March 12, 2015

Gina McCann
Environmental Quality Analyst
State of Michigan ADQ/DEQ
Saginaw Bay District Office

Dear Ms. McCann-

Pertaining to the Violation Notice sent Bay Carbon dated 2 March 2015 (section highlighted below):

RULE 910: AIR CLEANING DEVICES

On January 27, 2015, the AQD staff observed operation of graphite purification process in Building "E", while the liquid flow rate for the scrubber system was not being operated in a satisfactory manner.

This constitutes a violation of Act 451, Rule 910, which requires that an air-cleaning device shall be installed, maintained, and operated in a satisfactory manner and in accordance with the administrative rules and existing law.

Please initiate actions necessary to correct the cited violations and submit a written response to this Violation Notice by March 23, 2015 (which coincides with 21 calendar days from the date of this letter). The written response should include: the dates the violations occurred; an explanation of the causes and duration of the violations; whether the violations are ongoing; a summary of the actions that have been taken and are proposed to be taken to correct the violations and the dates by which these actions will take place; and what steps are being taken to prevent a reoccurrence.

If Bay Carbon Inc. believes the above observations or statements are inaccurate or do not constitute violations of the applicable legal requirements cited, please provide appropriate factual information to explain your position.

Thank you for your attention to resolving the violations cited above and for the cooperation that was extended to me during my inspection of Bay Carbon Inc. If you have any questions regarding the violations or the actions necessary to bring this facility into compliance, please contact me at the number listed below.

Sincerely,

Gina L. McCann

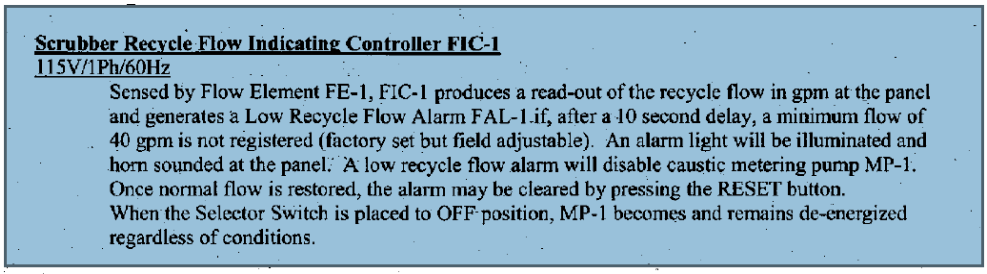
Gina L. McCann
Environmental Quality Analyst
Air Quality Division
989-894-6218

Bay Carbon is committed to complete whatever actions are necessary to insure the DEQ has confidence in the control of the manufacturing operations. In this communication, Bay Carbon provides pertinent data and suggested course of action to resolve the insufficiency.

Per the comment in your note (above) regarding the incorrect operation of the scrubber in Bay Carbon Building E, Bay Carbon respectfully disagrees with your comment in the section of the violation notice that states "the liquid flow rate for the scrubber system was not being operated in a satisfactory manner."

The scrubber in Bldg. E is a single tower system which sprays a caustic water shower into the column to remove the Cl2 in the gas stream. The spray is derived from a reservoir tank and is recirculated after exiting the column.

Below is an excerpt from the Advanced Air Technology scrubber manual:



Scrubber Recycle Flow Indicating Controller FIC-1
115V/1Ph/60Hz

Sensed by Flow Element FE-1, FIC-1 produces a read-out of the recycle flow in gpm at the panel and generates a Low Recycle Flow Alarm FAL-1 if, after a 10 second delay, a minimum flow of 40 gpm is not registered (factory set but field adjustable). An alarm light will be illuminated and horn sounded at the panel. A low recycle flow alarm will disable caustic metering pump MP-1. Once normal flow is restored, the alarm may be cleared by pressing the RESET button. When the Selector Switch is placed to OFF position, MP-1 becomes and remains de-energized regardless of conditions.

During the audit the scrubber was in operation (recall we could not get too close because of the high voltage lines on the floor). There was no active alarm on the scrubber (for flow or pH), and as such, the scrubber system was operating properly with respect to the recirculation of liquid.

In an earlier communication to Bay Carbon, you wrote

"It is my understanding that the scrubber efficiency is based off of a liquid-to-gas ratio and incorporated into scrubber design. During our post-inspection conversation it was asked, is recording the liquid flow rate making the system more effective? Yes. If the liquid flow rate is not sufficient to saturate the gas stream, or falls below the design value, collection efficiency will drop and the pollutant can be re-entrained in the gas stream and exiting out the stack. "

"Also, this is an additional monitoring point that effectively monitors scrubber operation and subsequently may aid in detecting malfunctions with the system. It is a check point that operators can monitor to ensure the system is operating as designed. Not monitoring this point is a missed opportunity for malfunction abatement."

As stated in the manual excerpt above, the flow was set at the manufacturer at 40 gpm. But they also note that the flow rate and alarm are field adjustable.

The recirculation flow rate is important, but not the sole key parameter to insure scrubbing efficiency. If the flow in the tower is reduced while the Cl2 stream is held constant, the system will see the pH drop since there is less caustic soda present in column to neutralize chlorine. The system will then automatically supply more caustic soda to the reservoir to increase the pH in order to main the scrubbing efficiency. Of course if the flow is set too low, the system will not be able to control pH and will alarm from the low pH values. See the manual excerpt below:

Scrubber Water pH AIC-1
115V/1Ph/60Hz

pH controller AIC-1 will adjust caustic metering pump MP-1 frequency based on input from pH sensor AE-1. Metering pump runs on 20 mA input from Controller AIC-1 at pH 9 and 4 mA at pH 10. Out-of range alarms are set for pH 8 and 12. A pH out-of-range alarm causes a light to illuminate and horn to sound at the panel. Once normal pH is restored, the alarm may be cleared by pressing the RESET button. High pH limit for interlock with metered water valve SV-1 is set at pH = 10.0 with a 0.2 pH dead band. Both 4-20 mA loop range and alarm/limit set points are field-adjustable.

There is a loss of liquid in the scrubber recirculation system that results from evaporation. The scrubber maintains adequate water in the reservoir via a controlled supply of city water. If this make up water supply fails, the tower flow will drop (alarm) and/or pH will drop (alarm).

My point is that the scrubber will provide the instant feedback for poor chlorine conversion based on an alarm matrix with at least one level of redundancy.

As we discussed during your visit the verbiage in the permit was not altered to reflect the operation of the scrubber when the unit in Bldg E was installed. We all have the common goal to take the appropriate actions to insure the level of Cl2 exiting the stack is controlled and below the required limits.

According to Advanced Air Technology, another critical parameter to insure high scrubbing efficiency is dilution air.

The manufacturer defines the scrubber efficiency as the conversion factor of the chlorine concentration from the input (9 cfh max) to the output (2.5 ppmv). According to the manufacturer this efficiency is driven by the column size, pressure drop across the column, pH of the neutralizing solution and the flow of dilution gas into the scrubber. The two magnahelic gauges PDI-1 and PDI-2 are the monitors which provide the feedback regarding the column pressure drop and the dilution feed. The readings of these gauges should be recorded on the run log at the start and end of each purification along with the pH of the neutralizing solution.

PDI-1: 4.0 inches (between 3-4 is acceptable according to AAT)

PDI-2: 0.5 inches (0.5-1.0 acceptable according to AAT).

It is Bay Carbon's position that the best approach for day-to-day monitoring of chlorine scrubbing is to record the values of PDI-1, PDI-2, and pH, as well as any alarm events that occur since an alarm event could constitute a chlorine release event.

Bay Carbon respectfully requests that we convene a meeting with the ADQ staff and alter permits such that they reflect the above process monitor recommendations. The current verbiage in the permit that pertains to monitoring is a hybridization of the monitors for the original house built

scrubber at Bay Carbon (taken out of use in about 2010) and the Advanced Air Technologies unit used today and in our opinion it does not reflect a plan which will insure that the existing Bldg E scrubber is operating properly.

In your earlier communication to Bay Carbon, you also wrote

"Were you able to discuss liquid flow rate with the manufacturer? In PTI 261-07A, condition IV. 1., states the scrubbing liquid recirculation rate should be no less than 40 gpm. It appears that this came from the PTI application. Also, from the demonstration it appears that Building E now has 2 scrubbers. Am I correct? The demonstration says, a "second scrubber…" It is unclear if a second scrubber was added to Building E or if a second scrubber from Advanced Air Technologies was added as a replacement. Please clarify. "

Building E has only one scrubber. It has sufficient capacity to process the output of two purification furnaces simultaneously. Only two furnaces can be run simultaneously since there are only 2 induction power supplies. Regarding the 40 gpm setpoint , please refer to the discussion above.

Lastly in your earlier communication to Bay Carbon, you also wrote:

"Further in reviewing the PM for the scrubber(s?) in Building E, I question why there is not a pressure differential range. If this is still a packed bed scrubber, as stated in the permit, then noting an upper bound for the pressure differential is important for identifying plugging in the bed."

Your point is correct. According to Advanced Air Technologies, clogging is reflected if PDI-2 drops from 0.5 to 0.25.

In closing, it is clear that improvements and actions at Bay Carbon are required to give DEQ the confidence that the purification operation at Bay Carbon does not exceed the air quality emission regulations. The Advanced Air Technologies scrubber in Bldg E is capable to meet the emission control requirements. Bay Carbon is starting a new monitoring plan which will record the operation parameters during each purification event. The table is shown below:

	Clock Time	Temperature C	N2 Flow CFH	Cl2 Flow CFH	PD-1 (allow value 3-4)	PD-2 (allow value 0.5-1.0)	pH (allow value 9-10)	Column Flow gpm	Initials
Load Start									
Load End									
Purge Start N2=60 cfh									
Purge End N2=30 cfh									
Heat Start									
Scrubber Start									
Cl2 Start Cl2=4.5 cfh									
Cl2 End Cl2= off									
Heat End/Cool Down Start									
Cool Purge Start N2=60 cfh									
Cool Purge End N2=30 cfh									
Cool Down End									
Scrubber End									
Unload Start									
Unload End									

It is our belief this approach will meet the needs which will prevent Cl2 emissions from the scrubber which exceed allowed values. Again, Bay Carbon is committed to complete whatever actions are necessary to insure that DEQ has confidence in the control of the manufacturing operations. We welcome any feedback, questions and additional discussions with the DEQ ADQ team which will help get all parties involved synchronized to a plan to meet the State's requirements.

Sincerely,

Mark Loboda
Scientist/Director of Technology
Bay Carbon Incorporated.