APPENDIX E-12
WESP Information

Enerfab Clean Air Technologies, LLC.

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October 22, 2004

API Industries, Inc.
PO Box 10010
Guayama, P.R. 00785
Attn: Ana Tirado
(787) 864-4545

Dear Ana,

With regard to the Wet Electrostatic Precipitator System (WESP) system located at the API Industries, Inc. Guayama Plant in Puerto Rico I would like to note two items now that the system is operational.

First item is the origin of the designed secondary operating power of the WESP. The value of 10.8kw was derived from the "WET ESP Design Information Section D. High Voltage System" which stated:

4. Minimum Secondary Operating Voltage is to be 27kvdc
5. Minimum Secondary Operating Current is to be 400madc

The product of 27kvdc and 400madc equals 10.8kw (kilowatts). This value was picked based on our initial design of the system. The design is based upon a proprietary performance curve and computer program used to size our systems for a given efficiency. The design for a 99+% efficiency is approximately 1000 watt per 1000 acfm. The total airflow in the system was designed for 10,000 ACFM and a 99.9% efficiency so the design called for 10,000 watts or 10kw which we then derived into a kvdc value and a madc value.

After startup and under process conditions with one incinerator operating the airflow is 1600 acfm therefore a value of 2000 watts (2kw) at this air flow rate through the WESP collector section or higher would produce a 99+% efficiency. According to the operational limits of the plant each of the two incinerators has a range of 1200 acfm to 3000 acfm so the secondary operating power would have to be in a range of 2 to 6KW to achieve a 99+% efficiency for both systems operating.

Second item is to clarify the sequence of startup of the WESP high voltage system during the incinerator startup. During the HAZOP meeting on August 21, 2004 it was agreed that the WESP would not have the high voltage energized until 15 minutes after the hazardous waste was being burned. The reason for the delay was to allow the incinerator system to come online and up to full operating temperature to ensure complete combustion and that no combustible startup gases were present in the WESP housing upon start up of the high voltage system. This change will address the safety concern we had upon startup of the incinerator system. If you require further information please contact me by telephone or email.

Regards,
CR Clean Air Technologies

Patrick Doonan
Project Director
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Letter sent via email by Francisco Claudio from EPA to API on Monday, November 14, 2005 at 4:18 PM. In this letter EPA approves API proposal to lower the AWFCOs to 10% during the CPT.

Ana:

Here is EPA's position on the type of waste and the conditions under which you will be approved by EPA to burn waste during the tests.

1- API has to "establish and comply with a limit on the maximum flue gas flow rate ... §63.1209(j)(2)". If API chooses to use maximum heat input, API will not be able to feed only aqueous waste, and will have to feed the maximum organic waste. Later, if API decides to feed more aqueous waste, API will still need to maintain the minimum combustion chamber temperature.

2- As we discussed previously, API has proposed to shutdown the interlocks while testing during the worst case scenario. PREQB do not agree because they think that they should establish the operating parameters. API indicated that if they operate on the interlocks, the system will shutoff the waste constantly and will affect the tests. API is willing to lower the interlock limit by 10% (e.g. 1,620o F instead of 1,800F) They mentioned that EPA has accepted that during the tests they could shutoff the interlocks.

After consulting Don Wright, EPA recognized that §63.1207(h) waives the operating parameters during performance test. However, §63.1207(f)(1)(viii) requires procedures for rapidly stopping the hazardous waste feed and controlling emissions in the event of equipment malfunctions. Changes to the AWFCO would achieve this. EPA accepts the lowering of the interlock by 10%.

Please, feel free to contact me if you still have any concerns.

Francisco Claudio
Environmental Engineer
Enforcement and Superfund Branch
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Letter sent via email by Wet Electrostatic Precipitator (WESP) manufacturer to API on Friday, July 22, 2005 at 05:15 PM. The letter explains the rationale of setting the WESP minimum secondary power input to 4 kW according to the actual Incinerator's operating conditions at 4,000 acfm.

Ana,

With regard to our telephone conversation about the KW parameter and 4 KW value:

1. The Kilo Watt (KW) parameter is the main parameter used by manufacturers of Electro-Static Precipitators (ESP), wet or dry, to evaluate the particulate removal efficiency. The electrostatic precipitator works by charging and collecting the particulate from the process gas stream. The charging and collection rate are both a function of the secondary voltage and current. The product of Direct Current (DC) voltage and current is watts (Volts x Amps = Watts) in the electrostatic precipitator this is the product of Kilo-Volts (KVDC) and milli-Amps (mADC) is equal to Kilo-Watts (KW). The higher the rate of charging and collecting is equal to the higher percent removal of particulate or a higher efficiency. The following Hazardous Waste Incinerator projects operating under the HWI MACT use the KW parameter to track performance of the WESP:
1. Tennessee Eastman, Kingsport, TN
2. Oxychem/Durez, Niagara Falls, NY

The KW parameter is also tied to the process gas flow by another parameter we use in the design of our WESP systems the parameter is Specific Power with units of KW per 1000 acfm. Our initial design point is usually 1000 watts per 1000 acfm so if the operating KW is 4 KW (4000 watts) and the airflow is 4000 acfm then this would equal 1000 watts per 1000 acfm. Since the electrostatic precipitator is a volumetric device much of the performance, charging and collection, depends on the specific process gas flow, particulate loading and particle size distribution. The only sure measure of efficiency for a given process is to perform a simultaneous inlet and outlet test of the WESP under process conditions at a various KW levels and check the results.

2. With regard to 4 KW as the WESP operating limit, this was a value that was decided on between Preciptech and API due to the operation of the WESP after startup under process conditions. The original operating KW value CRCAT proposed of 10.8 KW was based on our initial design review of the Ducon WESP. The design document "Design Information on the WESP @ ChemSource" submitted on November 21, 2002 has a value for a Minimum Secondary Operating Voltage of 27 KV and a Minimum Secondary Operating Current of 400mA where the product of these two values is equal to 10.8 KW secondary power.

The 27 KV and 400 mA values were initially estimated based on CRCAT's prior experience with the Hazardous Waste Incineration (HWI) process and our design program. The air load KW value for the WESP is actually 45 KW under static air conditions as measured October 2004. We estimated that the operating KW under process conditions would be 10.8 KW.

Upon startup we found the actual KW was limited by the high spark rate in the WESP. The high spark rate is most likely caused by the dripping of water from inside the WESP. The dripping

water is caused by the saturated gas stream condensing on the roof of the WESP. The dripping can be reduced by insulating the WESP roof and upper sides. In order to test if dripping water is causing the sparking we suggest using clear plexi-glass doors over the two man ways, above and below the ionizing frames, and observing the sparks and looking for the drips. Insulation should then be placed on the outside of the WESP where the dripping is occurring.

Regards,

Patrick Doonan
Wet ESP Division
Wheelabrator Air Pollution Control
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