data logger scans the CEM analyzer 4-20 mA outputs at least once every 15 seconds. This data is then used to calculate a one minute average which is stored in the data logger. Each one minute average is then used to calculate a rolling 60 minute average. Once every two minutes the polling computer ‘polls’ the data logger to retrieve the one minute averages which are then stored in a database on the PC. This data is backed up regularly on a writable CD or other suitable storage device. The data logger provides outputs for interfacing the CEM system to the plant MOD300 DCS in order to allow interlocking of the MHI operating conditions. These outputs include analog signals for O₂ and CO corrected to 7% O₂, a rolling 60 minute average of the corrected CO and digital outputs for high corrected CO, low O₂, calibration status, calibration failure, and CEM system trouble alarm.
Exhibit 3-1. CEM System Diagram
SECTION 4.0

SAMPLING LOCATIONS

4.1 Sampling Locations

4.1.1 Dimensions

Performance Specification 4B suggests that the sampling point be located:

- 2 equivalent duct diameters downstream from the nearest control device, point of pollution generation or other point at which a change in the pollutant concentration or emission rate may occur.

- 0.5 equivalent duct diameters upstream from the effluent exhaust or next control device.

The MHI CEM probe will be located in the MHI exhaust stack at a point downstream of the air pollution control equipment. The exhaust stack extends ≈70 ft above the Building 95 roof plane and is 3.5 ft in diameter. The MHI CEM sample probe port will be located 8 inches above the sampling ports for the reference test methods and 5.75 ft above roof level to allow easy access to probe and probe control box components. Also, the number of duct diameters downstream and upstream of any potential exhaust gas flow disturbances will be 6.3 and 18.7, respectively. Orientation of the probe will be in a downward direction (≈4°) facing the exhaust gas flow and extending 1.8 ft. to the centroidal region of the stack cross-section.

4.1.2 Stratification Checks

Stratification is defined as a difference in concentration greater than ten percent between the duct center and any point greater than one meter from the duct wall. The stratification test is not applicable to this source because the duct is only 42 inches in diameter and therefore none

4 - 1
of the test points is greater than one meter from the side of the duct. Therefore the stratification test will not be performed as part of the PST.
SECTION 5.0

ALTERNATIVE RA TEST PROCEDURES

The following is the procedure for conducting the alternative relative accuracy test. This procedure will be performed by personnel designated by RED. The alternative RA will be performed during the seven day drift test, most likely near the end of the test (day six or seven). The alternative RA procedure specifies that the entire CEMS must be checked, including light sources, filters, heaters, and timing functions. The following is a list of items that will fulfill this obligation and verify the accurate operation of the CEMS.

**CO Analyzers Diagnostics:** Record the following analyzer diagnostic parameters to insure they fall within acceptable operational values: Internal Temperature, Bench Temperature, Optical Bench Pressure, Sample Flow, Bias Voltage, Sample/Reference Ratio, AGC Intensity, Motor Speed.

**DAS and Data reduction:** Use the CO Monitor Zero and Full scale function to make sure the DAS is reading zero and full scale for both channels. The Oxygen monitor can only be checked with Calibration gases (no diagnostic capabilities). Manually calculate CO corrected to 7% oxygen, and check RHA channel calculations. Compare to recorded values to make sure calculations are correct.

**Datalogger:** Review DAS data to make sure the zero and full scale data was recorded properly.

**Heaters:** Check the temperature controllers for malfunction

**Chiller/Sample Pump:** Check the chiller and sample pump for malfunction

**Filters:** Check the filter on the chiller for water slip, inspect others

In addition to the inspections listed above, an Absolute Calibration Audit will be performed as part of the alternative RA test.
SECTION 6.0
SAMPLE IDENTIFICATION

For this program, no samples will be taken for shipping to a laboratory for analysis. All data will be collected and processed on-site and therefore a sample labeling scheme and a chain of custody procedure for samples will not be necessary.
SECTION 7.0
QUALITY ASSURANCE/QUALITY CONTROL

7.1 DATA COLLECTION and FORMS
Section 1 of this Test Plan presented the standardized forms that will be used to record the monitoring data. All forms will be filled in by the technician performing the work. The completed forms filled out by the technician will be reviewed by the second crewmember for completeness in the field prior to becoming part of the project file.

The bulk of the data collected during the CEM certification test will be processed onsite in one of RED’s computers for reporting purposes.

Data validation is the process of reviewing data and accepting or rejecting it on the basis of sound criteria. Supervisory and QC personnel will use validation methods and criteria appropriate to the type of data collected and to the purpose of the measurement.

The following criteria will be used to evaluate the field sampling data:
- Use of approved test procedures;
- Proper operation of the process being tested;
- Use of properly operating and calibrated equipment;
- Use of EPA Protocol 1 CEM calibration gases for the ACA
- Proper completion of the data sheets.

7.2 CEMS
The MHI CEMS will be calibrated in accordance with the procedures outlined in 40 CFR Part 60, Appendix B, Performance Specification 4B. At a minimum, a successful daily calibration check will be completed the morning of the scheduled Alternative RA test. The Alternative RA test will be performed during the CD period.
Appendix B

RED Rochester Multiple Hearth Incinerator

Continuous Monitoring System Performance Evaluation Test Plan

May 4, 2020
# CMS Performance Evaluation Test Plan

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1.0 Introduction
RED-Rochester, LLC (RED) operates a Multiple Hearth Incinerator (MHI) system for the treatment of hazardous waste sludge at the Kings Landing Wastewater Treatment Plant (KLWWTP). The incineration system includes a continuous monitoring system (CMS) for demonstrating continuous compliance with applicable emission standards and operating parameters. The CMS includes “parameter CMSs” such as flowmeters, pressure transmitters, level transmitters, thermocouples, a pH meter, and a weigh conveyor that measure parameter data from the operations of the incineration system, and a continuous emission monitoring system (CEMS) that monitors stack gas concentrations of carbon monoxide (CO) and oxygen (O₂).

On September 30, 1999, EPA promulgated the Final Standards for Hazardous Air Pollutants from Hazardous Waste Combustors, otherwise known as the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) rule. This rule applies to incineration systems that burn hazardous waste. The HWC MACT is promulgated at 40 CFR Part 63 Subpart EEE.

The HWC MACT places considerable emphasis on continuous monitoring to demonstrate compliance with applicable emission standards and operating parameter limits. As such, facilities are required to conduct performance evaluations on the CMS used to demonstrate compliance with the HWC MACT dioxin/furan emission standard. As part of the CT for the MHI, RED will conduct a CMS performance evaluation test to verify the CMS is calibrated and collecting valid data.

2.0 Performance Evaluation Objectives
The purpose of the CMS performance evaluation test is to assess the accuracy of the instruments that will continuously measure data to demonstrate compliance with the HWC MACT dioxin/furan emission standard and to ensure the instruments are properly integrated with the incinerator automatic waste feed cutoff (AWFCO) system. To verify the accuracy of an instrument, RED will demonstrate that the instrument meets either the performance specification promulgated by EPA or the manufacturer’s recommended specification if an appropriate performance specification has not been promulgated. RED will also perform an AWFCO system test to verify that an alarm will be triggered and the hazardous waste feed will be shut off if the control system records an operating parameter outside the AWFCO setpoint. The performance evaluation program summary is discussed in more detail in Section 5.0. Specific performance criteria is also discussed in Section 5.0 of this plan.

3.0 Performance Evaluation Test Plan Objectives
Pursuant to Section 63.1207(e) of the HWC MACT, RED must develop and submit a site-specific CMS performance evaluation test plan for approval by the Administrator. The purpose of the
CMS Performance Evaluation Test Plan is to provide a synopsis of the methods and procedures that will be used to verify the monitoring devices included in the CMS are calibrated and collecting valid data during unit operation. The objectives of this CMS Performance Evaluation Test Plan (CMS PETP) are to:

- Describe the continuous monitoring system
- Outline the methods and procedures that will be used to calibrate the CMS
- Specify instrument performance criteria
- Describe the CMS integration with the AWFCO system
- Outline the AWFCO functional testing
- Present a schedule for the program procedures, tests, and audits
- List the data quality objectives
- Present the internal and external quality assurance program

Specific procedures referenced and summarized by this test plan will be included in the CMS Performance Evaluation Plan that will be developed pursuant to Section 63.8(d) of the MACT General Provisions. The CMS Performance Evaluation Plan will be included in the MHI operating record.

4.0 Continuous Monitoring System (CMS) Description

The continuous monitoring system for RED’s MHI will consist of parameter CMSs and a CEMS. Parameter CMSs are instruments that are electronically connected to the distributive control system (DCS) and used to demonstrate compliance with system operational limits. The CEMS includes monitors that measure CO and O₂ concentrations in the stack to demonstrate compliance with the CO emission limit. The general locations of the continuous monitoring systems on the MHI are shown in Figure 1. The general arrangement of the MHI CMS is shown in Figure 2. Further description is provided below.

4.1 Parameter CMS Description

Parameter CMSs consist of a combination of instruments that continuously monitor and record parameter data from the operations of the incineration system. A list of the continuously monitored HWC MACT operating parameters is presented in Table 1.

4.1.1 CMS Instruments

Installed flowmeters, pressure transducers, thermocouples, pH meter, level transmitters, and voltage transducers are used to collect process information on the incineration system key regulatory parameters. These key process monitoring instruments are listed in Table 2 along with the instrument range and accuracy.
4.1.2 Data Acquisition and Recording
Each monitoring instrument produces a continuous electronic signal proportional to the instrument range. The signals are output to the incinerator DCS which uses an internal program to conduct required data manipulations and calculations. The DCS compares instantaneous or computed hourly rolling values to the respective AWFCO setpoints. The operating parameter data are stored in the internal DCS data storage system.

The DCS evaluates the monitoring instrument output measurement at least once every 15 seconds and computes and records the average value from the most recent 15-second readings at least once each minute. This meets the definition of a continuous monitor as defined by Section 63.1201(a) of the HWC MACT. To calculate an hourly rolling average, the DCS computes the arithmetic mean of the 60 most recent one-minute average values. As each new one-minute average value is recorded, the least recent of the previous 60 values is discarded from the data register, the new one-minute value is added, and an hourly rolling average is calculated and recorded. For a 12-hour rolling average, the arithmetic mean of 720 one-minute average values is calculated in the same way.

The DCS does not incorporate readings (data) generated during calibration periods into the instantaneous readings or the rolling average calculations. Once valid CMS data are available again, the DCS will resume rolling average calculations using the previously valid data values.

4.2 Continuous Emissions Monitoring system (CEMS)
The MHI CEMS is an extractive system designed to continuously measure CO and O2 levels in the exhaust gases. The ranges and expected accuracies of the CEMS analyzers are provided in Table 2. Further description of the MHI CEMS is provided in Section 3.0 of the HWMU-32 Continuous Emission Monitoring System Performance Specification Test (CEMS PST) Plan included as Appendix B of the CT Plan.

5.0 PERFORMANCE EVALUATION PROGRAM SUMMARY
The purpose of the CMS performance evaluation test is to verify the CMS is calibrated and collecting valid data during the CT Plan. To calibrate the system instruments, RED will follow procedures defined in performance specifications promulgated by EPA or manufacturer’s recommendations for those devices that do not have promulgated performance specifications. The performance evaluation test of the CMS components will consist of three parts:

- Instrument calibration verification
- Functional testing of the AWFCO system and associated alarms, and
- Audit of CMS data reduction and recording functions.
A brief description of each is provided below.

5.1 Instrument calibration verification

5.1.1 Parameter CMS
The parameter CMSs required to show compliance with the dioxin/furan standard will be calibrated as part of the Confirmatory Evaluation Test. Summaries of the calibration procedures are shown in Table 3.

5.1.1.1 INSTRUMENT CALIBRATION
The instrument calibration will be completed prior to beginning the dioxin/furan stack sampling part of the Confirmatory Test. As EPA has not promulgated any specific performance specifications for parameter CMSs, RED will use manufacturer’s procedures and working knowledge of specific instruments to conduct the calibrations.

5.1.1.2 INSTRUMENT LOCATION
Pursuant to Section 63.8(c)(2) of the MACT General Provisions, all CMSs shall be installed such that representative measurements of emissions or process parameters from the affected source are obtained. RED has installed all CMSs so that they measure representative process parameters or process emissions. Instrument locations are shown in Figure 1.

5.1.2 CEMS
The CEMS performance evaluation will follow the requirements in Performance Specification 4B for CO and O2 CEMS found in 40 CFR Part 60, Appendix B. The CEMS performance evaluation will consist of the calibration drift test, calibration error test, response time test, and relative accuracy test. Specific details of the CEMS calibration procedures can be found in Section 1.2 of the HWMU-32 EMS PST plan included as Appendix B of the Confirmatory Test Plan.

5.2 AWFCO SYSTEM INTEGRATION AND TESTING
The DCS includes an automatic waste feed cutoff (AWFCO) system that stops the hazardous waste feed when the control system records an operating condition outside the limits necessary to comply with permit conditions. The parameter CMSs and CEMS described in this plan are integrated with the AWFCO system. Each AWFCO parameter has an alarm and alarm message associated with it that audibly sounds and logs in the control room when the trip point for that AWFCO parameter is approached. The DCS compares the instantaneous or calculated rolling average values, depending on the parameter averaging times, to the corresponding parameter trip set point. Upon exceedence of an interlock set point, the DCS activates shutoff command to stop the hazardous waste feed. In addition, an AWFCO will trigger if the lower or upper range limits of any CMS instrument is reached or exceeded during a one-minute average. Additional AWFCO trips will occur if any CMS instrument measurement DCS software is turned off or sends an invalid data input.
As part of the CMS Performance Evaluation Test, the AWFCO system will be tested. To test the AWFCO system, RED will simulate a measurement signal in the DCS associated with the parameters of the CMSs. The simulated CMSs measurement signal in the DCS will be increased or decreased, to the level that trips the AWFCO. The indication that the AWFCO has tripped will be shown as an alarm on the computer screen. RED will verify that an AWFCO alarm causes the hazardous waste feed to cease. The proper functioning of the system will be documented. RED will also perform invalid data input AWFCO tests. Invalid data inputs occur when the DCS input measurements are out of range or there is a loss of the instrument measurement signal. RED will test the invalid data AWFCO trips by turning off the software measurement loop causing an invalid data state.

5.3 Data Quality Objectives
RED expects the data measured by the continuous monitoring devices to be precise, accurate, and complete. The CMS will be calibrated using manufacturer’s procedures or standard EPA accepted procedures prior to the conduct the dioxin/furan stack sampling part of the Confirmatory Test. The expected accuracies of the continuous monitoring instruments are presented in Table 2.

6.0 TEST SCHEDULES
The performance evaluation test of the parameter CMSs will be conducted within 45 days prior to the commencement of the dioxin/furan stack sampling Confirmatory Test. The CEMS PST will not necessarily be conducted at the same time as the CMS parameter monitoring performance evaluation test. The CEMS PST is expected to be completed in 8 days. The CMS performance evaluation test is expected to be completed in 5 days.

7.0 QUALITY ASSURANCE
Pursuant to Section 63.8(e)(3) of the MACT General Provisions, the CMS Performance Evaluation Test Plan must include an internal and external quality assurance (QA) program. The QA programs are described below:

7.1 Internal QA
The quality of data generated by the system will be assured by implementing internal quality control procedures. The internal QA program will include the activities planned by routine operators and analysts to provide an assessment of CMS performance. The routine procedures include the following:

• Testing and other quality assurance checks of parameter CMS and CEMS following procedures summarized by this test plan and specified in the CMS Performance Evaluation Plan. In addition to this CMS Performance Evaluation Plan, the QA program will include the activities planned by routine operators and analysts to provide an assessment of CMS performance.
Test Plan, the CMS Performance Evaluation Plan as prepared pursuant to Section 63.8(d) of the MACT General Provisions and is integrated into RED’s Operating Record.

- Field verification of the CMS instrument location, condition, and installation.
- Daily audit of the CEMS components and operating parameters. Corrective action will be taken as needed to remedy malfunctions or abnormal operating conditions.
- Daily calibration drift checks on the CEMS. The results of the calibration drift check will be reviewed daily and the monitoring instruments will be adjusted for drift as appropriate.

**7.2 External QA**
RED’s external QA program shall include systems audits that include the opportunity for on-site evaluation of instrument calibration, data validation, sample logging, and documentation of quality control data and field maintenance activities. The QA program implementation will verify conformance via:

- Reviews of calibration procedures in the CMS Performance Evaluation Plan
- Reviews of data sheets to ensure completeness and accuracy
- Examinations of facility records documenting the data verification and data reduction/calculation procedures performed for compliance purposes.

The Administrator may perform similar verification of conformance to the QA Program by a similar review process.

In addition, the quality of data generated by the CMS will be assured by implementing the quality control procedures presented in the Continuous Monitoring System Performance Evaluation Plan. This program addresses all aspects of quality control for the incinerator process parameter monitors and the continuous emission monitors.

**8.0 DOCUMENTATION**
Results of the performance evaluations will be summarized on data sheets. All data sheets, calculations, CMS system data records, and calibration or reference material certification will be included in CMS Performance Evaluation Test Report. This report will be included as part of the Notification of Compliance and will be maintained as part of the Operating Record.
### Table 1. Continuously Monitored Operating Parameters for Demonstrating Compliance with the Dioxin/Furan Emission Standard

<table>
<thead>
<tr>
<th>Operating Parameter</th>
<th>Units</th>
<th>Averaging Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sludge Feed Rate</td>
<td>lb/hr</td>
<td>Hourly RA</td>
</tr>
<tr>
<td>Combustion Temperature (Hearth Level #3 or #4)</td>
<td>° F</td>
<td>Hourly RA</td>
</tr>
<tr>
<td>Secondary Combustion Chamber (SCC) Temperature</td>
<td>° F</td>
<td>Hourly RA</td>
</tr>
<tr>
<td>Stack Gas CO Concentration (a)</td>
<td>ppmv</td>
<td>Hourly RA</td>
</tr>
<tr>
<td>Chlorine and Chloride Feed Rate (b)</td>
<td>lb/12hr</td>
<td>12-Hour RA</td>
</tr>
<tr>
<td>Stack Gas Flow</td>
<td>acfm</td>
<td>Hourly RA</td>
</tr>
</tbody>
</table>

(a) Dry basis corrected to 7% oxygen.  
(b) A calculated value based on the waste feed rate and sludge analysis.

RA - rolling average
### Table 2. Key Regulatory CMS Instrumentation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Location</th>
<th>Instrument Type</th>
<th>Instrument Tag No.</th>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sludge Feed Rate</td>
<td>lbs/hr</td>
<td>F1</td>
<td>Weigh belt conveyor / strain gauge</td>
<td>WE/WT 739</td>
<td>0 - 30,000</td>
<td>± 5.0% of full scale</td>
</tr>
<tr>
<td>Combustion Temperature</td>
<td>°F</td>
<td>T1, T2</td>
<td>Thermocouple, TYPE K</td>
<td>TE943S, TE943N, TE944</td>
<td>0 - 2,000</td>
<td>± 0.75% of full scale</td>
</tr>
<tr>
<td>SCC Temperature</td>
<td>°F</td>
<td>T3, T4</td>
<td>Thermocouple, TYPE K</td>
<td>TE1021A &amp; 1-14/20 TE1021B &amp; 1-14/21</td>
<td>0-2,000</td>
<td>± 0.75% of full scale</td>
</tr>
<tr>
<td>Stack Gas Flow</td>
<td>acfm</td>
<td>F7</td>
<td>Anubar, Differential Pressure Transducer</td>
<td>FE/FT 1147</td>
<td>0 - 25,000</td>
<td>± 5% of full scale</td>
</tr>
</tbody>
</table>
### Table 3. Key Regulatory CMS Instrumentation Calibration Procedures

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Instrument Type</th>
<th>Calibration Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sludge Feed Rate (lbs/hr)</td>
<td>Weigh Conveyor / strain gage transducers</td>
<td>Clean weigh conveyor belt and rollers. Perform zero and span calibration. To perform zero calibration, run the belt for 5 -10 minutes to ensure it is empty. Perform Instrument Zero calibration function. For span calibration, use the standard weight for the span value. Perform Instrument Span calibration. After calibration, verify that DCS readings agree with the Instrument at zero and with the span weight installed. Record all as-found and as-left data on the master calibration sheet. If an error is detected greater than the manufacture accuracy full range specification, check condition of all wiring and connections, check the Trio block directly, make any repairs or replacements necessary to bring the reading back into tolerance. Record all repairs and replacements on the Master calibration sheet.</td>
</tr>
</tbody>
</table>
# Table 3. Key Regulatory CMS Instrumentation Calibration Procedures

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<tr>
<th>Parameter</th>
<th>Instrument Type</th>
<th>Calibration Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°F)</td>
<td>Thermocouples, Type K</td>
<td>Check thermocouple type and condition. Use a standard thermocouple simulator to generate a millivolt signal from the ANSI standard thermocouple tables corresponding to a given temperature. At the thermocouple well, generate a signal according to process value listed on the master calibration sheet back to the Trio block and verify readings on the DCS. Check @ 0%, 25%, 50%, 75% and 100% of the span. Record all as-found and as-left data on the master calibration sheet. Verify that the DCS readout is the same as test value. If an error is detected greater than the manufacture accuracy full range specification, check condition of all wiring and connections, check the Trio block directly, make any repairs or replacements necessary to bring the reading back into tolerance. Record all repairs and replacements on the Master calibration sheet.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Instrument Type</td>
<td>Calibration Procedure</td>
</tr>
<tr>
<td>--------------------</td>
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<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Stack Flow (acfm)</td>
<td>Annubar, Pitot Tube</td>
<td>Pull and clean the flow element. Use standard inches of water pressure calibrator or an incline manometer to calibration the transmitter. At the transmitter, generate a signal to the transmitter differential high side cell according to process value listed on the master calibration sheet. Verify calibration using calibration standard at 0%, 25%, 50%, 75% and 100% of the span. Record all as-found and as-left data. Verify that the DCS readout is the same as test values. If an error is detected greater than the manufacture accuracy full range specification, check condition of all wiring and connections, check the Trio block directly, make any repairs or replacements necessary to bring the reading back into tolerance. Record all repairs and replacements on the Master calibration sheet.</td>
</tr>
</tbody>
</table>
Figure 2. General Arrangement of MHI Continuous Monitoring System
Multiple Hearth Incinerator Instrument Controls
Secondary Combustion Chamber Instrument Controls