



**MARQUIS**  
ENERGY

December 20, 2013

Attn: Compliance Tracker (AE-17J)  
Air Enforcement & Compliance Assurance Branch  
Air & Radiation Division  
U.S. Environmental Protection Agency  
Region 5  
77 W. Jackson Boulevard  
Chicago, Illinois 60604

Cynthia King (C-14J)  
Office of Regional Counsel  
U.S. Environmental Protection Agency  
Region 5  
77 W. Jackson Boulevard  
Chicago, Illinois 60604

Regional Hearing Clerk (E-19J)  
U.S. Environmental Protection Agency  
Region 5  
77 W. Jackson Boulevard  
Chicago, Illinois 60604



**Re: Marquis Energy, LLC, – Hennepin, IL  
Consent Agreement & Final Order – SEP Completion Report  
Docket No. CAA-05-2013-0016  
Billing Account No. 68010727  
Facility ID No. 155010AAJ**

Dear Correspondents:

Pursuant to Conditions 40 of the above-listed Consent Agreement & Final Order (CAFO) for Marquis Energy, LLC (Marquis), we are providing the Completion Report concerning the Supplemental Environmental Project (SEP) implemented at the Marquis' facility in Hennepin, Illinois. The SEP included the installation and operation of a scrubber to recover ethanol from the fermentation exhaust gas stream is detailed below. The conditions of the Administrative Order are in *italics* with the details as to compliance.

39. *Within 30 days after the effective date of this CAFCO, Respondent must pay \$34,078 civil penalty by electronic funds transfer, payable to the Treasurer, United States of America, and sent to the Federal Reserve Bank of New York.*
40. *Respondent must send a notice of payment to the USEPA Compliance Tracker, Cynthia King, and the Regional Hearing Clerk.*

The CAFCO was signed on April 3, 2013. On April 12, 2013, the Notice of Fund Payment Transfer was sent to USEPA. See **Attachment 1**.

45. *At the facility, Marquis Energy must complete the SEP as follows:*

a. *A contract with Pentair, Ltd. Must be executed by March 31, 2013.*

Marquis submitted signed correspondence to Haffmans North America accepting the General Terms of the proposal (Reference No. H11.6035-6). The Haffmans' proposal was included in the SEP proposal submitted to USEPA on January 9, 2013. Copies of the Letter of Acceptance from Marquis, along with the Proposal previously submitted to USEPA is attached. **See Attachment 2.**

b. *All engineering, structural steel, enclosures, piping, valves, control equipment, and associated infrastructure must be acquired, installed, and operational by October 31, 2013.*

Included are pictures of the new and existing CO2 scrubbers with identification of the process flow. **See Attachment 3.**

The new CO2 scrubber was installed and initial performance testing was conducted in July of 2013, and Marquis Energy demonstrated compliance with the scrubber permit limits. Performance testing was conducted by Stack Test Group, a testing company from Ottawa, Illinois. Pentair Haffmans, the design firm, was onsite during the testing.

Marquis Energy is the first ethanol plant to install this particular combination of CO2 scrubber and chiller that not only controls volatile organic material (VOM) and hazardous air pollutant (HAP) emissions from the fermentation process, but recovers ethanol that would otherwise be emitted with the CO2 exhaust. Due to the fact that this is a prototype, Marquis Energy was in ongoing communications with Pentair Haffmans concerning adjustments to the system in order to meet Pentair's ethanol recovery guarantees. Additional performance testing was conducted in November 2013. The new CO2 scrubber was run intermittently from July to November while Pentair and Marquis Energy evaluated the system. Agreement was reached that the most effective ethanol recovery could occur from operating both scrubbers concurrently. Therefore, testing in November 2013 was conducted under this configuration. Pentair Haffmans was onsite to evaluate ethanol recovery performance. The new CO2 scrubber has been operational on a continuing basis since November 25, 2013.



- c. *Until the scrubber is installed and operational, Marquis Energy must submit quarterly progress reports to USEPA, at the compliance tracker. Progress reports should include a detailed summary of the status of the scrubber installation and operation project.*

Reports were submitted to USEPA in April, June, and September of 2013.

46. *Respondent must spend at least \$1,650,000 to purchase and install necessary equipment and \$638,000 to operate the equipment annually for 5 years.*

Marquis Energy has tracked the costs to purchase and install the necessary equipment for the new CO<sub>2</sub> ethanol recovery scrubber project. Attached please find a spreadsheet detailing the applicable invoices and payments made by Marquis Energy. Also included are invoices and/or cancelled checks showing payment that correspond to the invoice numbers identified on the detailed spreadsheet. **See Attachment 4.** As identified in Attachment 4, the total construction costs for the CO<sub>2</sub> ethanol recovery project exceeded 1,650,000.

Based on monthly costs, estimated annual costs to operate the scrubber equipment will be \$638,000 per year.

47. *Respondent must continuously use or operate the scrubber equipment installed as the SEP for at least 5 years following installation, except during maintenance activities, operational issues and startup, shutdown and malfunction events, during which the facility will operate using the backup scrubber.*

From July to November 2013, prior to running the new CO<sub>2</sub> scrubber on a continuous basis, the backup scrubber was operating. To the extent practicable, Marquis Energy intends on operating both scrubbers consecutively in order to maximize ethanol recovery, except “during maintenance activities, operational issues and startup, shutdown and malfunction events,” in which the backup scrubber will be operated.

51. *SEP Completion Report must be submitted by December 31, 2013, and contain the following information:*

- a. *Detailed description of the SEP as completed;*

The CO<sub>2</sub> scrubber has been installed and is operational. Performance testing has been conducted on the scrubber individually and on the new and backup scrubber running



consecutively. Compliance with permit limits has been demonstrated under both scenarios. In order to maximize ethanol recovery, Marquis Energy intends to the extent practicable to operate both scrubbers consecutively. Operators collect water samples from the scrubber bottoms on a daily basis and conduct tests to determine the percentage of alcohol being recovered and routed to the beer well. The sample is measured using the high performance liquid chromatography or Near Infrared (NIR) testing to determine the ethanol content in the water. Water flow is measured utilizing the plant's distributed control system (DCS). The DCS data and test data is used to calculate the amount of ethanol recovery. See **Attachment 5**.

Marquis Energy will continue to track water flow and ethanol recovery for the next 5 years. Marquis Energy will also track annual operational costs.

*b. Description of any operating problems and the actions taken to correct the problems;*

Marquis Energy conducted initial start-up of the scrubber in July 2013. During startup, a gasket on the chiller had ruptured so Johnson Controls, a third party retained by Marquis Energy to maintain the chiller, had to repair the gasket. Thereafter, Johnson Controls conducted additional checks on the chiller to prevent any other operational issues. Marquis Energy also had M&M, the manufacturer of the chiller skid, come to the site and conduct some additional repairs after the initial run.

Another issue was identified with the data being collected on the DCS system. Trident, the third party contractor who is responsible for connecting monitors to the DCS system had not correctly tagged the temperature gauges on the new scrubber. Therefore, Trident was contacted and programming changes had to be made prior to beginning testing. Additionally, manual readings were taken by plant operators to confirm that the DCS program changes for the new scrubber reflected the field data.

There were also some issues identified with maintaining the proper water balance within the plant for ethanol recovery. By operating both scrubbers consecutively, Marquis Energy determined that ethanol recovery could be maximized while maintaining the proper water balance.

*c. Itemized cost of goods and services used to complete the SEP documented by copies of invoices, purchase orders or cancelled checks that specifically identify and itemize the individual cost of the goods and services;*

See response to Condition 46 above and **Attachment 4**.



- d. *Certification that Marquis Energy has completed the SEP in compliance with this CAFCO; and*

See Certification provided in response to Condition 53 below.

- e. *Description of the environmental and public health benefits resulting from the SEP (quantify the benefits and pollution reductions, if feasible).*

Performance testing was conducted in November 2013 and demonstrated that our emissions were below permitted limits. Pentair Haffmans was onsite to evaluate ethanol recovery performance. The new CO<sub>2</sub> scrubber has been operational on a continuing basis since November 25, 2013. See **Attachment 6** – Performance Test Report for November 2013 testing.

Additionally, by recovering ethanol from the existing process, there is an overall reduction in particulate matter (PM), VOC, and Carbon Dioxide (CO<sub>2</sub>) emissions that would result from processing and fermenting additional corn to achieve the same increased ethanol production. Over a 5-year period, it is estimated that 7,486 tons of CO<sub>2</sub> will be avoided.

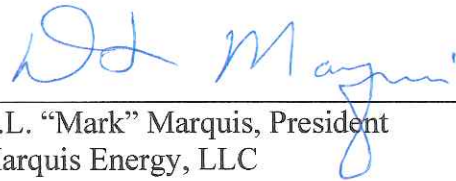
The impact of the proposed project results in a reduction in VOC emissions, as well as other pollutants associated with natural gas combustion, because approximately 2.73 million British thermal units (mmBtu) per hour of natural gas will no longer be needed to heat the water routed to the Cook Water tank. The heated water off the new scrubber will be routed to the Cook Water tank thus eliminating the need to use the boiler for such purposes. (Pentair Haffmans Specifications).

The differential pressure monitor for the new scrubber was connected to the DCS system to allow increased monitoring. By connecting the DP gauges to the new scrubber into the DCS system and tracking the DP electronically, the potential for risk of excess PM emissions to the atmosphere due to fouling of the scrubber packing is reduced. Additionally, the packing installed in the new scrubber is a high efficiency structured Sulzer packing that has a longer lifespan and provides a consistent operating range relative to the cleaning cycle, application and type of equipment.



53. *Certification signed by an officer of Marquis Energy concerning the information provided in this Completion Report.*

I certify that I am familiar with the information in this document and attachments, and that based on my inquiry of those individuals responsible for obtaining the information, it is true and complete to the best of my knowledge. I know that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

  
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D.L. "Mark" Marquis, President  
Marquis Energy, LLC

Dated: December 20, 2013

If you should need any additional information concerning this SEP Completion Report, please do not hesitate to contact me at (815) 925-7300.

