DTE Energy

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December 16, 2016

Mr. Francis Lim, Senior Environmental Engineer
Air Quality Division, Michigan Department of Environmental Quality
27700 Donald Court
Warren, MI 48092-2793

Re: DTE Electric Response to the MDEQ-AQD Violation Notice of November 15, 2016, St. Clair Power Plant Unit 2, MATS 30-day rolling Mercury Excursion

Dear Mr. Lim:

This letter is in response to the Michigan Department of Environmental Quality (MDEQ) Air Quality Division's (AQD) Violation Notice dated November 15, 2016. DTE Electric Company's St. Clair Power Plant reported an emission limit deviation from the 40CFR63, Subpart UUUUU, (aka Mercury & Air Toxics Standards or MATS) deviation during the semi-annual ROP Certification report dated September 15, 2016. The company determined that for 13 days, from June 17-29, Unit 2 exceeded the MATS emission limit of 1.2 lbs/TBtu based on a 30-day rolling average as determined each calendar day the boiler operates. MDEQ's Notice of Violation cited the following:

Process Description	Rule/Permit Condition Violated	Comments
EU-BOILER2-SC	*40 CFR 63.9991 and Table 2.1c of 40 CFR 63, Subpart UUUUU*	*Exceeded the mercury 30-day rolling average emission limit (as determined each calendar day the boiler operates) of 1.2 lb/TBtu*

Background

At St. Clair Power Plant, mercury emissions from coal-fired boilers are controlled through the injection of sorbent into the flue gas. The site uses activated carbon injection (ACI). ACI involves the injection of powdered activated carbon (PAC) into the flue gas upstream of the particulate matter control system, the electrostatic precipitators. PAC adsorbs oxidized mercury, capturing it as particle matter in the fly ash which is then captured by the existing ESP.

In this process, several factors affect the mercury control performance of an ACI system, including the potential uncontrolled mercury emission rate (i.e. concentration of mercury in coal), oxidation of vapor phase mercury in flue gas path, PAC injection rate, flue gas temperature profile at the PAC injection point, and the PAC characteristics.

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In an ACI system, to achieve the desired target mercury emission rate, the designed injection rate of PAC is derived by evaluating the emission unit's operating characteristics. Some of the operating characteristics include the mercury content expected in the flue gas, other chemicals in the flue gas, and the volume of flue gas exiting the boiler (typically described in millions of actual cubic feet at the injection location) to be treated by PAC. These operating characteristics influenced the development of each emissions unit's design PAC injection rate. For St. Clair Unit 2, the designed PAC injection rate was predicted to vary from 10 to 130 lbs of PAC / hour, depending upon the fuel blend and operating load of the unit.

In 2015, the ACI systems were installed on all units at St. Clair Power Plant to meet the designated MATS emission limits. To demonstrate mercury compliance, a mercury sorbent trap system was chosen as the certified monitoring method and is used to provide regulatory reporting data.

Monitoring using the certified sorbent trap system comes with an inherent delay in availability of compliance data, as explained later under "Dates & Duration of Violation." Therefore, the mercury control system installation included a continuous process monitor to provide relative mercury emission data and the ability to automate control of PAC injection rate to attain a target mercury emission rate. Because of the inherent delay of sorbent trap data, a direct comparison of the process monitor's data and sorbent trap system's data cannot occur real-time.

The MATS standards and limits took affect on April 16, 2016. Compliance demonstration testing of the ACI system and mercury sorbent trap system occurred from April 16-May 15th indicating mercury emissions were compliant to MATS standard. The mercury control system's process set point for automatic PAC injection was set at 0.96 lbs/TBtu, as controlled by the mercury process monitor output. Selection of that set point was based on benchmarking other mercury control systems within the industry and allowing a margin of safety by subtracting the detection limits for both the methods from the MATS standard of 1.2 lbs/TBtu.

Summary of Events and Actions Taken

Attachment A summarizes the overall sequence of events from April 15 to July 2, 2016. On June 29, 2016, St. Clair Power Plant received analytical results of the June 15 - 22 operating period's mercury sorbent traps. Following input of the information into the certified DAHS (data acquisition and handling system), the DAHS calculated the daily and 30-day rolling average mercury emission values. It was then realized that exceedances of the MATS 30-day average mercury emission limit had occurred. In response, St. Clair Power Plant overrode the automated PAC injection set point and manually increased PAC injection to 100 lbs PAC/hr.

At this time, the plant was relying on the mercury control system's process monitor data to indicate whether mercury emissions were dropping. The process monitor's average mercury emissions prior to PAC injection increase was 0.83 lbs/TBtu. After the PAC injection increase, the monitor's average mercury emissions dropped to 0.6 lbs/TBtu, which was a 30% decrease. Later, when the plant received the June 27 to July 1 period's mercury sorbent trap analytical results, the DAHS confirmed reduction in both the daily and 30-day rolling average mercury emission values. The 30-day rolling average mercury emission values attained compliant levels on June 30, 2016.

Afterward, DTE Electric personnel from the Engineering Support Organization (ESO) began evaluating potential causes of the elevated mercury emissions. The primary issue to surface was that the mercury control system's process monitor output was showing mercury emissions around 1 lb/TBtu during the period in question; thus indicating that the certified sorbent trap results would have been compliant. Therefore, the investigation focused upon reviewing both the sorbent trap system and mercury process monitor data, starting from May 15 thru fall, on Unit 2. The difference in the readings between the two monitoring methods was calculated and then evaluated using statistical techniques to understand the normal spread between readings.

Data variance between the output from the mercury process monitor and the certified sorbent traps was expected. The readings vary between the process monitor and the sorbent traps because 1) each system uses different analytical techniques, 2) each system has distinct normal response variation, 3) each flue gas sample is taken from separate (although close) points in the stack, and 4) the sorbent trap's final certified results depend upon the regulatory-prescribed data processing techniques. The goal of the data review was to determine if the mercury control system's process set point adequately accounted for variability between the two monitoring systems enabling sufficient PAC injection to assure compliance with the MATS mercury limit.

Based on the statistical analysis of the monitoring data (Attachment B), it was determined that the process set point used over May and June for automatic control was not enabling sufficient PAC injection to ensure the sorbent trap results complied with the MATS limits.

Dates and Duration of the Violation

DTE Electric determined that Unit 2 exceeded the MATS emission limit of 1.2 lbs/TBtu based on a 30-day rolling average as determined each calendar day the boiler operates from June 17-29 for 13 days. Excess emissions are no longer occurring and the violation is not ongoing.

DTE Electric notes that despite the 13 day duration, the highest, single day, 30-day average value during that period was 1.279 lb/TBtu (6.6% over the limit). Using that maximum value and the heat input for those 13 days, the highest, worst case mass of mercury emitted amounts to less than one ounce of mercury.

As mentioned earlier, compliance data from a certified sorbent trap system is not immediately available. Understanding the lag time involved in the mercury sorbent trap monitoring and analytical methodology leads to a better understanding of why the plant learned "after the fact" that mercury levels were elevated. This results in an inherent delay in being able to address excess emissions that may have already occurred.

A paired, sorbent trap set is typically in the monitoring system for about seven days. Therefore, a 30-day average value can be made up of four or more pairs of trap sets. From the time when the traps are first put in the monitoring system, analytical results for a trap may not be available for 3 weeks or more. The timing of this is dependent on several factors; these include, removing the traps from the stack, preparing them for shipment, shipping them to a lab, lab receipt, sample preparation at the lab, lab analysis, lab report preparation, lab report approval, lab report distribution, and data entry.

As an example, a paired trap was in service from June 16-22. It was sent out to the lab, arrived, analyzed, and results were available 7 days later. In this example, on June 29, the DAHS was populated and the 30-day rolling average calculated for June 16-22.

Summary Explanation of the Cause and Steps being taken to prevent a reoccurrence

The plant's ACI systems are equipped with a mercury control system with a continuous process monitor to measure the relative mercury emission output because of the inherent delay of compliance data availability, collected by a certified mercury sorbent trap system. As discussed earlier, based on the statistical analysis comparing the mercury data from the two monitoring systems, the mercury control system did not adequately account for variability between the two monitoring systems to enable sufficient PAC injection to assure the sorbent trap results complied with the MATS limits. The overall ACI system was newly installed with no history of operational data. The mercury control system's process set point was initially selected based on benchmarking other mercury control systems in the industry.

After this exceedance and with the analysis of several months of operating data, the mercury control system now injects sufficient PAC such that no further exceedances of the 30-day rolling average have occurred.

DTE Electric continues to evaluate the operational data from all of the ACI systems throughout the fleet. Compared to the June timeframe when the exceedance occurred, DTE Electric only had two months of operating data. We now have over 8 months of operating data. DTE Electric will continue to use continuous improvement tools and capabilities to review the last eight months of operating data and future data to uncover other potential process improvements.

DTE Electric and St. Clair Power Plant are committed to meeting all regulatory limits as can be seen by the large investments made in pollution control equipment. If you have any questions on the information contained herein or would like further information, please contact Jason Roggenbuck at (810) 326-6218 or jason.roggenbuck@dteenergy.com.

Sincerely,

Leann Warner

Leann Warner
Plant Manager – St. Clair Power Plant

Cc: A. Zhu – Acting District Supervisor, Southeast Michigan District Office, MDEQ
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