

Illinois Environmental Protection Agency  
Bureau of Air  
March 2010

Responsiveness Summary for the  
Public Comment Period on a  
Revision to the Construction Permit Application from  
Marquis Energy, LLC for the  
Ethanol Manufacturing Plant in  
Hennepin, Illinois

Source Identification No.: 155010AAJ  
Application No.: 06020041

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## **DECISION**

On March 26, 2010, the Illinois Environmental Protection Agency (Illinois EPA) Bureau of Air issued a revised Construction Permit to Marquis Energy, LLC to increase permitted production capacity of the plant located in Hennepin to 125 million gallons ethanol per year. At the same time, the Illinois EPA is issuing this Responsiveness Summary to address questions submitted during the public comment period that was held on the proposed issuance of the permit.

## **BACKGROUND**

Marquis Energy, LLC submitted an application to the Illinois EPA in February 2006 to build an ethanol manufacturing plant at 11953 ESK Road, Hennepin in Putnam County, Illinois. The facility as permitted had a 110 million gallons ethanol per year capacity. The Illinois EPA issued a construction permit to Marquis Energy in September 2006 and the facility has subsequently been constructed.

In December 2007, Marquis Energy submitted an application to the Illinois EPA to revise the construction permit to increase permitted capacity to 125 million gallons ethanol per year.

The Illinois EPA, Bureau of Air evaluates applications for permits for proposed sources of emissions. An air pollution control permit application must appropriately address compliance with applicable air pollution control laws and regulations before a permit can be issued.

Following its initial technical review of Marquis Energy's application, the Illinois EPA Bureau of Air made a preliminary determination that the application met the standards for issuance of a permit.

## **COMMENT PERIOD AND PUBLIC HEARING**

Due to the public interest in the original permit and continued interest in the project, the Illinois EPA decided to hold a public comment period and hearing before making a decision on the revised construction permit for the plant. Accordingly, after it completed its preliminary review of the application, the Illinois EPA prepared a draft of the revised construction permit it was proposing to issue. The public comment period opened with the publication of notices in the Putnam County Record and LaSalle NewsTribune on June 4, 2008. The notice was published in those papers again on June 11 and June 18, 2008. The public hearing was held on July 22, 2008 at the Putnam County High School in Granville to accept oral comments and answer questions about the proposed plant and the draft permit prepared by the Illinois EPA. The comment period closed on August 21, 2008.

Following the close of the public comment period, the Illinois EPA reviewed the public comments and conducted its final technical review of Marquis Energy's application. This review led to a final determination by the Illinois EPA that the application for revision of the construction permit met the standards for issuance of a permit.

## **AVAILABILITY OF DOCUMENTS**

Copies of the revised Construction Permit issued to Marquis Energy, LLC and of this Responsiveness Summary are available by the following means:

1. From the Illinois Permits Database on the USEPA's website:

<http://www.epa.gov/reg5oair/permits/ilonline.html>

2. By contacting the Illinois EPA by telephone, facsimile or electronic mail:

Illinois EPA  
Bradley Frost, Office of Community Relations

888/372-1996 Toll Free – Environmental Helpline  
217/782-7027 – Desk Line  
217/782-9143 – TDD  
217/524-5023 – Facsimile

[brad.frost@illinois.gov](mailto:brad.frost@illinois.gov)

## **QUESTIONS AND COMMENTS WITH RESPONSES BY THE ILLINOIS EPA**

1. Issuance of a revised permit, as proposed, would improperly reward Marquis for submitting incorrect information and not hold Marquis accountable for its original calculations for the plant's emissions. The original construction permit issued to Marquis was based on a 2006 application that contained required information on maximum process rates and potential emissions. The nature of information on the maximum process rates and potential emissions is such that good air pollution control and engineering practice are assumed when such data is provided. Thus, operational practices are not a factor that should change the maximum physical process rate or potential emissions of emissions units.

**The issuance of a revised permit, as has now occurred, would not treat Marquis inappropriately. The comment reflects an incorrect understanding of the terms “maximum process rates” and “potential emissions,” as used in the permitting of sources of emissions. These terms include considerations beyond the theoretical, physical capacity of emission units. Enforceable limits on the operation of an emission unit or a source, as established in a permit, are also a relevant factor in the determination of maximum process rates and potential emissions. Operational practices, which address various aspects of the operation of emission units, can routinely play a role in the determination of maximum process rates and potential emissions. Likewise, a permit applicant's plans for operation of emission units are also significant and, once appropriately codified in a construction or federally enforceable operating permit, are more important when determining permitted units'**

**maximum process rates and emissions than the theoretical operating capacity of the units. This is because the maximum process rates of emission units and the potential emissions of a source can be set by the enforceable terms and conditions of the permit that is issued.**

2. In its original application, as well as the current application, Marquis was required to provide data for the maximum process rates of equipment and potential emissions with precision. A key question is in which application was Marquis telling the truth and properly characterizing maximum process rates and potential emissions of this plant?

**This comment reflects an overly simplistic approach to the original and current permit applications. It does not consider that both applications could have been properly prepared, honestly describing this fuel ethanol plant based on the information and knowledge that was available when each of the applications was prepared. In this regard, it should not be assumed that the capacity of a complex facility such as a fuel ethanol plant can be physically determined or measured in absolute terms, like the capacity of storage tank or the horsepower output of an engine. Rather, the determination of the annual capacity of a proposed ethanol plant involves experience and technical judgment about the ability of the various operations in a planned plant to efficiently function together to make ethanol. As such, it is certainly reasonable that the capacity of the plant as empirically determined after the plant was built could differ from its theoretical capacity as determined earlier when the plant was proposed or designed. Moreover, as a number of new ethanol plants were developed and began operation during the period between the time that the original and current permit applications were prepared by Marquis, it would also be reasonable to expect significant developments in the technology of ethanol production during this period, consistent with the circumstances now reported by Marquis.**

3. In the project summary prepared to accompany the proposed issuance of a revised construction permit for the Marquis plant, when discussing the increase in permitted production of the plant, the Illinois EPA states “The increase will not require construction of new equipment and/or facilities but rather be achieved through improved operating procedures for the plant as achieved at other similar plants. These improvements are reflected in a higher guarantee for plant capacity from the firm that designed this plant.” However, the application does not include a listing or description of specific operating procedures that have changed, documentation for vendor guarantees, or other pertinent information. There is also not any further discussion of these improved operating procedures. The application also does not contain information from equipment vendors that shows how the physical capability of the plant as a whole (and of all of the processes) has increased from 110 million to 125 million gallons per year.

**Marquis’ application for a revised construction permit did not need to include the information indicated in this comment. This is because Marquis was not proposing to rely on the design or theoretical capability of various pieces of equipment for the permitting of the plant but instead rely on restrictions on the production and operation of the plant contained in the revised permit. The Illinois EPA in issuing a**

revised permit is also relying on explicit restrictions on the operation of the plant, continuing the approach taken in the original permit.

The portion of the project summary addressed by this comment was prepared by the Illinois EPA to provide the public with general background information about Marquis's request for a revised permit. It was based on discussions with Marquis before submittal of the application for a revised permit. As explained, Marquis' request for an increase in the permitted ethanol production from the plant does not entail installation of new production equipment. Rather it reflects reassessment of the capacity of the plant that was constructed, considering its operational capacity. Simply stated, the plant will be able to produce more ethanol than was originally expected. Based on discussions between Marquis and the Illinois EPA, this reflects a reevaluation of the rated or design capacity of the plant by the firm that designed the plant. It also reflects a reevaluation by Marquis of the level of production at which it will eventually be able to operate the plant. These new evaluations reflect experience at other new ethanol plants.

However, as already discussed, it is not necessary for these developments to be further explained or documented in the application. In addition, as the developments in the plant's practices and operating procedures are yet to be developed, they are not yet available.<sup>1</sup> To the extent that improvement in the plant's practices and operating procedures have already been made, they are still not emission data and need not be provided in the application. As these developments involve proprietary information developed by Marquis it should not be expected that Marquis would make the specifics of these developments public, as doing so would make this information available to its competitors.<sup>2</sup> Information from the firm that designed the plant and other equipment vendors would not necessarily provide information about the capacity of the plant or equipment as relevant for permitting, as implied by this comment. This is because they would be representations for the minimum capacity or capabilities, not for maximum capacity and capabilities.<sup>3</sup>

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<sup>1</sup> In the application for a revised construction permit, Marquis had to make a prediction for the maximum level of production that was achievable by the plant in the future given both the physical capabilities of the equipment at the plant and its own ability to actually operate the plant as experience and skill is gradually acquired on how to operate the plant effectively.

<sup>2</sup> As a general matter, these operational developments would include **refinements in manufacturing procedures at the plant that increase the yield or speed of the ethanol manufacturing process.** Most significantly, for the fermentation process these developments would involve measures that result in more efficient preparation of corn for fermentation, better selection and management of yeast, better management of the fermentation process, and operation to better levels of ethanol in the beer. These developments would also involve improvements to equipment inspection and maintenance procedures that result in less down-time for maintenance with more time available for production.

<sup>3</sup> In particular, the guarantees for plant capacity provided by the firm that designed this plant is not relevant for permitting as it is a guarantee for the minimum capabilities of the plant, rather than a statement of its maximum capacity. As such, it is to be expected that Marquis would permit the plant for more than its "guaranteed capacity," to reflect the maximum level of production that would actually be achievable by the plant. In that regard, the Illinois EPA's understanding is that the original guaranteed capacity of this plant was 100 million gallons of ethanol per year.

4. The current application from Marquis should be considered an admission that the original application submitted in 2006, contrary to procedural requirements for permit applications, understated the physical production capability of the proposed plant and the maximum process rates and potential emissions of the various emission units at the plant. As this violated applicable procedural requirements, the penalty provisions of the Environmental Protection Act should properly be invoked. The Illinois EPA should issue a Violation Notice to Marquis for such understatement in its original application. A revised permit should not be issued until these violations are resolved.

**This comment has been referred to the Illinois EPA's Bureau of Air, Compliance Section for investigation. As this comment alleges that Marquis violated certain applicable requirements and recommends that an enforcement action be initiated against Marquis, it is not appropriate in this Responsiveness Summary for the Illinois EPA to further respond to the substance of this comment. This is because, as a general matter, the effectiveness of the Illinois EPA's enforcement program would be compromised if the details of internal deliberations concerning initiation of enforcement for various cases were made public. Effective enforcement by governmental authorities demands the ability to exercise judgment and discretion in carrying out enforcement.**

**In addition, the violation alleged by this comment would not be an appropriate basis for the Illinois EPA to defer action on Marquis' current application, as is also suggested by this comment. This is because the alleged violation concerns conduct by Marquis that took place in 2006 and preceded the application for a revised construction permit. The occurrence or nature of any violation, as alleged by this comment, would not be altered by the issuance of the revised permit.**

5. Because Marquis did not properly characterize the maximum physical capability of equipment and the potential emissions of the plant in its original application, the Illinois EPA should exercise greater care in reviewing the current application.

**The Illinois EPA has exercised appropriate care in reviewing the current application given the nature of the plant and its circumstances. This occurred independently of the particular claims made in this comment.**

6. Because of the new information provided by Marquis in the current application about the capacity of this ethanol plant, which raises doubts about the certainty of other aspects of the application, the Illinois EPA should not issue a revised construction permit until after the emissions testing required at the plant has been performed. At most, the Illinois EPA should grant a revised permit that authorizes temporary operation of the plant for 96 hours at the higher, 125 million gallons per year rate while required emissions testing is performed.

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However, Marquis applied for an obtained a permit that allowed the plant to produce 110 million gallons per year.

**The Illinois EPA has proceeded as generally requested by this comment. That is, the Illinois EPA held off issuance of a revised construction permit until after the emissions testing required at the plant was completed and reviewed. This was a reasonable action. The required emissions testing had to be performed promptly after the plant began operation. Deferring final action on the current application until this testing was completed enabled compliance with the emission limits in the original permit to be confirmed prior to issuing a revised permit. If violations of emission limits had been identified, the issuance of the revised permit with an increase in the permitted production would have acted to increase the magnitude of such violations.<sup>4</sup> Finally, as the capacity of the plant is increasing gradually, through improved operating and maintenance procedures, the actual production of the plant was not unreasonably constrained by waiting until emissions testing was being completed and reviewed.<sup>5</sup>**

**However, the Illinois EPA has not proceeded as specifically requested by this comment. That is, the issued permit allows more than temporary operation of the plant at a short-term production rate equivalent to 125 million gallons per year. It does not restrict operation at this rate to only 96 hours, for the narrow purpose of enabling further emissions testing to be performed. It would have been inappropriate to restrict operation of the plant as specifically requested by this comment. Such a restriction would have been inconsistent with the gradual increase over time in the production of the plant. It also would not provide sufficient time for operation at a rate equivalent to 125 million gallons per year to enable emissions testing to be scheduled and conducted at this rate.<sup>6</sup> In addition, emission testing at an operating rate equivalent to 110 million gallons per year has been conducted and demonstrated compliance with a margin of compliance. Accordingly, while the issued permit does require further emission testing at the plant at a production rate equivalent to 125 million gallons per year, it provides that such testing shall be conducted within a year of beginning operation at this rate.<sup>7</sup>**

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<sup>4</sup> The identification of violations would likely have also led to the submittal of another application by Marquis with a request for further revisions to the permit to redistribute permitted emissions among the various units at the plant so as maintain the status of the plant as a whole below the emission thresholds for a major source.

<sup>5</sup> A partial increase in the permitted production of the plant, to 116.5 million gallons per year, was also authorized in conjunction with a new construction permit, Permit 08100019, which addressed a physical change to the plant that acted to reduce emissions. In particular, that permit addressed ducting the exhaust from the feed cooler baghouse to the oxidizer system for the feed dryer. This provided further control of PM and VOM emissions from the feed cooler. Considering this reduction in emissions, a revised version of Construction Permit 08100019 was issued on October 30, 2009 that allowed the plant to produce 115 million gallons of ethanol per year.

Construction Permit 08100019 was revised again January 29, 2010 to allow the plant to produce 116.5 million gallons of ethanol per year. Unlike the current permit action, which involves a revision to the original construction permit for the plant, the increases in permitted production allowed by Construction Permit 08100019 were not accompanied with any increases in the permitted emissions of the plant as a whole.

<sup>6</sup> The federal New Source Performance Standards (40 CFR Part 60) provide that emissions testing of new emission units shall be conducted within 180 days of initial startup of a subject unit or 90 days of operation of the subject unit at the maximum production rate at which the unit will be operated.

<sup>7</sup> The issued permit requires that the emissions of the key units at the plant, i.e., the fermentation tanks with their scrubber and the feed dryers with their thermal

7. USEPA's 2007 rulemaking on the PSD program, which changed the status of fuel ethanol plants so they were no longer categorized as chemical process plants, did not alter the status of fossil-fuel fired boilers. Under the PSD program, fossil-fuel boilers (or combinations thereof) that have more than 250 million Btu (mmBtu) per hour heat input capacity are major stationary sources if their potential emissions of any PSD pollutant are 100 tons per year or more.

**This comment correctly describes how fossil fuel boilers must be addressed when reviewing applicability of the PSD program to a proposed project that includes boilers. Accordingly, when the Illinois EPA evaluated the applicability of the PSD program to the Marquis plant with the requested increase in permitted production, the Illinois EPA had to consider whether the boilers at the plant would qualify as a major stationary source compared to the 100 ton per year major source threshold of the PSD program. However, the boilers at the plant, which are fired with natural gas, would not qualify as a major source because their potential emissions of various PSD pollutants are all less than 100 tons per year. Increases in the permitted emissions of the boilers are not proposed. In particular, the emissions of nitrogen oxides (NO<sub>x</sub>) from these boilers continue to be limited to 85.85 tons per year. (Refer to Conditions 2.1.6(a) and Table I of both the original and revised construction permits.)**

- 8 The Marquis plant, taken as a whole, is a major stationary source subject to permitting under the PSD program. This is because the combined heat input capacity of the plant's boilers is more than 250 mmBtu per hour and these boilers, together with the other emission units at the plant, constitute a single stationary source. This is a consequence of Section 169(1) of the Clean Air Act, which provides that a "major emitting facility" or "major stationary source" for purposes of the PSD program "...mean any of the following stationary sources of air pollutants which emit, or have the potential to emit, one hundred tons per year or more of any air pollutant from the following types of stationary sources:...fossil-fuel boilers of more than two hundred and fifty million British thermal units per hour heat input..."<sup>8</sup> In particular, the boilers at the Marquis plant are not a separate stationary source. The plant is a single stationary source. The operation of the plant from a process perspective is directly linked to the operation of the plant's boilers, which provide the steam needed for certain steps in the production of ethanol.

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oxidizer, again be tested within one year of beginning operation of the plant at a monthly rate that is equivalent to 125 million gallons per year. This monthly trigger for testing is set at 11.0 million gallons per month, which is a value than is higher than 10.04 million gallons per month or the annual limit on production divided by 12 months. This was done to account for variation in production from month to month. That is, in practice, to produce 125 million gallons of ethanol per year, averaging 10.04 million gallons per month, the production in certain months must actually be greater than this level to offset months in which production was lower.

Alternatively, if the increase in the production of the plant proceeds slowly and the trigger level for further testing is not reached within the next year, further testing is required in any case to be conducted within two years, i.e., by March 31, 2012.

<sup>8</sup> USEPA's PSD rules provide a similar definition for a major stationary source at 40 CFR 52.21 (b) (1) (i) (a).

**This comment does not demonstrate that it is appropriate to categorize the Marquis plant as a “fossil-fuel boiler facility” subject to the 100 ton per year PSD major source threshold. Instead, it supports classification of the plant as a fuel ethanol plant, which as a result of USEPA’s rulemaking on the treatment of ethanol production facilities is no longer classified as a chemical process plant. This is because the boilers at the plant support the operation of the plant and production of ethanol and do not have a separate role or function unrelated to the production of ethanol.**

**Proceeding in the manner recommended by this comment would also be contrary to one of USEPA’s objectives in undertaking rulemaking to change the classification of fuel ethanol plants under the PSD program. USEPA clearly recognized that this action could result in increases in emissions at certain plants. At the same time, USEPA also expected that this action would allow for “... larger, more economically efficient plants which, in turn will emit less emissions per gallon of ethanol produced.”<sup>9</sup> And in fact, this is the situation presented with the issuance of a revised construction permit for the Marquis plant.**

9. The boilers at the Marquis plant are not a “nested” minor source, separate from the source as a whole. The Clean Air Act does not define or otherwise address the concept of “nested” sources existing within other larger sources. In addition, USEPA guidance setting forth the concept of “nested” sources appears to contravene past interpretations of the definition of “stationary source” under the PSD program.

**This comment does not demonstrate that the boilers at the Marquis plant should not be approached as a nested source within the larger, overall source that is the fuel ethanol plant. “Nesting of sources” is an approach to applicability of PSD by USEPA that is well-established.<sup>10,11</sup> Nesting directly addresses the day-to-day implementation of the statutory definition of major emitting facility or source in the PSD program, as in actual practice the listed categories of sources can either constitute an entire source or only a portion of a larger source.<sup>12</sup> It respects the statutory definition and provides consistent and equitable treatment of proposed projects, ensuring that in cases where listed sources or activities would be parts of larger sources, applicability of PSD to the**

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<sup>9</sup> Final rule: “Prevention of Significant Deterioration, Nonattainment New Source Review, and Title V: Treatment of Certain Ethanol Production Facilities Under the ‘Major Emitting Facility’ Definition,” 72 FR 24,060 (May 1, 2007), see page 72 FR 24,070.

<sup>10</sup> For example, refer to the letter from Cheryl Newton, USEPA, Region 5, to Robert Hodanbosi, Ohio Environmental Protection Agency, January 22, 1998, concerning Pro-Tec Coating Company, and the letter from Pamela Blakley, USEPA, Region 5, to Paul Dubenetsky, Indiana Department of Air Management, October 26, 1999, concerning the Fountain Foundry in Veedersburg, Indiana.

<sup>11</sup> In addition, in Footnote 4 in the preamble to its final rulemaking changing the treatment of ethanol production facilities under the PSD program (72 FR 24,060, May 1, 2007), USEPA specifically refers to a USEPA memorandum discussing nesting. (Memorandum from Thomas Curran, USEPA, concerning “Treatment of Aluminum Die Casting Operations for the Purposes of New Source Review Applicability” December 4, 1998.)

<sup>12</sup> In actual practice, nesting can occur for listed sources or “activities” other than fossil-fuel boilers. Acid plants, sulfur recovery plants, secondary metals production facilities and chemical process plants are all activities that can constitute the entirety of a source or only a portion of a larger source.

**listed activities is approached in the same manner as if the listed activities would make up the entirety of the sources.<sup>13</sup>**

10. Marquis is now admitting that the potential emissions of the plant are higher than what was applied for and permitted in 2006, with potential emissions of carbon monoxide (CO), volatile organic material (VOM) and particulate matter (PM) all more than 100 tons per year.<sup>14</sup> Because the plant's potential emissions are more than 100 tons per year, the plant is a major source under the PSD program.

**This comment does not demonstrate that the plant is a major source for purposes of PSD permitting. In the current application, Marquis has not made any statements about the potential emissions of the plant in 2006. Rather, in the current application, Marquis applied for an increase in the potential emissions of certain pollutants from the plant that would occur in the future, i.e., if and when a revised permit was actually issued. This comment also does not demonstrate that the potential emissions of the plant were more than 100 tons per year when the original permit was issued. The fact that the plant has now been permitted to emit more than 100 tons per year of CO, PM and VOM does not show that the plant's potential emissions were more than 100 tons per year in 2006. It also does not make the plant a major source now, as the applicable major source threshold for the plant as a whole is now 250 tons per year.<sup>15</sup>**

11. Fuel ethanol plants are subject to the 100 ton/year PSD major source threshold, rather than the 250 ton/year threshold, because they qualify as "fuel conversion plants." Fuel ethanol plants are fuel conversion plants because they produce ethanol that is to be used as fuel from corn. Corn is a biomass-fuel, which is combusted to provide useful heat.<sup>16</sup>

**This comment does not demonstrate that the plant is a major source for purposes of PSD permitting. Shelled corn, as processed at this plant, does not satisfy a common-sense understanding of the term "fuel." Corn is an agricultural commodity that is grown for direct use as food for humans and animals, as a feedstock for production of corn syrup, corn starch, beverage ethanol, and other manufactured food products, and as a feedstock for production of various chemicals, notably fuel ethanol. While**

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<sup>13</sup> In the absence of nesting, a proposed listed activity at a larger source would potentially be shielded from applicability of PSD as the status of the source would be determined by the classification of the larger source and would govern the applicability of PSD to the proposed activity.

<sup>14</sup> Marquis' new characterization of plant emissions, as reflected in Table 1 of the draft permit, indicates potential or permitted emissions of 113.33, 116.81, and 138.57 tons per year for CO, VOM and PM, respectively.

<sup>15</sup> As discussed in response to other comments, the change in the permitted emissions of the plant, with the issuance of a revised permit that allows annual emissions of more than 100 tons for certain pollutants is governed by and is consistent with the current PSD rules. Under the current PSD rules, the plant as a whole is not considered a chemical process plant and is not in one of the 28 listed categories of sources for which the PSD major source threshold is 100 tons per year. Rather, the applicable PSD major source threshold for the plant as a whole is now 250 tons per year.

<sup>16</sup> Corn contains 8000 to 8500 Btu per pound on a dry basis. See: <http://energy.cas.psu.edu/energycontent.html>

**corn may be burned as a fuel in certain limited circumstances,<sup>17</sup> this secondary or incidental use of shelled corn in this manner is not sufficient to make a plant that produces fuel ethanol from shelled corn qualify as a fuel conversion plant.**

**Incidentally, it is interesting that one of the 28 listed categories of stationary source that is subject to the 100 ton per year major source threshold of the PSD rules is “charcoal production facilities.” If charcoal production facilities, which convert wood or biomass feedstock into charcoal, were considered to be fuel conversion plants, it would not have been necessary for charcoal production facilities to have been specifically listed as a category of source subject to the 100 ton per year major source threshold under the PSD program.**

12. For fermentation, the original 2006 permit was based on a controlled emission factor of 110 pounds of acetaldehyde per million gallons of ethanol produced. The current application uses a factor of 107 pounds per million gallons of ethanol but does not explain or provide the basis for the lower factor. A revised permit should not be issued unless a persuasive explanation is provided showing the need for a lower factor. The explanation should include documentation of comparative design information between the equipment at the Marquis plant and the other ethanol plants for which emission data is available.<sup>18</sup>

**The emission testing conducted at the Marquis plants confirms that the factors used in the applications to calculate acetaldehyde emissions from fermentation are conservative. That is, these factors conservatively address or overstate actual acetaldehyde emissions, which testing showed to be less than 5 pounds per million gallons of ethanol.<sup>19</sup> Accordingly, it was reasonable to rely on a factor of 110 pounds per million gallons in the original application. It was also appropriate to rely on an even lower factor for the revised permit, as was proposed by Marquis to maintain permitted acetaldehyde emissions below 10 tons per year with the increase in permitted production.**

**Given that acetaldehyde emissions from fermentation have been empirically confirmed by emissions testing, it is not necessary to investigate the specific features in the design of the fermentation scrubber that enable a lower emission rate to be achieved for acetaldehyde. This is particularly true as such information would not have served as a substitute for emission testing to confirm compliance or an alternative to on-going operational monitoring to confirm proper operation of the**

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<sup>17</sup> Shelled corn is occasionally used as fuel in rural areas in residential or farm settings in small “corn stoves.” Corn is not commonly marketed as a commercial fuel for general use, in a manner similar to natural gas, oil, coal or even wood.

<sup>18</sup> This is an important issue since the current application shows total acetaldehyde emissions of 9.96 tons per year, which is only slightly under the major source threshold for an individual HAP, 10 tons per year. Neither Marquis nor the Illinois EPA has claimed in the record that “improved operating procedures” have led to a lower acetaldehyde emissions from fermentation.

<sup>19</sup> The measured acetaldehyde emissions for fermentation at the plant were 0.0289 pound per hour, equivalent to an emission factor of 2.31 pounds per million gallons. (0.0289 pound of acetaldehyde per hour ÷ 12,500 gallons of ethanol per hour = 2.31 pounds acetaldehyde per million gallons of ethanol.)

**scrubber, consistent with the conditions under which the scrubber was operating when emission testing was conducted.**

13. As discussed, for fermentation, the original and current Marquis applications used emission factors of 110 and 107 pounds of acetaldehyde per million gallons of ethanol produced, respectively, but did not provide a basis for these factors. While Marquis did provide emission test data for Glacial Lakes Energy, that data did not support these factors because the data shows much higher emissions, 245 pounds per million gallons.<sup>20</sup> Marquis did not really submit any information that explained or justified the acetaldehyde emission factors it used. It did not even explain the much higher data from Glacial Lakes was submitted, if it could not be used to develop an appropriate emission factor. Since, Marquis does not explain its emissions factors, the current application should be denied unless and until an explanation is submitted and is made available for public comment.

**Further information is not needed for the historical emission factors used in the original and current permit applications. As already discussed, the tested acetaldehyde emission rate from fermentation is significantly below the emission factor used in the applications.**

14. The proposed limit for acetaldehyde emissions of the fermentation scrubber is too low. Ganiel Brady and Gregory Pratt of the Minnesota Pollution Control Agency published a review of emission test data from a number of fuel ethanol plants in Minnesota (Brady Report).<sup>21</sup> The average acetaldehyde emission rate from 32 tests of fermentation scrubbers was 0.71 lbs per hour. The emission rate with a 95 percent upper confidence level (UCL) was 1.23 lbs per hour. The largest plant tested had a capacity of 50 million gallons/year, less than half that of the Marquis plant. Given this data for much smaller plants from the Brady Report, the proposed limit for acetaldehyde for the fermentation scrubber at the Marquis plant, 1.44 lbs per hour, is too low.

**The data reported in the Brady Report is not applicable to the Marquis plant. The Brady Report implicitly addresses fuel ethanol plants that are older, as well as smaller than the Marquis plant. It is not appropriate to assume that the scrubber controlling fermentation at the Marquis plant, which is a newer and larger plant, would have similar emissions as the scrubbers at older and smaller plants. The fermentation scrubber at the Marquis plant had to be designed for a higher level of efficiency to maintain emissions of hazardous air pollutants (HAPs) below major source thresholds while accommodating greater production. The scrubbers at the plants addressed by the Brady Report did not have to be or were not as efficient.**

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<sup>20</sup> While the original application did include the results of stack testing for fermentation at Glacial Lakes Energy, that testing showed an acetaldehyde emission factor of 245 pounds per million gallons of ethanol. (The measured acetaldehyde emission rate was 1.26 pounds per hour, three-run average, for a plant with a nominal capacity of 45 million gallon per year, which yields an emission factor of 245 pounds per million gallons.) This factor is over twice those used in both the 2006 application and the current application.

<sup>21</sup> *Volatile Organic Compound Emissions from Dry Mill Fuel Ethanol Production*, Ganiel Brady and Gregory Pratt, Minnesota Pollution Control Agency, Journal of the Air and Waste Management Association, Volume 57, pages 1091-1102, September, 2007.

15. In comments submitted to USEPA in a rulemaking proceeding,<sup>22</sup> the Nebraska Department of Environmental Quality reports that scrubbers at ethanol plants in Nebraska have had a great deal of difficulty achieving even 98 percent control for acetaldehyde emissions. The tested acetaldehyde emission rates of some of the fermentation scrubbers in Nebraska cited in those comments would significantly exceed the 6.28 tons per year limit for fermentation in the draft permit for the Marquis plant.

**As already discussed, the emission data from various existing fuel ethanol plants is not applicable to the Marquis plant. The fermentation scrubbers at those plants did not have to be or were not as efficient as the scrubber at the Marquis plant.**

16. If the acetaldehyde emissions from the plant with the requested increase in permitted production were calculated using the emission factor for fermentation used for the original permit, 110 pounds per million gallons, the plant would exceed the major source threshold for an individual HAP. A revised permit could not be issued for the plant without a case-by-case determination of Maximum Achievable Control Technology (MACT) having been made for the plant, as required by Section 112(g) of the Clean Air Act for a new source that is major source for emissions of HAPs.

**This comment does not demonstrate that the plant was or is a major source of emissions for HAPs. To accommodate the increase in permitted production of the plant, Marquis has now committed to and is effectively subject to a slightly lower emission factor for emissions of acetaldehyde from fermentation so that the plant is still not a major source for emissions of acetaldehyde. This adjustment was feasible because of the conservative nature of the emission factor used in the original application, as was appropriate in the projections of emissions for the plant when it was being proposed.**

17. The plant is a major source of emissions of HAPs because of errors in the calculations of acetaldehyde emissions from the feed dryers. For the feed dryers, the original permit limits acetaldehyde emissions to 1.5 tons per year, total, reflecting data in the application showing emissions of 1.50 tons per year. Dividing 1.5 tons per year of emissions by annual feed production of 356,800 tons, yields an acetaldehyde emission factor of 0.0084 or 0.00841 pounds per ton of feed. Nominally, the 0.0084 factor is the one which was used in the original 2006 application.

However, in the application for revised permit, Marquis used an emission factor of 0.008 to calculate potential emissions of 1.62 tons per year with higher permitted ethanol production. Marquis committed a serious error by rounding the emission factor from 0.0084 to 0.008.<sup>23</sup> There is not an engineering basis for reducing emissions through

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<sup>22</sup> Correspondence from Shelley Kaderly, Nebraska DEQ, to USEPA, May 8, 2006.

<sup>23</sup> Engineering calculations should carefully consider the number of significant digits to which results are calculated. In this case, calculation of an emission factor with only a single significant figure (0.008) is not consistent with good practice for the handling of significant digits in engineering calculations. With an emission limit of 1.5 tons per year, with two significant digits, the emission factor should also have been calculated to two significant digits. Use of a factor that is rounded to one significant digit is improper and could lead to erroneous results.

rounding. The effect of this rounding is to reduce the emission factor used by 5 percent from the base factor used in the original application. The consequences are significant.<sup>24</sup> The acetaldehyde emissions of the feed dryers using a factor 0.0084 lbs per ton of feed and annual production of 405,545 tons of feed, as now requested, is 1.70 tons per year. It is not 1.62 tons per year as shown in the application and reflected in the limit in the draft permit. This would push the plant's potential acetaldehyde emissions over 10.0 tons per year. As a result, the revised permit cannot be issued since the plant has not been subject to a case-by-case determination of MACT pursuant to Section 112(g) of the Clean Air Act.

**This comment does not demonstrate that the plant was or is a major source of emissions for HAPs. Certain emissions of acetaldehyde from feed drying have not been "overlooked" due to rounding, as suggested by this comment. Rather, to accommodate an increase in permitted production of the plant, Marquis has now committed to and is effectively subject to a slightly lower factor for emissions of acetaldehyde from feed drying, i.e., 0.0080 instead of 0.0084 pounds per ton of feed. Accordingly, the plant is still not a major source for emissions of acetaldehyde. This adjustment was feasible because of the conservatism in the emission factor used in the original application, as was appropriate in the emissions projections by Section 112(g) of the Clean Air Act for a proposed plant.**

18. Marquis has not explained or justified the acetaldehyde emission factor that it is used for feed drying in its original 2006 application, i.e., 0.0084 lb/ton. It also has not reconciled this factor with the higher factor of 0.015 lbs per ton feed shown by test results for the feed dryer at Glacial Lakes Ethanol, which were included in the original application. For the feed dryer at that plant, the measured acetaldehyde emission factor was 0.015 lbs per ton of feed.<sup>25</sup> This factor is almost twice as high as the factor of 0.0084 lbs per ton reflected in the original permit for the Marquis plant.

**The emission testing conducted at the Marquis plant confirms that the factors used in the applications to calculate acetaldehyde emissions from feed drying are conservative. They overstate actual acetaldehyde emissions, which testing showed to be about 0.006 pounds per ton of feed.<sup>26</sup> Accordingly, it was reasonable to rely on a factor of 0.0084 pounds per ton in the original application. It was also appropriate to rely on an even lower factor for the revised permit, as was proposed by Marquis to maintain permitted acetaldehyde emissions below 10 tons per year with an increase in permitted production.**

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<sup>24</sup> The draft permit would provide for permitted acetaldehyde emissions of 9.96 tons per year, as calculated in Marquis' application (See spreadsheet in Marquis' application, "Project Emission Summary - Increased Throughput Existing Ethanol Production Plant - November 2007, Revision 1"). As a result of the rounding of the acetaldehyde emission factor for the feed dryers and improper handling of significant figures, the plant's potential acetaldehyde emissions would actually be 0.08 tons per year more than shown in the current application.

<sup>25</sup> The measured emission rate at Glacial Lakes Ethanol was 0.23 lbs per hour, three-test average, for a feed dryer with a nominal process rate of 15 tons of feed per hour, yielding an emission factor of 0.0153 or 0.015 lb/ton of dried feed.

<sup>26</sup> The measured acetaldehyde emissions for feed drying at the plant were less than 0.20 pounds per hour, equivalent to an emission factor of 0.006 pounds per ton of feed. (0.20 pound of acetaldehyde per hour ÷ 36 tons of feed per hour = 0.0055, ≈ 0.006 pounds acetaldehyde per ton)

19. The Brady Report also includes data for acetaldehyde emissions from feed dryers. It shows acetaldehyde emissions of 0.26 pounds per hour, 95 percent UCL, based on 30 tests, all at plants with a capacity of no more than 50 million gallons per year. This suggests that acetaldehyde emissions of the feed dryers at the Marquis plant would be 2.5 times as high or 0.65 pounds per hour. This would put the plant over the 10 tons per year major source threshold for an individual HAP.

**As already discussed, the data reported in the Brady Report is not applicable to the Marquis plant. It is implicit in the Brady Report that that it addresses ethanol plants that are older, as well as smaller than the Marquis plant. The control systems at those plants for feed drying did not have to be or were not as efficient as the control system at the Marquis plant.**

### **FOR ADDITIONAL INFORMATION**

Questions about the public comment period and permit decision should be directed to:

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### Listing of Significant Changes between the Draft Permit and Issued Permit

Condition 2.1.1: The description of the boilers now indicates that the boilers may be equipped with economizers. The economizers would recover additional heat from the exhaust to preheat the water feed to the boiler. They would not increase the amount of fuel that the boilers are capable of firing or the potential emissions of the boilers.

Condition 2.1.5(d): An additional operating requirement is set for the boilers related to the level of “excess” oxygen in the exhaust after combustion. Until emissions testing at a lower level of oxygen is conducted that demonstrates the compliance with applicable limits for CO and VOM, each boiler must be routinely operated with its excess oxygen at or above 4.0 percent. This new requirement is added to the permit to help ensure that the CO and VOM emissions of the boilers comply with applicable emission limits in the permit. This requirement was found to be necessary because the emissions testing for one boiler, which was conducted while it was operating with significantly less than 4.0 percent oxygen, that were above the applicable limit. (The measured VOM emissions of the other boiler were well below the applicable limit, but it was operating at significantly more than 4.0 percent oxygen. The emission testing only showed that the boilers complied with the applicable VOM limit based on the average emission rate of the two boilers.)

Condition 2.1.7(b): Further emission testing of each boiler for CO and VOM emissions is required within “one year” of issuance of the revised permit, i.e., by March 31, 2011. This testing will verify that management of the oxygen levels of each boiler ensures compliance with applicable limits for CO and VOM emissions.

Condition 2.1.8-2: Continuous operational monitoring is now required on each boiler for excess oxygen. This monitoring is needed to support the new operational requirements for the boilers related to excess oxygen.

Condition 2.3.7: Additional emission testing is required for the grain milling operation (emissions of particulate matter). This action was taken because of a deficiency in the procedures for the initial testing. The location in the ductwork selected for sampling did not meet applicable USEPA criteria that address disturbances of the gas flow distribution in a duct. This deficiency in the initial testing argues for further testing. (The particulate emissions of the grain milling operation, which is controlled by a fabric filter, do comply with applicable limits based on the results of the initial testing.)

Condition 2.4.5: For the fermentation scrubber, an additional operating requirement is set related to use of additives that enhance control of acetaldehyde emissions. As related to use of such additives in the scrubbant, the Permittee must routinely operate the fermentation scrubber in a manner consistent with operation during emissions testing. This new requirement is added to the permit to help ensure that its emissions of comply with applicable emission limits in the permit.

Condition 2.4.6(b)(i): For fermentation operations, minor changes were made to the emission limits for HAPs in response to the results of emission testing. In particular, limits for HAPs other than acetaldehyde were increased. Limits for acetaldehyde were reduced by a greater amount. Overall, the permitted emissions of HAPs from the fermentation system were reduced.

Condition 2.4.7(a)(ii): For the fermentation scrubber, additional emission testing is required to verify compliance with applicable limits at the higher production rate now allowed for the plant by the revised permit. This testing must be conducted within two years, i.e., by March 31, 2012, or within one year of operation at a monthly production rate that correlates with the new permitted annual rate, i.e., 11 million gallons of ethanol per month. This monthly trigger for testing is set at a value that is higher than 10.04 million gallons per month, i.e., the annual limit on production divided by 12 months. This was done to account for variation in production from month to month. That is, in practice, to produce 125 million gallons of ethanol per year, averaging 10.04 million gallons per month, the production in certain months must actually be greater than this level to offset months in which production was lower.

Condition 2.4.8-1 and 2.4.8-2(a): For the fermentation scrubber, changes were made to the requirements for operational monitoring to simplify and clarify these requirements. The provisions for continuous operational monitoring now clearly address the overall pressure drop across the scrubber. Instrumentation is now allowed for measurement of the pressure between the packed bed of the scrubber and the demister section. Monitoring of overall pressure drop is adequate to confirm proper operation of the scrubber. The further data for pressure between the bed and the demister provides relevant diagnostic data, which can be used in the event of changes in overall pressure drop. However, as such, this parameter need not be continuously monitored.

Conditions 2.6.1 and 2.6.2: The description of the stillage operations now indicates that corn oil may be recovered from the stillage and handled separately as another byproduct from the plant. This would not increase the capacity of the stillage operations. However, it would reduce the amount of material sent to the feed dryers, as that material would contain less oil.

Conditions 2.6.1, 2.6.2, 2.6.5(b)(ii), 2.6.6(b) and (c) and 2.6.8-1(d): Various changes were made to the permit to address the new configuration of the feed cooler/baghouse, with only a portion of the exhaust from this unit now going directly to the atmosphere and the remainder going to the oxidizer system as provided for by Construction Permit 08100019. The description of the feed cooler/baghouse is changed (Conditions 2.6.1 and 2.6.2). A restriction is set on the amount of exhaust to the atmosphere (Condition 2.6.5(b)(ii)). Changes are made to emission limits, “transferring” some of the previously permitted particulate emissions from the cooler/baghouse to the oxidizer system (Conditions 2.6.6(b) and (c)). Requirements for operational monitoring are established to verify the flow rate of the direct exhaust on an ongoing basis in the event that the volume of the direct exhaust to the atmosphere cannot be physically constrained by a fixed stack damper (Condition 2.6.8(d)).

Condition 2.6.7(a)(ii): Additional emission testing is required of the oxidizer system to verify compliance with applicable limits at the higher operating rate now allowed for the plant by the revised permit. The dates by which this testing must be conducted are the same as those for the further testing of the fermentation scrubber.

Condition 2.8.5(a)(ii): For the barge loading operation, up to 1 million gallons of ethanol may now be loaded out when the control system (flare) is not operating. This change was made to provide some allowance for loading without control of emissions. This will act to prevent disruption in the schedule for the operation of the barge dock, which is used for businesses other than the ethanol plant, and the schedule for the arrival and departure of barges at the dock. This

change is possible because control of VOM emissions from barge loading is not required by applicable regulations.

Condition 2.8.6(a)(ii) and (b)(i)(B): For the barge loading operation, limits on VOM emissions are set now for loading that may now occur with emissions going directly to the atmosphere. The overall limit for annual VOM emissions from barge loading operations is unchanged and continues to apply to all barge loading, both controlled and uncontrolled.

Attachment A: The listing of emission units at the plant is updated to reflect the various changes to the plant that have occurred or may occur, have already discussed. Changes were also made to clarify this listing.

Table I: The summary of the plant's permitted emissions on an annual basis is revised to be consistent with the changes that have already been discussed. In particular, the permitted PM emissions from feed dryer/oxidizer and feed cooler baghouse are adjusted for the portion of the exhaust from feed cooler that must now be controlled by the oxidizers. The permitted HAP emissions of the fermentation operations are also adjusted.