ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
BUREAU OF AIR

May 2007

Responsiveness Summary for Public Questions and Comments on the Construction Permit Application from Illini BioEnergy, LLC for an Ethanol Plant in Hartsburg, Illinois

Site Identification No.: 107025AAB
Application No.: 06030028

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INTRODUCTION

Illini BioEnergy, LLC (Illini BioEnergy) has applied for an air pollution control construction permit to build a fuel ethanol production plant in the community of Hartsburg in Logan County.

Upon review of comments received during the public comment period and final review of the application, the Illinois Environmental Protection Agency (Illinois EPA) has determined that the application meets the standards for issuance of a construction permit. Accordingly, on May 14, 2007, simultaneously with the preparation of this Responsiveness Summary, the Illinois EPA issued a permit to Illini BioEnergy to construct the proposed plant. The plant must be constructed and operated in accordance with all applicable regulations and the terms and conditions of the issued permit.

The issued permit includes a number of additional requirements for the proposed plant compared to the draft permit, as well as various clarifications to conditions, based on public comments. In particular, the issued permit contains additional limitations on certain operations and additional requirements for monitoring and recordkeeping to assure that the proposed plant would not be a major source of emissions under the federal rules for Prevention of Signification Deterioration (PSD), 40 CFR 52.21.

DESCRIPTION OF PROPOSED PLANT

Illini BioEnergy has proposed to construct a plant to produce ethanol from corn. The plant would be designed to have a nominal capacity of 100 million gallon per year, with the ability to actually produce up to 110 million gallons of ethanol per year. The denatured ethanol produced by the plant would be used as motor vehicle fuel. When added to gasoline, ethanol is an octane enhancer and oxygenated fuel additive, which reduces hydrocarbon and carbon monoxide emissions in vehicle exhaust. The plant would produce ethanol by batch fermentation of ground corn, followed by processing to separate out and purify the ethanol. The plant would also produce animal feed from the stillage material remaining after the fermentation process. The plant would have facilities to receive raw material (grain) and ship products (fuel ethanol and feed) by both truck and rail. Natural gas would be used as the fuel for the plant.

The stillage produced at an ethanol after fermentation can be dried by either steam heated or direct-fired feed dryers. Illini BioEnergy originally proposed to use five steam heated dryers controlled by regenerative thermal oxidizers, with the steam for the dryers being supplied from two proposed natural gas-fired package boilers. Following the public comment period on the draft permit, in conjunction with certain other changes to the proposed plant that respond to public comments, Illini BioEnergy changed the design of the proposed plant to use four direct-fired natural gas dryers. These dryers would be controlled with recuperative thermal oxidizers with heat recovery steam generators, which allow these oxidizers to also supply steam for the plant so that separate package boilers are no longer needed.

COMMENT PERIOD AND PUBLIC HEARING

The Illinois EPA Bureau of Air evaluates applications and issues permits for 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 Illini BioEnergy's application, the Illinois EPA Bureau of Air made a preliminary determination that the application for the proposed plant met the standards for issuance of a construction permit and prepared a draft permit for public review and comment.

The public comment period began with the publication of a notice in the Lincoln Courier on September 30, 2006. The notice was also published in this newspaper on October 7 and 14, 2006.

A public hearing was held on November 15, 2006 at the Hartsburg High School, 400 West Front Street in Hartsburg to receive oral comments and answer questions regarding the application and draft air permit. The comment period closed on December 15, 2006.

AVAILABILITY OF DOCUMENTS

The permit issued to Illini BioEnergy and this responsiveness summary are available on the Illinois Permit Database at www.epa.gov/region5/air/permits/ilonline.htm (please look for the documents under All Permit Records (sorted by name), State Construction Permits). Copies of these documents may also be obtained by contacting the Illinois EPA at the telephone numbers listed at the end of this document.

GENERAL COMMENTS WITH RESPONSES BY THE ILLINOIS EPA

1. How are the emissions of the proposed plant determined? For example, are emissions estimated by using emissions factors published by USEPA in its *Compilation of Air Pollutant Emission Factors*, AP-42?

The projected emissions of the proposed plant generally reflect information in the application supplied to Illini BioEnergy by ICM, the designer of the proposed plant. The information is based on a variety of supporting information and documentation. The projected emissions for the proposed plant reflect the designer's experience with similar emission units at other plants, including the results of emissions testing, and performance guarantees provided by suppliers of air pollution control equipment for the proposed plant. Emission factors and emission calculation methodologies published by USEPA in AP-42 are used to estimate emissions for certain operations at the proposed plant, such as roadways and flares, for which emission testing is impractical and alternative approaches are commonly used to determine emissions.

2. The draft permit sets limits on the emissions that are just below the thresholds at which the plant would be considered a major source.

This is correct. However, Illini BioEnergy has conservatively applied for emission limits that are believed to generally reflect the emission guarantees that it has obtained for the proposed plant. It is expected that the actual emissions of the plant would be below these numbers. As an example, oxidizers can achieve higher efficiencies in practice than the minimum efficiency required by the permit and higher efficiencies in practice would lower the actual emissions from the plant.

3. There are serious problems with the determination of potential emissions for a number of operations at the proposed plant, as addressed in separate detailed comments. If the potential emissions of the proposed plant for any criteria pollutant are 100 tons per year or more, a permit may not be issued since the proposed plant has not undergone review under the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21, as is required for a proposed major source. Similarly, if the potential emissions of any single hazardous air pollutant (HAP) from the plant are 10 tons per year or more a permit can not be issued since the plant has not undergone a case-by-case determination of Maximum Achievable Control technology (MACT) for emissions of HAPs.

   This is a critical issue because the margins between the permitted emissions for the proposed plant and the 100 ton/year major source threshold are very small for most pollutants. In particular, based on the summary of emissions in Table 1 of the draft permit, these margins are 2.09, 2.44, 2.63, and 2.86 tons per year for volatile organic material (VOM), particulate matter (PM), carbon monoxide (CO) and nitrogen oxides (NOx), respectively. The detailed comments for certain units at the proposed plant show that the potential emissions of those units have been underestimated. When these underestimates are considered, it is clear that the proposed plant will be a major source for certain pollutants. In addition, for the specific units for which emissions have been underestimated, these emission calculations constitute errors in the application.

In the issued permit, the "margins" between the permitted emissions of the plant and the 100 ton/year major threshold source are all at least 2.0 tons. This is an adequate margin given the nature of the underlying emissions calculations and the provisions of the permit that act to ensure that the proposed plant will not be a major source of emissions. The various comments on specific operations do not identify fundamental flaws in the evaluation of the emissions of the proposed plant, whose correction results in the proposed plant being a major source.

4. Emissions of condensible particulate must be included in total PM emissions when determining whether the proposed plant is a major source for emissions of particulate matter. However, when responding to public comments on the proposed issuance of a construction permit for a fuel ethanol plant proposed by Marquis Energy (Marquis) in Hennepin, Illinois, the Illinois EPA indicated that this was not the case, contrary to applicable federal regulations and current USEPA guidance. In response to the particular comment, the Illinois EPA stated:

   > Condensible PM emissions from these operations [grain handling and milling operations] also will not affect the determination that the proposed plant is not a major

> source. This is because condensible PM is a component of particulate matter10 (PM-10) but not total suspended particulate (TSP), as generally addressed by the permit. The permitted PM-10 emissions of the proposed plant are less than 85 tons/year, compared to the major source threshold of 100 tons/year.[1]

First, the draft permit, which is similar to the construction permit issued for the proposed Marquis plant, does not address emissions of "Total Suspended Particulate" or TSP. The draft permit routinely refers to "Particulate Matter" or "PM." PM involves the total mass of particulate emissions regardless of size and includes condensible particulate. It would be inconsistent with the federal PSD rules, 40 CFR 52.21, to presume that condensible PM is not part of total particulate matter emissions when reviewing the proposed plant to determine whether it is a major source for particulate matter under the PSD rules.

Second, pursuant to 40 CFR 52.21(b)(1)(i)(a), whether a source is major under the PSD rules is based on its emissions of "regulated NSR pollutant(s).[2] Condensible particulate is a component of PM-10 which is regulated by a National Ambient Air Quality Standard (NAAQS). Further, the PSD rules consider particulate matter emissions to be regulated without regard to size and, as such, constituted by the total mass of emissions from a proposed being evaluated for applicability under the PSD rules. The condensible particulate may not be excluded from "total particulate matter" emissions when evaluating whether the proposed plant should be considered a major source.

Condensible particulate has been appropriately considered when determining whether the proposed plant is a major source for "particulate matter" under the PSD rules. With respect to the specific role of condensible particulate in such determinations, the Illinois EPA's statement in the Responsiveness Summary in the Marquis proceeding was perhaps not as clear as it could have been, especially given the terminology used in the permit. However, condensible particulate may be excluded from emissions of total suspended particulate (TSP) when evaluating whether a proposed plant is a major source of particulate based on emissions of TSP. More importantly, particulate larger than PM-10 can be excluded when evaluating whether the proposed plant is a major source based on its PM-10 emissions. The commenter's statement that "…the PSD rules consider particulate matter (PM) emissions to be regulated without regard to size…" also is incorrect.

This confusing situation is a result of the different forms in which particulate exists and may be measured and the associated changes over time in the way that USEPA has regulated

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[1] Response 37, from the *Responsiveness Summary for Public Questions and Comments on the Construction Permit Application From Marquis Energy, LLC for an Ethanol Plant in Hennepin, Illinois.*

[2] *Regulated NSR pollutant*, for purposes of this section, means the following: (i) Any pollutant for which a national ambient air quality standard has been promulgated and any constituents or precursors for such pollutants identified by the Administrator (*e.g.*, volatile organic compounds are precursors for ozone); (ii) Any pollutant that is subject to any standard promulgated under section 111 of the Act; …(iii) Any Class I or II substance subject to a standard promulgated under or established by title VI of the Act; or (iv) Any pollutant that otherwise is subject to regulation under the Act; except that any or all hazardous air pollutants either listed in section 112 of the Act or added to the list pursuant to section 112(b)(2) of the Act, which have not been delisted pursuant to section 112(b)(3) of the Act, are not regulated NSR pollutants unless the listed hazardous air pollutant is also regulated as a constituent or precursor of a general pollutant listed under Section 108 of the Act.

particulate under the Clean Air Act. When the PSD rules were originally adopted, the rules addressed emissions of particulate matter as "total suspended particulate," as would be measured by USEPA Method 5. Condensible particulate was not included since it would not be measured by USEPA Method 5. This situation changed in 1987 when USEPA adopted a NAAQS for PM-10 and subsequently adopted new emission test methods for measurement of filterable PM-10 and condensable particulate. This created two overlapping classes of particulate matter emissions: 1) PM-10, which includes filterable PM with a diameter of 10 microns or less and condensable particulate, and 2) Total suspended particulate, which includes all filterable particulate, both with a diameter of 10 microns or less and greater than 10 microns, but not condensable particulate.

In any event, the broad point made by the Illinois EPA in the Responsiveness Summary for the Marquis project is still valid for the proposed plant. There is a greater "safety margin" for the proposed plant from being a major source based on its PM-10 emissions than based on its PM emissions, i.e., the plant is being permitted for PM-10 emissions of 77.81 tons/year, whereas it is being permitted for PM emissions of 98.00 tons/year.[3] The PM emissions of the plant are more important than the PM-10 emissions for determining whether the source is a major source.

5. If the emissions of a particular emission unit as initially tested or monitored are higher than expected, would the plant have to reduce the amount of ethanol it produces to stay below the major source threshold?

In the event that emissions of a particular emission unit are initially higher than expected, one possible response would be to reduce ethanol production. However, it is more likely that Illini BioEnergy would take corrective actions to reduce the emissions of the responsible unit, with adjustments or repairs to the installed emission control technology on the particular unit. The situation could also be addressed by "reallocation" of emissions from other units that perform significantly better than planned or by implementation of additional measures or equipment to further control emissions. Illini BioEnergy could manage the initial operation of the plant while these actions are being carried out so that the plant's actual emissions never exceed the major source threshold.

COMMENTS ON THE DRAFT PERMIT WITH RESPONSES BY THE ILLINOIS EPA

6. Various conditions in the draft permit contain language mandating the NSPS affected units comply with "related provisions" of 40 CFR Part 60, Subpart A, the General Provisions of the federal New Source Performance Standards (NSPS). The term "related provisions" is vague and subject to varying interpretation by different parties. Instead, the permit language for all NSPS-affected emission units should simply require compliance

[3] This difference in permitted emissions of the plant for PM-10 and PM is due solely to the limits for roadways, for which separate limits are set. The annual emissions of roadways are limited to 20.19 and 40.37 tons/year for PM-10 and PM, respectively. Thus, total particulate emissions from roadways, including particulate larger than 10 microns, must only be considered when determining compliance with the PM limit, and not for the PM-10 limit. For emission units at the plant other than roadways, the permit limits particulate emissions as if all particulate would be PM-10, without accounting for any difference in PM and PM-10 emissions.

with all provisions of 40 CFR 60, Subpart A.

The conditions addressed by this comment are appropriately written. As a matter of both federal and state regulations, Illini BioEnergy must comply with applicable requirements of the General Provisions of the NSPS for emission units that are subject to the NSPS. The conditions addressed by this comment merely identify the regulatory obligation.

7. Measurements of emissions by USEPA Method 18 should be required to address at least 20 specific organic compounds, including acetaldehyde, acetic acid, ethanol, formaldehyde, formic acid, furaldehyde, methanol, glycerol, lactic acid, butanol, acrolein, isoamyl alcohol, ethyl acetate, succinic acid and isoamyl acetate. These compounds are recognized byproducts of fermentation. Several of these compounds have higher boiling points, so that they may be retained in stillage materials until they are subjected to elevated temperatures in the feed dryers.

While emission measurements for many of the compounds listed in this comment will be made as part of VOM emission testing, the extent of such testing is a matter that is appropriately resolved shortly before testing, as part of the approval of a test plan by the Illinois EPA. This is because USEPA may continue to evaluate and refine its guidance for testing of VOM emissions at ethanol plants and other grain processing plants. However, the general effect of this USEPA guidance is also clear, as it requires VOM test results to be properly "adjusted" to accurately reflect the actual mass of VOM emissions.

Boilers (Condition 2.1)

In the issued permit, the oxidizer-boiler systems are addressed by Condition 2.1 as these systems function as boilers and are subject to emissions standards that apply to boilers. Condition 2.6 addresses the operation of these systems as they function as control devices for the feed dryers and other emission units at the plant.

8. The permit should prohibit the boilers from being fired beyond their design capacity. Such firing might otherwise occur to maintain the steam output in the event of degradation or damage of a boiler.

It is not necessary for the permit to address operation of the boilers outside their design capacity. Industrial boilers are selected for routine operation at less than their rated capacity, so as to accommodate normal variations in steam demand. Operation of a boiler above design capacity to compensate for degradation or damage would be contrary to good air pollution control practice.

9. The draft permit would not limit the potential to emit of the boilers, because it would only limit the design heat input capacity of each boiler (Condition 2.1.5). The permit must actually limit each boiler from being fired beyond its capacity to have a physical limit on throughput to limit the physical potential to emit of the boilers.

As this condition would set a limit on the design heat input of units, it would establish a

physical limit on the capacity of the boilers to operate and have emissions. As such, this condition is sufficient to define the potential emissions of the boilers. Moreover, this condition is readily enforceable. Compliance can be confirmed from the name plate on the boiler or its design specifications, without the need to review hour-by-hour records of actual consumption of fuel.

10. Condition 2.1.6(a) erroneously states that the emission limits for the boilers in the draft permit "…are based on information in the application including the maximum firing rate (230 million Btu/hr, each), the emission factors based on the manufacturer's guaranteed data for NOx (0.04 lb/mmBtu) and CO (0.04 lb/mmBtu), …." However, the application indicates that the maximum firing rate of each boiler is 260 million Btu/hour. In addition, the emission calculations use emission factors of 0.035 lb/million Btu for NOx and CO.

The emission limits for NOx and CO in Condition 2.1.6(a) of the draft permit were based on the application, as revised by Illini BioEnergy. Illini BioEnergy reduced the size of each boiler from 260 million Btu/hour, as stated in its initial submittal, to 230 million Btu/hour. At the same time, it used a higher emission factor for the NOx and CO emissions of the boilers. These two actions counterbalanced each other, so that the projected emissions of NOx and CO from the boilers were essentially unchanged.[4]

As already explained, Illini Bio Energy has further revised its plans for the plant. The plant would now have two combined dryer/oxidizer/boiler systems, each with a total rated heat input capacity of 212 million Btu/hour. Each system takes the place of a boiler, with a rated heat input of 230 million Btu/hour, as discussed above, and a separate oxidizer, with a rated heat input of 18 million Btu/hour.

11. Contrary to Condition 2.1.6(a), which limits the maximum firing rate of each boiler to 230 million Btu per hour, the VOM, PM and SO2 emission limits for the boilers reflect a firing rate of 260 million Btu/hour. The Illinois EPA should not accommodate a situation in permitting where an applicant states it will operate boilers at 230 million Btu/hour when it really intends to operate at 260 million Btu/hour. Steam production is a likely constraint for the overall plant. If the plant actually intends to operate the boilers at a rate higher than stated in the application, then emissions of other units should also be re-evaluated based on potential debottlenecking.

The circumstances surrounding emission limits for the boilers in the draft permit should not be portrayed as accommodating operation of a boiler at more than 230 million Btu/hour. Condition 2.1.6(a) of the draft permit would have limited the design heat input capacity of the boilers to 230 million Btu/hour, as clearly stated by that condition. As observed in this comment, when the size of the boilers was reduced, the emission calculations for VOM, PM and SO_2 were not adjusted. This resulted in emission rates for VOM, PM and SO_2 that were about 13 percent higher than would have been calculated using AP-42 emission factors, since

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[4] Emissions of NOx and CO were initially calculated as the product of an emission factor of 0.035 lb/million Btu and a heat input of 260 million Btu/hour, for an emission rate of 9.1 lb/hour. When the size of the boilers was reduced, the emissions were calculated as the product of an emission factor of 0.040 lb/million Btu and a heat input of 230 million Btu/hour, for an emission rate of 9.2 lb/hour.

emissions were still calculated based on a boiler heat input of 260 million Btu/hour. However, this did not indicate that Illini BioEnergy intended to operate the boilers at 260 million Btu. As already explained, the emission calculations for NOx and CO, which were of greater concern, were adjusted when the boilers were downsized.

12. Recordkeeping and reporting for continuous monitoring conducted for the boilers should include "out of control" periods of the monitoring system, as defined by federal continuous emissions monitoring regulations in 40 CFR 60, Subpart A.

The general provisions of the NSPS, 40 CFR 60 Subpart A, do not have any provisions to address periods when continuous emission monitoring systems are "out of control," nor are such provisions needed. Out of control periods are only addressed under the NSPS for emissions monitoring for mercury conducted pursuant to the "Clean Air Mercury Rule." Out of control periods are also addressed under the Acid Rain Program for monitoring of SO_2 emissions. The circumstances that require out of control periods to be addressed in these programs, that is, quantification of emissions for purposes of programs that involve emission allowances, are not present for the "compliance monitoring" required of the oxidizer/boiler systems.

This comment provides an example of the types of issues that are present in the federal regulations for continuous emissions monitoring that support the approach to those regulations taken in the permit, i.e., reference to those regulations rather than restatement.

13. The draft permit would not require testing of the boilers for emissions of PM, SO_2 or HAPs. Accordingly, the limits for these pollutants are not enforceable as a practical matter since site-specific emission factors are never developed and compliance determination is a paper exercise that may not reflect the actual emissions of the boilers.

Emission testing and site-specific emission factors are not needed for the emission limits for PM, SO_2 or HAPs to be enforceable. As certain emission factors are being relied upon for the boilers, the relevant issue is whether the boilers are operating in a manner such that the selected emission factors should be considered representative of the boilers. This issue is addressed by the provisions of the permit that require emission units at the plant be operated in accordance with good air pollution control practice. These requirements are accompanied by requirements for recordkeeping to generally verify that units are properly operated. Records are also required for any periods of abnormal operation, with detailed information for such periods including consideration of the potential consequences for additional emissions of a unit. These records go well beyond a "paper exercise," serving to appropriately address operation of the boilers on an hour-by-hour basis. Beyond this, USEPA emission factors from AP-42 are generally considered to be biased on the high side, so that use of such emission factor should generally be expected to overstate emissions from normal operation of the boilers.

14. Recordkeeping for daily usage of natural gas by the boilers, as required by Condition 2.1.9(b)(ii) of the draft permit, cannot ensure compliance with hourly emission limits.

This condition of the draft permit addressed records required by the NSPS. As previously explained, the permit does not rely on records of gas usage to provide practical enforceability of hourly emission limits.

15. Absent monitoring or recordkeeping on an hourly basis for heat input, Condition 2.1.9(f) does not provide a basis to determine hourly emissions for purposes of verifying compliance with hourly emission limits for every hour of the year. Moreover, because the permit does not actually limit the hourly heat input, there is no clear assurance of compliance with either hourly or annual emission limits, unless continuous emissions monitoring is conducted for pollutants.

The permit imposes recordkeeping requirements that are adequate to verify whether the oxidizer/boiler systems comply with hourly emission limits. As previously explained, the permit requires detailed records for those particular periods, or hours, when a boiler is not operating normally, which records must specifically address the possibility and nature of any excess emissions. At other times, when a boiler is operating normally, records are only required to confirm normal operation. This approach does not necessitate maintaining records of emissions hour-by-hour. Likewise, this approach does not require records of the usage of natural gas on an hour-by-hour basis, which would unquestionably be a paper exercise. Instead, records of the natural gas usage of the boilers may be maintained on a longer-time period, as needed to calculate the "base" emissions of the boilers attributable to normal, compliant operation.

Emergency Engine (Condition 2.2)

16. If the performance of the emergency engine depends on the use of emission control devices, such as trap oxidizers, then additional monitoring and recordkeeping provisions should be included in the permit to ensure that such devices are properly operating.

Add-on control equipment or engine adjustments, as addressed in this comment, are not routinely used on small emergency engines. Due to the limited usage of these engines and the need for simple, reliable operation, these engines are usually the basic, low-emission engines available from manufacturers.

17. The annual limits on operating hours and emissions of the emergency engine should be on a rolling 12 month basis.

These limits do apply on a rolling 12-month basis, as recommended by this comment. (See Condition 1.1(e).)

Grain Handling and Milling (Condition 2.3)

18. The application does not include technical details for the design of the grain receiving area or the associated fugitive emissions collection system, including the effective grate area of the dump-pit and the amount of aspiration air. This is unacceptable because it is not possible to know if the design of these systems will properly and effectively collect

fugitive emissions.

New grain receiving operations can be readily designed and constructed to control PM emissions. The permit requires that the PM emissions from grain receiving at the proposed plant not exceed 5 percent opacity. This sets the "specification" for control of PM emissions from the grain handling operations, which the operations and associated control devices must be designed, constructed and operated to meet. Even if the design of the proposed operation had been completed and details of the design submitted in the application, review of that design data for the operation would not excuse Illini BioEnergy from complying with the performance specification for operation established in the permit.

19. The baghouse for grain handling operations, which has a capacity of 48,000 SCFM, serves other grain handling operations beside the receiving area. The application does not contain information on the amount of aspiration air to each operation or information on baffles and other control measures on each operation. Without this information, one cannot ensure that the system is designed to provide 95% collection efficiency, as relied upon in calculating PM emissions. Any increase in the size of the baghouse to assure effective control of emissions or failure of the fugitive emission collection system to properly function would threaten to push the plant's PM emissions over the major source threshold. The application should be considered incomplete until these details for the design of the control system are provided.

As explained above, the grain handling operations can be readily designed to achieve effective control of fugitive PM emissions. The receiving of grain at the proposed plant is the only operation for which such emissions pose any particular concern. Once grain has been received, operations can be readily enclosed so as to allow effective capture of PM emissions. The capacity of the baghouse for grain handling operations provided in the application, 48,000 SCFM, should be ample for effective control of emissions.

20. The potential PM/PM10 emissions from grain handling and the feed cooler calculated in the application are all understated by small, but significant, amounts of condensible particulate. While measurements of condensible PM are required as part of all particulate emission testing, this does not address the problem of determining the total actual filterable plus condensible PM/PM10 potential to emit during pre-construction review of the proposed plant.

    For the baghouses controlling the grain handling operations, the application uses a factor of 0.005 grain per standard cubic foot (gr/scf). This is a common vendor guarantee for baghouses for filterable-only particulate (Method 5 "front half" catch or Method 201). It is not the practice of baghouse vendors to make guarantees for emissions of condensible particulate, absent other gas treatment, since condensible particulate is not controlled by a baghouse by itself. If the PM/PM10 potential to emit is calculated solely on the basis of filterable particulate-only guarantees, then the calculations will not reflect additional emissions potential over and above the maximum 0.005 gr/scf filterable-only factor. Recent emission tests at the Vera Sun - Fort Dodge, Iowa plant show that condensible particulate constitutes the majority of emissions from grain handling and milling.

Likewise, test results for the feed cooler show condensible particulate emissions greater than the filterable emissions.

While these tests show exemplary performance of baghouses for control of filterable particulate, the actual potential emissions of the relevant emission units are based on the 0.005 gr/scf guarantees for filterable-only PM as the baghouses age and wear. On a potential to emit basis, condensible particulate must still be considered in addition to the filterable-only emissions. While the amounts of condensible particulate over and above the filterable emissions of 0.005 gr/scf are not enormous, they contribute to under accounting of PM emissions large enough in the aggregate to push the proposed plant, as presently depicted, over the major source threshold for PM/PM10.

The "problem" that this comment addresses is created by the commenter and is not real. As noted in the comment, baghouses are very effective in controlling filterable particulate. The amount of condensable particulate from grain handling, milling and feed coolers, which is "uncontrolled" with a baghouse, is not a significant factor in the total PM emissions compared to the emission limits that have been set for these units. Condensible particulate only becomes a potential problem if one presumes that the emissions of filterable particulate from these units will actually be at the level of the guarantee. Otherwise, the particulate emissions from these units, including both filterable and condensable particulate, are adequately addressed by the permit.

21. The application must be revised to consider condensible PM emissions from the grain handling and milling operations at the proposed plant. In PM emissions testing conducted at VeraSun in Fort Dodge, Iowa, a 110 million gallon/year fuel ethanol plant, it was found that condensible PM constitutes most of the PM emissions from both the milling and grain handling operations. Emissions of condensible PM, as measured by USEPA Method 202, were 0.132 and 0.069 lb/hr from the baghouses for grain handling and milling, respectively. Assuming continuous operation, the condensible PM emissions from these two operations at the VeraSun plant would be 0.88 tons/yr.

The data provided in this comment confirms the conservative nature of the PM emissions calculations in the application for the proposed plant. It does not show a need for changes to the application or the permit. This is because the comment cites data showing actual PM emissions of at most 1.8 tons/yr, total, from the baghouses for grain handling and milling at the 110 million gallon/yr VeraSun plant. The permit for the proposed plant conservatively accounts for and allows PM emissions of up to 17.93 tons/yr from these units.

22. The construction permits issued to Patriot Renewable Fuels in Annawan (Patriot) and Marquis Energy in Hennepin (Marquis) included the following provision, which was not present in the draft permits, that modifies how USEPA Method 5 may be used to test PM emissions.

> For emission units for which the average stack gas temperature is less than 250 ºF, such as grain handling operations, but not including boilers, testing may be conducted at actual stack gas temperature without heating of the probe or filter

> holders. (Condition 3.1-1(b) Note a)

While it is reasonable to allow an unheated probe if USEPA Method 5 testing is carried out carefully with respect to collecting particulate from probe washing, this condition does not curb an unacceptable exercise of discretion by the emission testing personnel provided by Method 5 procedures when testing is conducted with an unheated probe. In particular, the following provisions of Method 5 allow problematic source testing at the primary or sole discretion of emission testing personnel:

> 8.1.3 Desiccate the filters at 20 ± 5.6 ºC (68 ± 10 ºF) and ambient pressure for at least 24 hours. Weigh each filter (or filter and shipping container) at intervals of at least 6 hours to a constant weight (i.e., < 0.5 mg change from previous weighing). Record results to the nearest 0.1 mg. During each weighing, the period for which the filter is exposed to the laboratory atmosphere shall be less than 2 minutes. Alternatively (unless otherwise specified by the Administrator), the filters may be oven dried at 105 ºC (220 ºF) for 2 to 3 hours, desiccated for 2 hours, and weighed. Procedures other than those described, which account for relative humidity effects, may be used, subject to the approval of the Administrator. (USEPA Method 5 - Section 8.1.3)
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> Alternatively, the sample may be oven dried at 104 ºC (220 ºF) for 2 to 3 hours, cooled in the desiccator, and weighed to a constant weight, unless otherwise specified by the Administrator. The sample may be oven dried at 104 ºC (220 ºF) for 2 to 3 hours. Once the sample has cooled, weigh the sample, and use this weight as a final weight. (USEPA Method 5 - Section 11.2.1)

For probe washings, Method 5 provides the following:

> NOTE: The contents of Container No. 2 as well as the acetone blank container may be evaporated at temperatures higher than ambient. If evaporation is done at an elevated temperature, the temperature must be below the boiling point of the solvent; also, to prevent "bumping," the evaporation process must be closely supervised, and the contents of the beaker must be swirled occasionally to maintain an even temperature. … (USEPA Method 5 - Note after Section 11.2.4)

During PM emission testing in which the front half of the sampling train is not heated according to procedures set forth in USEPA Method 5, with measurements made in a lower temperature flue gas, what would otherwise be condensible particulate that would normally be collected in the back half of the sampling train may be deposited on the filter and in the probe. The cited provisions of USEPA Method 5 give emission test personnel discretion for unsupervised decisions in favor of oven treatment for filters and thermal treatment of probe washings. With an unheated sampling train, such discretion for sample catch processing may cause unaccounted losses of the condensible particle deposited in the front half of the sampling train. Accordingly, to avoid loss of PM sample, with resulting low measurements of PM emissions, the permit should not give testing personnel discretion as to methods used to treat filters and probe washings.

The Illinois EPA has not modified USEPA Method 5, as implied by this comment. Rather, the Illinois EPA has relied upon relevant provisions of the federal New Source Performance Standards (NSPS) for Grain Elevators, 40 CR 60 Subpart DD. In particular, for grain handling operations, as addressed by the condition, 40 CFR 60 303(b)(1) provides that "… the probe and filter holder shall be operated without heaters." In this regard, USEPA Method 5 accommodates testing at different temperatures based on the particular application of the test method. The comment also presumes that the selection of drying method for the various collected PM samples, whose purpose is to remove moisture from the sample, would significantly affect the measurement that is made. For example, the back half catch from a PM sampling train must also be dried when determining condensible PM emissions. The comment also overlooks the role of the Illinois EPA in supervising the conduct of emission tests. Finally, this comment presumes that condensible PM emissions are present in the exhaust from grain handling operations. However, the reported presence of condensible PM emissions may be an artifact of testing conducted with a probe and filter heated to approximately 250 ºF (or of reactions that occur in the back half of the sampling train that would not otherwise occur in the atmosphere).

23. The requirements of 35 IAC 212.462 should apply to the grain handling operations at the proposed plant, i.e., Condition 2.3.5(b) should not be included in the permit. This condition in the draft permit provides that an individual grain handling operation need only comply with applicable requirements of 35 IAC 212.462 if a certified investigation performed by the Illinois EPA determines that the operation is causing or tending to cause air pollution. This condition makes grain handling operations at the plant conditionally exempt from the requirements of 35 IAC 212.462, with applicability only triggered if the Illinois EPA finds that an operation is causing air pollution.

    The grain handling operations are not entitled to this exemption because another criterion for this exemption will not be met. The relevant portion of Section 9(f) of the Environmental Protection Act (which is the legal basis for this provision), also provides that a criterion for exemption is that a grain elevator not be required to obtain a Clean Air Act Permit Program permit pursuant to Section 39.5 of the Act. Since the proposed plant will be required to obtain a Clean Air Act Permit Program permit pursuant to Section 39.5 of the Act because the plant is actually a major, the plant is not entitled to this exemption. The elevator is also not entitled to this exemption because it would be a new elevator under 35 IAC 212.462(e), with an annual grain throughput over 300,000 bushels. Further, the elevator does not qualify for an exemption under 35 IAC 212.462 through reference to 35 IAC 212.461(c) or (d). Finally, the primary purpose of this plant is not to act as a grain elevator in the traditional sense that motivated the legislative intent of the statutory language. This is primarily an ethanol plant and not a stand-alone grain elevator.

The condition of the draft permit addressed by this comment properly reflect the provisions of the Environmental Protection Act (Act) that relate to Illinois' rules for grain elevators at 35 IAC 212.462. At the present time, as permitted, the proposed plant is not a major source of emissions so that it will not be required to operate under a CAAPP Permit. (If circumstances change in the future so that a CAAPP permit is required, this would also

trigger applicability of 35 IAC 212.462 for the grain handling operations.) The various state rules cited in this comment do not act to trigger applicability of 35 IAC 212.462, given the overarching effect of the Act. Finally, the language of the Act is clear on its face and it is not necessary to speculate on legislative intent. If such speculation is desired, a better explanation of that intent is available than offered by this comment. The legislature acted because it found that the requirements of 35 IAC 212.462 were excessive if a grain operation was not causing air pollution, perhaps in part due to increased use of hopper trucks and improved dump pit designs, which have made the specific requirements of 35 IAC 212.462 outdated and unnecessary as a routine matter.

24. When USEPA approved the revision to Illinois' State Implementation Plan to include this provision of Section 9 of Illinois' Environmental Protection Act discussed in the above comment, USEPA never intended this provision to apply to facilities other than stand-alone rural grain elevators.[5] Moreover, when it approved this provision, USEPA relied upon modeling performed for standalone grain elevators that showed that compliance with the National Ambient Air Quality Standard (NAAQS) for PM-10 would not be jeopardized by this provision. One feature of that modeling was rural background conditions that did not account for the presence of large sources like an ethanol plant in the neighborhood of an elevator.

The provision in question has ample ability to directly protect the NAAQS. This is because the emission control requirements of 35 IAC 212.462 are only "waived" if air pollution is not occurring. If a violation of the NAAQS is caused by a grain elevator, given its particular circumstances, it would constitute air pollution, which would trigger applicability of 35 IAC 212.462 for the elevator if and as necessary to prevent such violations in the future. Accordingly, whether the USEPA specifically "anticipated" the use of this provision for grain elevators associated with new ethanol plants is not relevant. The provision still operates in a manner that is protective of the ambient air quality standards.

25. Even if the grain handling operations are exempt from 35 IAC 212.462, the requirements of these rules should be applied to assure compliance with the limit for the fugitive emissions from grain unloading (for which 95% capture efficiency is used in the emission calculation). In particular, it is essential that the dump pits be designed and operated to achieve the face velocity specified in 35 IAC 212.462(b).

The Illinois EPA agrees with the spirit of this comment but not its substance. To ensure effective control of fugitive PM emissions from grain handling operations, including the dump pit, the permit relies on the requirements of the federal NSPS for grain elevators, 40 CFR 60, Subpart DD. Even though the plant will not meet the applicability criteria of these rules, the relevant requirements of this NSPS are imposed on the proposed plant. This is because this NSPS sets restrictions on opacity and the presence of visible emissions from grain handling operations, so as to directly address the effectiveness with which fugitive PM emissions are controlled. Accordingly, the NSPS is a more appropriate means to address the effectiveness of emission control than the equipment standards in 35 IAC 212.462, which many consider outdated due to advances in the design of grain dump pits and changes in the

[5] Telephone conference with John Summerhays, USEPA, Region 5, on December 12, 2006.

types of trucks that transport grain. Moreover, 35 IAC 212.462 specifies the face velocity from aspiration air at the surface of the grate, so it does not actually serve to address the overall capture of PM emissions from grain receiving.

26. Since compliance with the requirements of 35 IAC 212.462 is mandatory, the permit must include requirements for testing and operational monitoring to ensure compliance with those requirements. These would include measuring collection system flow rates at key locations based on testing of face velocities and establishment of set points for compliance evaluation based on flow rates, means to ensure that apportioned gas collection rates were being achieved, periodic opacity monitoring requirement to address the no visible emission requirement and other monitoring for each element of 35 IAC 212.462. In addition, ongoing operational monitoring and measures are needed to ensuring compliance with the fugitive emission limits of Condition 2.3.6(a), for which compliance is dependent on effective capture of emissions.

As already explained, unless grain handling operations at the proposed plant cause air pollution, it is not expected that they will be subject to 35 IAC 212.462. However, the permit includes appropriate work practices and testing, instrumentation and recordkeeping requirements to verify that the measures to control PM emissions from the grain handling operations are properly implemented and to reasonably identify any lapses in such control measures.

27. The grain handling and milling baghouses must be subject to monitoring sufficient to assure compliance during the period between emission testing. Monitoring of pressure drop may be sufficient to ensure that gross baghouse failures are detected, but pressure drop is not a sufficiently sensitive technique to detect small leaks and other smaller filter failures that will interfere with compliance with the specified limit of 0.005 grains per standard cubic foot (gr/scf).

For baghouses used for grain handling and milling, as well as most other applications, the accepted practice for operational monitoring is measurement of pressure drop. The performance limit set for the baghouses at the proposed plant, 0.005 gr/scf, is not so different from the performance specification for most new baghouses in similar service, 0.01 gr/scf, to require additional operational monitoring. Monitoring of pressure drop will serve to assure that the baghouse is being properly operated, without being subjected to high pressures that would threaten the integrity of the filter. It will also assure that deterioration in the performance of a baghouse, as would be revealed by a low pressure drop, is identified.

28. Use of “manufacture’s recommendations” in the operational requirements and monitoring provisions for grain handling and milling operations at Conditions 2.3.5(c) and 2.3.5(d)(i) is indeterminate; such provisions cannot be enforced in practice. The permit should include specific enforceable requirements for emissions and parameter monitoring. For example, the baghouse pressure drop parameters and an envelope of variance from such parameters should be determined and fixed during emission testing. The permit should establish a procedure by which such limits on parameter set points and maintenances of minimum tolerances as an envelope of operation is established pursuant to testing and

communications with Illinois EPA. The permit should also set minimum standards for accuracy and testing of pressure drop instrumentation.

For certain operational requirements and monitoring and instrumentation for operational parameters, a requirement that a source follow manufacturer's recommendations is enforceable. In the event of poor operational performance of a monitoring system, it is a simple matter to compare the actual practice or action of the source to those that are recommended by the manufacturer. It is not necessary for the permit to establish specific protocols for measurement of parameters like pressure drop, temperature or liquid flow rate, for which operational measurements are routinely and reliably made by sources as part of their standard operating practices.

29. Continuous bag leak detection systems must be required on the grain handling and hammer mill baghouses to ensure compliance with the 0.005 gr/scf performance limit for PM emissions. An annual baghouse inspection is not sufficiently frequent to provide assurance that compliance with applicable limits is being achieved.

Bag leak detection systems are used on large baghouses on units such as solid fuel fired boilers and steel furnaces. They are not necessary or appropriate for baghouses used on grain handling or milling operations.

30. If Illini BioEnergy may accept shipments by straight truck (e.g., shipments directly from local farmers), PM emissions from straight truck loading must be addressed in the emission calculations and physical limits on potential emissions from the plant. This is because the calculations for fugitive emissions from grain receiving are based on the factor for uncontrolled emissions for grain delivery by hopper truck (from AP-42 Section 9.9.1, Grain Elevators) and 95 percent control from choke flow. However, the draft permit would not limit truck delivery of grain to the plant to hopper trucks, prohibiting delivery by straight trucks. Without such a condition, the plant can also accept delivery of grain by straight trucks, since straight trucks are still in use to transport grain. Since the emissions calculations do not address delivery of grain by straight trucks, any grain deliveries by straight trucks could push the plant over the major source threshold for PM.

    In response to a similar comment made in the permit proceeding for Marquis, the following condition was included in the issued permit:

    > Grain from "straight trucks" (as distinguished from hopper bottom trucks) shall only be received if the grain receiving operation for such trucks is equipped with quick closing doors and an aspirated dump pit. (Condition 2.3.5(b) of the Marquis permit)

    However, this condition does not satisfy the basic need to limit the potential fugitive emissions from grain receiving. The uncontrolled emission factor for receiving of grain by straight trucks is 0.18 lb/ton, over five times higher than the factor for hopper trucks, 0.0035 lb/ton. It is not sufficient for the permit to specify some control measures as a contingently applicable requirement if the plant chooses to receive some grain from straight trucks. The measures specified in the Marquis permit, i.e., an aspirated pit and

quick closing doors, are not capable of achieving the same 95% control achieved for hopper truck deliveries with choke flow. "Quick closing doors" cannot pass muster as a valid technique to provide all needed control to achieve the minimum 95% control efficiency for hopper loading for the higher uncontrolled emissions from straight truck loading. Under Illinois EPA's approach both hopper and straight truck unloading would utilize aspirated dump pits for receiving grain. Accordingly, the "extra control" to manage the dramatically higher emission rate with straight truck unloading would have to be achieved by the "quick closing doors." However, quick closing doors cannot control any fugitive emissions from straight truck loading while such loading is actually occurring since the doors to the dump pit must remain open to receive the grain.

Any emissions from grain received by straight trucks must be fully characterized, which has not yet happened. The permit must specifically address the proportion of deliveries between hopper and straight trucks or otherwise limit the number of such straight grain truck deliveries. Without such emission characterizations and enforceable physical limits on the potential emissions, PM emissions from grain receiving would exceed targets set from emission calculations based entirely on hopper trucks. This could also cause the plant's PM emissions to exceed the 100 ton per year major source threshold.

The issued permit includes the condition from the construction permit for the proposed Marquis plant quoted by this comment. The purpose of this condition is to require that the emission rate, in lbs/ton, for uncaptured PM from any grain received at the plant from straight trucks does not exceed the emission rate for hopper trucks, as was used in the emission calculations. This is further required as the issued permit limits the opacity of the uncaptured or fugitive emissions from grain receiving to no more than 5 percent irrespective of whether grain is received by straight trucks or hopper trucks.

The use of an aspirated dump pit with quick-closing doors for receiving of grain by straight trucks provides significantly higher control efficiency than choke flow control on a hopper truck. This compensates for the higher uncontrolled emission factor for any receiving of grain from straight trucks. This occurs because the quick closing doors serve to enclose the unloading operation <u>while grain is actually being unloaded</u>, reducing loss of dust due to wind currents and allowing the aspiration system to operate more effectively. While the doors to the dump pit building must be open for a truck to enter the building, as observed by this comment, the doors do not remain open during unloading of grain. The doors are closed after each truck enters the building, only to reopen after unloading is complete to allow the truck to leave the building and the next truck to enter.

31. The permit should prohibit all outdoor storage of grain for any reason, such as storage of off-specification grain, or outside storage of milled grain from upsets of the mash preparation process.

It is not appropriate for the permit to address the outside storage of grain because the plant is not being developed with facilities to store grain outside or to subsequently handle grain that has been stored outside. It is also not appropriate for the permit to speculate on upsets that might occur at the plant and the actions that might be needed to address them.

Mash Preparation and Fermentation Area (Condition 2.4)

32. My analysis of information in the application for the fermentation scrubber indicates that it will not be able to comply with applicable limits under all likely operating scenarios. Based on the application, the gas flow rate for this scrubber will vary from 6,000 to 13,000 acfm, with inlet VOM concentration ranging from 6,000 to 14,000 ppm and outlet VOM concentration ranging from 35 to 300 ppm. The application also indicates a VOM emission factor of 900 lbs per million gallons of ethanol, which is equivalent to 11.3 lbs/hour for production of 110 million gallons/year. The permit limits VOM emissions to 11.12 lbs/hour and requires that the scrubber achieve at least 98% control efficiency. These emission limits are essentially based on the promise of maintaining VOM emissions within 900 lbs per million gallons of ethanol.

    This data is not internally consistent. Given the data for the upper and lower operating conditions of the scrubber, as well as average gas flow, my analysis indicates that the scrubber will not always be able to comply with the limits in the draft permit.[6] It also indicates that the scrubber will not be able to comply with the hourly emission limit if it can only achieve 98% control efficiency. This raises serious questions about whether the plant will actually be able to comply with annual VOM emission limits.

As also noted in the application, the emission factors for the fermentation scrubber are based on actual test data at similar ethanol plants plus a moderate margin of safety and are considered to be conservative. The analysis performed by this commenter used the extremes of the data for different operating parameters of the scrubber in a way that is not realistic. For example, it is not realistic to combine the stated maximum gas flow and maximum VOM concentration in the exhaust. However, as indirectly shown by the calculations in this analysis, at the typical gas flow rate from fermentation (11,000 acfm), the outlet VOM concentration in the exhaust would have to be about 65 ppm to be in compliance, with a VOM control efficiency of at least 99 %. The scrubber would not be in compliance if the outlet VOM concentration is greater than 125 ppm.

33. The application identifies a number of factors that appear to mitigate against long-term assurances of compliance with VOM emission limits by the fermentation scrubber. For example, the application indicates that scrubber water comes directly from a well at temperatures of 47 ºF to 85 ºF. While the permit may require scrubber water temperature not to exceed the temperature during emission testing, it is questionable that this will be achieved in practice without the ability to manage water temperature and equipment or without the ability to independently manage the water temperature. The application also does not show that a programmable logic controller would be used for automated operation of the scrubber to address variation in water temperature, VOM concentration and gas flow

[6] For example, if the flow rate is 13,000 cfm and the outlet VOM concentration is 300 ppm, the VOM emission rate would be 58.74 pounds/hour, rather than 11.12 lb/hr as allowed. To be in compliance, the outlet VOM concentration would have to be less than 60 ppm. Likewise, if the inlet VOM concentration is 6000 ppm and the outlet VOM concentration is only 300 ppm, the control efficiency would only be 95 percent, rather than 98 percent as required. To comply with the control efficiency requirement, the outlet concentration would have to be no more than 120 ppm.

rate. At the same time, the water flow to the scrubber is constrained by the water balance for the plant, which is a consideration apart from maintaining the optimum VOM control efficiency. The application also indicates that the exhaust flow from fermentation is widely variable. Applicant has not submitted enough information about the temporal nature of variability of this process to design compliance accountability measures that ensure emission testing will address worst-case emissions. All of these factors should give pause about the emission calculations for fermentation.

The stable source of water for the scrubber provides reassurance that the scrubber will perform with VOM emissions that comply with applicable limits. Unlike plants that use some process water as make-up for the scrubber, the water supply for the proposed plant will come directly from the well, minimizing variation in temperature. To assure that emission testing accurately addresses the temperature of the water supply, emission testing will either have to be conducted during hot weather or the water temperature during testing will have to be manipulated to reflect the peak temperature of the supply.

The comment also identifies other techniques that could be used to enhance the performance of the scrubber, if it is necessary to do so. These include addition of a chiller system so that cooler water could be provided to the scrubber. A programmable logic controller could also be used for more careful operation of the scrubber, to enable water flow rate to be managed on a real-time basis based on process parameters, so that compliance is maintained without disrupting the water balance for the plant.

34. The Illinois EPA should question whether the VOM emissions from fermentation can be characterized on the basis of factors expressed in terms of "pounds per million gallons of ethanol." Fermentation is one step removed from the distillation process and efficiencies inherent in its evaluation. It is not practical for an emission test to extend over the time period for production of one million gallons of ethanol, this type of performance factor must be discounted for overall emissions characterization. Traditional stack tests for three one hour periods, accompanied by parametric monitoring to address continuing compliance, are not sufficient to demonstrate that the claimed performance has actually been achieved. Illini BioEnergy has attempted to lull the Illinois EPA into complacency with the performance data that has been supplied for the fermenter.

It is appropriate for the VOM emissions from fermentation to be limited to 900 pounds per million gallons of ethanol produced. This is a fundamental factor for performance of the fermentation scrubber and limits emissions relative to actual production of ethanol. However, as observed by this comment, determining compliance with this factor will not be so straightforward that it can be relied upon by itself. Accordingly, the permit also directly limits the VOM emissions of the fermentation scrubber, in pounds per hour, and imposes requirements for proper operation of the scrubber.

35. Condition 2.4.5(a)(i) in the draft permit provides that the key operating parameters of the fermentation scrubber shall be maintained at levels consistent with levels at which emission testing demonstrated compliance with applicable requirements. The language is not sufficiently explicit to make enforceable a process whereby emissions testing is

performed under different process operating variables and an envelope of acceptable operating parameters for the scrubber is determined and then made enforceable. Based on parameter monitoring, there must ultimately be a clear method that provides enforceable criteria as to when a unit must be considered out of compliance.

The effect of Condition 2.4.5(a)(i) is clear. After emissions testing of the fermentation scrubber is performed (which must be conducted while the fermentation area is operating at capacity), the plant must generally continue to operate the scrubber with a minimum water flow rate, maximum water temperature and maximum exhaust gas temperature that are consistent with the values of these operating parameters during emissions testing. Deviations from these operating requirements would be a violation of this condition. This has obvious consequences for the operating conditions for the fermentation scrubber under which the plant elects to conduct emission testing of the scrubber, i.e., testing must be conducted with values of these operating parameters that can be consistently and reliably maintained. While testing of the scrubber with more water would show lower VOM emissions, it would also create a future obligation to always operate with "more water." Of course, emissions testing must also be conducted when the scrubber is operating with enough water that the scrubber meets applicable limits.

Given the straightforward nature of fermentation of corn, the Illinois EPA expects that there will only be a single normal operating mode for the scrubber. While some variation in exhaust gas flow to the scrubber will occur due to the cyclical nature of batch fermentation, this variation will be dampened by the staggered operation of seven fermentation tanks. Accordingly, it seems unlikely that a series of tests of the scrubber under different operating modes will be performed. However, if the plant does elect to conduct multiple tests to address different operating modes or to establish a more complex relationship of operating parameters, this would initially be addressed by the Illinois EPA as part of the review of the plan for testing. It would then be further addressed by the Illinois EPA as part of the processing of the operating permit application for the plant. This would define the different operating modes of the fermentation area for which each set of operating parameter values would apply. The issued permit does address such circumstances, with provisions that would allow operation of the fermentation scrubber pursuant to an alternative "compliance plan" while an application for a revised permit to incorporate such a plan is being reviewed by the Illinois EPA.

36. The conditions of the permit that set required values of operating parameters for the fermentation scrubber, as well as for other control devices, must be written to ensure that the plant may not "cherry pick" operating parameters to comply with only a single emission limit at a time. The process of establishing an operating condition envelope for compliant operation must reflect simultaneous compliance with all limits demonstrated with simultaneous and corresponding ranges of operating conditions during the test.

The draft permit does not allow "cherry picking" of operating requirements, as this comment cautions against. Where the permit contains multiple operating requirements for a control device, all requirements are to be met. Expressed in other words, a deviation from a single requirement for a control device is a deviation from proper operation of the device,

even if the device is "overcomplying" with other requirements.

37. It is unclear whether "differential pressure across the scrubber" is considered a "key operating parameter" for the fermentation scrubber. The flow rate and temperature of the liquid scrubbant in the scrubber, which is a packed tower scrubber rather than a high energy scrubber, are much more important to the proper operation of the scrubber than differential pressure.

Differential pressure is not treated as a "key" operating parameter of the fermentation scrubber. This is why the permit has separate provisions for proper operation of the scrubber relative to key operating parameters, i.e., scrubbant flow rate and temperatures, and proper operation relative to pressure drop. If the pressure drop of the scrubber goes outside the normal range, it is not a deviation from operating requirements for the scrubber. However, it does trigger a requirement to initiate appropriate corrective action to restore the differential pressure to the normal range.

38. The language at Condition 2.3.5(a)(ii), which relates to an operating range of the differential pressure as "defined by the Permittee" to required actions by the plant, is particularly offensive. This is because it imparts to the plant the sole discretion to determine the final form of an applicable requirement without reference to the determination through a compliance test or other agreed upon procedure. Such provisions are not practically enforceable.

This condition is appropriate and is enforceable. As a general matter, there is nothing improper about requiring a source to initiate corrective action when a unit is operating abnormally, particularly if the initial responsibility for defining normal and abnormal operation is placed on the source. While the commenter may find it distasteful to allow the source to define abnormal operation for a particular operating parameter, this is a direct consequence of the secondary role of differential pressure in the performance of the fermentation scrubber. This prevents the pressure differential during testing from being used as an appropriate basis to distinguish between normal and abnormal operation.

While it may seem that the plant is being given complete discretion to define abnormal operation of the scrubber, the plant is subject to continuing supervision by the Illinois EPA. If the plant fails to take timely corrective action in response to changes in the differential pressure of the scrubber and the performance of the scrubber and compliance are eventually affected, the Illinois EPA can cite the plant for violation irrespective of any definition of abnormal operation selected by the plant. The plant is best served by developing a sound and reasonable definition of abnormal operation that allows timely corrective action to be initiated well before compliance is threatened.

39. The draft permit should require that emission testing for the fermentation scrubber be conducted when process units are operating at least at 95% of their maximum rate.

The permit generally requires that emission testing be conducted during operating conditions that are representative of maximum emissions. (See Condition 3.1-1(a).) An

obvious element of the operating conditions that produce maximum emissions from emissions units controlled by a scrubber is operation in the maximum operating range of those units, so as to present the scrubber with a high pollutant loading and high flow rate.

40. The "uncontrolled" VOM generated by the fermentation process depends on the fermentation cycle in each tank, breathing losses, displacement losses upon filling and other factors. Actual VOM emissions depend on surrogate parameters of both the process generation of VOM and the parameters of scrubber operation. As a result, the recordkeeping operations required under Condition 2.4.9(a) are insufficient to reflect process and scrubber control parameters from which emissions can be determined and compliance with emission limits assured.

The records required by Condition 2.4.9(a) are not intended to be used to directly determine VOM emissions from the fermentation area or compliance with VOM limits. Rather they are intended to provide basic information about the operation of the fermentation tanks so that the Illinois EPA can readily identify any significant changes in the fermentation process. If such changes did occur, the Illinois EPA would then be able to assess whether the changes would significantly affect the VOM emissions generated from fermentation, so that retesting of the fermentation scrubber should be required.

41. The recordkeeping requirements of Condition 2.4.9 do not reflect the extensive parameter monitoring requirements of Condition 2.4.8. At a minimum, all parameter monitoring of Condition 2.4.8 must be incorporated into required recordkeeping provisions.

Whenever monitoring and instrumentation are required by the permit, recordkeeping for measured data is also required. This principle has been explicitly stated in Condition 1.5 of the issued permit. Accordingly, the permit does not have to separately address recordkeeping for the data collected or measured by each required monitor or instrument.

42. The draft permit does not indicate exactly how fermentation emissions would be calculated from monitored data and required records. Since the seven fermentation tanks operate as batch processes, rather than merely addressing tank liquid levels, recordkeeping must address aspects of the fermentation cycle on each tank, such as the time of filling, tank temperatures, hourly average fermentation rate, hourly average transfer rate to the beer well and likely other factors. The rate of emissions would be functions of both these factors and the control device operating parameters. Until there is a firm method for making ordinary emission determinations from this unit from process and control device parameters listed in the permit, a permit should not be issued. If emissions will instead be related solely to a function of operating parameters for the scrubber and process throughput in the fermentation area, then this decision should be documented and sufficient monitoring and recordkeeping should be imposed to both support emission determinations and assure compliance with applicable limits.

As explained above, the permit does not intend that emissions generated by the fermentation area be calculated from detailed operating data for the fermentation area. Rather, emissions from the fermentation area would be calculated from general emission factors for the area,

which would be based on the results of emissions testing. Compliance would be determined by proper operation of the fermentation scrubber, in a manner that is consistent with the operation of the scrubber during the most recent emissions testing that demonstrated compliance with applicable limits and requirements.

43. Because of process and control device variability and because of the small margin of compliance with the major source threshold, the permit should require a continuous VOM emissions monitor on the fermentation scrubber, which is clearly available technology. In addition, a continuous monitor for scrubber gas flow should be required for fully integrated VOM concentration and flow characterization. In response to a similar comment requesting a continuous VOM monitor made in the Patriot proceeding, the Illinois EPA stated:

> The circumstances of the fermentation process do not justify continuous emissions monitoring for VOM. First, the process is not believed to be as variable or complex as the comment implies. Second, the permit requires that the fermentation process and associated scrubber be developed and operated so as to ideally operate at no more than 80 percent of the applicable limits for VOM emissions. Third, operational monitoring is adequate to both verify proper operation of the scrubber and identify improper operation of the scrubber. Finally, monitoring for VOM emissions is not readily implemented, as monitoring for VOM poses the same issues for accurate quantification of VOM emissions that are posed by emissions testing, which USEPA has addressed in its industry specific guidance for VOM emissions testing at ethanol plants.[7]

The Illinois EPA's first finding is rebutted by the "Fermentation Scrubber Discussion" in the application, which states that "The fermentation process is not steady state, but much like a sine wave with peaks and valleys in pressure and gas flows. As a result, the scrubber will see variable gas flow rates, variable concentrations of VOM, variable water (liquor) flow rates, and variable gas and water temperatures." These are the types of circumstances that fully justify VOM and gas flow monitoring for this scrubber.

Illinois EPA's claim that the unit "ideally operate[s] at no more than 80 percent of the applicable limits for VOM emissions" is contradicted by my earlier comments that show, based on information in the application, that the scrubber will not be able to meet its emission limit under a 98% control efficiency requirement. In addition, countervailing process-related factors that mitigate against maintaining this scrubber in the optimum state for VOM control were also identified.

Illinois EPA's claim that "operational monitoring is adequate to both verify proper operation of the scrubber and identify improper operation of the scrubber" is not effectively demonstrated since the application has not quantitatively demonstrated the entire series of fermentation gas flow and VOM concentration variability in a robust enough manner to properly design an emission test protocol that would assure compliance.

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[7]. Response 64, *Responsiveness Summary for Public Questions and Comments on the Construction Permit Application from Patriot Renewable Fuel, LLC for an Ethanol Plant in Annawan, Illinois*, October, 2006

Given the process variability it is not possible to know for sure that any three one-hour sampling periods were the most appropriate for determining the highest potential for VOM emissions. As such, any parameter monitoring based on testing done without full knowledge that the process was operating during a period of maximum emissions will also fail to assure compliance.

Illinois EPA's final claim that "...monitoring for VOM poses the same issues for accurate quantification of VOM emissions that are posed by emissions testing..." is a diversion. USEPA's generic scaling factor or more complex procedures can be applied to VOM continuous monitoring data done under Performance Specifications 8 or 8A, just as they are applied to emission measurements using USEPA Method 25 and 25A.

The circumstances of the fermentation process do not justify continuous emissions monitoring for VOM, as the Illinois EPA has already explained in the Patriot proceeding. The commenter's analysis of the expected performance of the scrubber is flawed as it is based on selective use of data from the application. While there may be some variability in operation, this variability should not be so great as to necessitate continuous monitoring. It is widely recognized that the operational conditions under which emission testing of scrubbers is performed must be carefully selected so that they represent worst-case performance and maximum emissions. However, the consequence of this recognition is that these conditions are not developed from design data submitted in a construction permit application. Instead, they are developed based on actual operating data during initial operation of equipment, subject to review and approval by the Illinois EPA. If necessary, several emission tests can also be performed to assure that sufficient emission data is collected to address variation in performance. Finally, emissions monitoring for VOM clearly poses technical challenges, as the comment acknowledges. If undue variation in operation were to be revealed, attention would be better focused on eliminating that variation and enhancing the scrubber to better control emissions, rather than creating new monitoring protocols that would do nothing to directly reduce emissions.

44. Condition 2.4.10(a)(i) of the draft permit, which addresses immediate reporting by the plant for certain deviations from operating requirement for the fermentation scrubber, is not specific enough for proper enforcement. This is because it is not clear what a 2.0% exceedance would be. A 2% temperature exceedance in ºF would be different than a 2% exceedance in ºC. Does a 2% exceedance mean 2% above the floor or a maximum value of an operating parameter? The permit should address parameter envelopes of expected operations proposed for establishment on process and control device parameters during emissions testing, with subsequent approval by Illinois EPA.

The issued permit expresses temperature values in ºF to provide clarity on how a 2% exceedance of an operating parameter value for temperature is to be determined. For parameters for which minimum values are set, immediate reporting would be required if the actual value of a parameter were 2% less than the set value; for maximum values, immediate reporting would be required if the actual values were 2% higher than the set value. In addition, the plant would have to report all exceedances in its quarterly reports.

The permit clearly defines the general mechanism by which the required or set values for operating parameters would be set, i.e., the value of the specified operating parameters during testing. Any further action or "interpretation" that becomes necessary with respect to the set values of operating parameters for the fermentation scrubber can occur in the processing of the operating permit for the plant by the Illinois EPA.

45. Condition 2.4.10(a), which allows the plant to operate for up to three hours in the event of a malfunction of the scrubber before making a report to Illinois EPA, is objectionable. With complete loss of the scrubber, uncontrolled VOM emission rates can range from 1200 to 2000 lbs/hour, which could push the plant over the major source threshold. Instead, the plant should be required to cease mash preparation while the scrubber is in a malfunction condition. Such a malfunction could be caused by something as simple as loss of scrubber water from a frozen line or failure of a pump.

This condition does not authorize continued operation with excess emissions during a malfunction of the fermentation scrubber. Rather, it addresses one aspect of malfunctions, i.e., when the Illinois EPA has to be notified as related to the Illinois EPA's role in overseeing operation of the plant. For this purpose, the Illinois EPA has effectively set a deadline of three hours for the scrubber to be repaired before the Illinois EPA must be immediately notified. As observed in the comment, many possible malfunctions of the scrubber could be caused by simple things that should be able to be corrected very quickly. Incidents are also not expected to involve catastrophic failures of the scrubber, so that they would not be accompanied by total loss of control, with emissions at the levels noted in this comment. For these types of incidents, immediate notification of the Illinois EPA would be unnecessary and regular reporting with the periodic quarterly reports should be sufficient.

As this condition does not authorize continued operation with excess emissions during a malfunction, it is not appropriate for this condition to set specific "mitigation" measures that must be implemented in the event of a malfunction. First, those predefined measures might not be appropriate, effective or sufficient for any particular malfunction. Second, the establishment of such measures might be misconstrued as authorizing certain excess emissions. Instead, the appropriate course of action by the plant during a malfunction must be determined on a case-by-case basis, recognizing that Illini BioEnergy is at all times under a general obligation to use good air control practices to minimize emissions. While it may very well be appropriate in the event of certain scrubber malfunctions to cease mash preparation, as recommended by this comment, this may not always be the case.

46. Condition 2.4.6(b)(ii) limits PM emissions from the fermentation scrubber to 0.13 lb/hr and 0.58 tons/yr. However, the permit does not require monitoring or testing to verify compliance with these limits. The application does not include details on physical control measures to limit PM emissions from this unit, such as limits on the dissolved solids concentration of the scrubbant water, the average aerodynamic aerosol diameter of the spray nozzles in the scrubber, or the type of demisting technology that will be used, if any. In the absence of such information there is no basis to make the determination that PM emissions will meet the specified limits.

The issued permit requires testing of PM emissions from the fermentation scrubber. This testing will provide the necessary basis to determine whether specific compliance procedures are needed to address PM emissions from the scrubber, which the application describes as having minimal PM emissions. If compliance procedures, i.e., work practices, sampling, instrumentation, or recordkeeping, are needed to address PM emissions, they can be established in the operating permit for the plant.

Miscellaneous Emission Units for Mash Preparation and Fermentation (Condition 2.4)

47. The cook water tank should be controlled by an oxidizer. This process tank receives once-through scrubbant from the fermentation scrubber, which will contain significant amounts of ethanol and other VOM, as well as water from the biomethanators and side stripper bottoms. The mixer, which follows the cook water tank so that its potential for VOM emissions comes from the process stream from the cook water tank, will be controlled by an oxidizer. The application should be regarded as incomplete until the organic compound content of the material in the cookwater tank is provided, so as to enable a calculation of VOM emissions based on the vapor pressure of the material.

The cook water tank will be controlled by an oxidizer, as recommended by this comment. This is one of the changes to the design of the proposed plant made by Illini BioEnergy. As such, further detailed design data for the cook water is certainly not required.

48. The application discounts the need for control of VOM emissions from several process tanks on the basis of brief Organic Vapor Analyzer measurements on a much smaller plant. The application does not indicate that the tank process variables and design of the planned plant are the same as the plant for which measurements were made. For example, the application does not show whether the tanks envisioned for the proposed plant and the tanks whose emissions were measured on the smaller plant both had submerged fill, a detail that could be relevant for whether the emissions are comparable.

The application adequately addresses these "miscellaneous emission units." The emissions from these tanks were properly calculated to account for differences in the size of the plant at which measurements were made and the size of the proposed plant and other relevant factors in calculating VOM emissions. The issued permit also appropriately addresses these units as it requires that the plant keep records for the VOM emissions of these units. The permit also includes provision for the plant to promptly have VOM emissions testing conducted for these units if requested by the Illinois EPA.

49. The projected VOM emissions for the stillage tanks, the syrup tank, the cook water tank, and the liquifaction tank were all calculated on the basis of the exhaust rates of tanks at a smaller plant with only 41% of the capacity of the proposed plant. There is no reason to believe the exhaust rates of these tanks will be the same at the proposed plant, with its larger tanks and higher throughputs. The emissions of these miscellaneous tanks could push the plant over the 100 ton/year major source threshold. Failure to properly consider the potential emissions of these tanks would constitute improper permitting the proposed plant. At the very least, the permit should require periodic testing of these tanks and

mandate that a tank be controlled if found to have VOM emissions that would push the plant over the major source threshold.

It is not appropriate for the permit to specify particular consequences if the plant's emissions were to exceed the major source threshold. If this were to occur, it would be a violation and the specific consequences for violations are determined on a case-by-case basis in the context of a potential or actual enforcement action.

50. The "Fugitive VOM Survey" in the application indicates that the mash screen, where residual material removed from the fermentation tanks during each cleaning cycle is screened, is a unit that would be controlled. The potential for VOM emissions from this unit is not completely characterized, perhaps because the emission calculations in the application indicate that it will be controlled by an oxidizer. However, such control is not indicated in the draft permit, which shows the Mash Screen without control, which would allow uncontrolled emissions from this unit.

The mash screen will be controlled, as indirectly suggested by this comment. This is one of the changes to the design of the proposed plant made by Illini BioEnergy.

51. Although the application indicates that the syrup stream from the evaporators is mixed with wet cake from the centrifuge before drying and that the evaporated water is sent to the biomethanator, this is not sufficient to ensure that VOM emissions do not occur as overhead vapor flow from a condensation operation to which evaporator vapors are directed. There is no information on whether eductors are used as a motive force for condenser flow and whether there are any emissions associated with the evaporation process for thin stillage. It is difficult to believe that a vent is not associated with the evaporation process and non-condensible gases will be completely absent.

The evaporators should not generate emissions. The thin stillage processed by the evaporators is a liquid stream that has already been subjected to distillation in the beer still and separation of solids in centrifuges. The condensate water from the evaporators is ultimately returned to the mash preparation area, after processing in the biomethanator.

Distillation Area (Condition 2.5)

52. The application is incomplete because it does not show the disposition of process off-gases from the molecular sieve regeneration cycle. Molecular sieves typically have two parallel process trains, with one in use for ethanol dehydration while the other is in a regeneration cycle. The regeneration cycle regenerates the molecular sieve matrix by removing water/weak ethanol solution using a vacuum. The vacuum apparatus and any condenser or steam eductor are likely to have some type of venting. Note that the condenser associated with molecular sieve regeneration will be different from the 200 proof condenser, which is used to process the ethanol vapor output of the molecular sieves during actual operation. 4.4.1

The regeneration of the molecular sieves would not generate VOM emissions that have not

been otherwise accounted for. This is because the liquid stream from regeneration is recovered for its ethanol content. Any vapors from regeneration are eventually vented to the oxidizer/boiler systems.

53. For units that are controlled by the oxidizer systems, Condition 2.5.5 should clarify that during the shutdown of units, the heat input level of an oxidizer shall be maintained above the specific level that has been previously demonstrated in emissions testing to show compliance with applicable limits.

The issued permit clarifies operating requirements for the oxidizer systems during shutdown of emission units. (See Condition 2.5.5-1(c).) However, it is not appropriate to require that a specific firing rate be maintained during such periods. The permit instead restates the general obligation that equipment be operated in accordance with good air pollution control practice. This requires that the temperature in the combustion chamber of the oxidizers be maintained at the "compliant" level for as long as it is feasible to do so, ideally until after process units are shutdown. If operation of process units lags behind the oxidizers, they must be expeditiously shutdown once the temperature in the oxidizers drops below the compliant level.

54. It is not clear that monitoring of the operating parameters for the distillation area specified in Condition 2.5.9(a) can be used to predict emissions from the oxidizers. If the objective of process-related monitoring is to determine emissions, then the gas flow from the two distillation condensers will be among the appropriate parameters of interest. If the calculation of emissions at the oxidizer associated with distillation VOM destruction is the objective, then it would also be necessary to determine the mass rate of VOM in such flows during emissions test, along with continuous volumetric monitoring. If the objective of the conditions is to relate VOM emissions from the oxidizer to the distillation process rate, it is not clear that the four independent process variables addressed in Condition 2.5.9(a) will achieve this purpose.

The purpose of the records required by Condition 2.5.9(a) is to assure that the normal operating parameters of the fermentation operation are documented so that short-term or long-term changes in operation can be identified. These records are not intended to be used on a routine basis to calculate the contribution of the distillation area to VOM emissions as occur through the oxidizer systems.

55. If recordkeeping is required for distillation process parameters, the presence of monitoring devices to gain such information is implied. However, the draft permit does not contain conditions that require such monitoring devices to be calibrated or maintained or to conform to accurate measurement standards.

The issued permit specifies that the plant must operate all required monitoring devices and instrumentation in accordance with good monitoring practices. This requires that required monitoring devices and instrumentation be appropriately calibrated and maintained to provide accurate measurements.

56. The application does not include information on the potential for VOM emissions through pressure relief valves and rupture disks in the distillation area. If the distillation area will have pressure relief valves, rupture disks, or other kinds of bypass release devices, these devices should be listed and their emissions should be subject to recordkeeping requirements. If these devices are part of the design, reference to any emissions from such devices should be included in the recordkeeping requirements of Condition 2.5.9. In addition, these devices should be subject to the requirements of a Leak Detection and Repair Program.

Any pressure relief devices that are needed in the distillation area, with discharge to the atmosphere rather than to a control device, would be addressed by Condition 2.8 of the issued permit. This condition addresses components of the piping system and access hatches in process vessels at the plant that are in VOM service but are normally closed to the atmosphere. As such, Condition 2.10 is also the appropriate condition in which to address pressure relief devices. Condition 2.10 does require that the plant implement a Leak Detection and Repair Program, which program would have to extend to any pressure relief devices in VOM service in the distillation area.

Feed Dryers and Oxidizer/Boiler Systems (Conditions 2.1 and 2.5)

57. The application provides test results for a feed dryer at Glacial Lakes that indicate a controlled CO emission factor of 1.21 lbs/ton of dry feed. This is far higher than the factor used in calculating CO emissions for the dryers at the proposed plant. Use of this factors yields significantly higher emissions, making the plant a major source for CO. The application does not provide any specific details as to the steam tube dryer operations, such as tested uncontrolled emission rates at other plants or process information on the operation of such dryers.

    The consultant who prepared the application has provided a factor of 0.465 lbs CO/ton of dry feed in another current permit application, which relies upon 95% control for CO. In the absence of substantial justification for the claimed CO emission factor for the dryers, the application must be considered incomplete. Alternatively, a permit cannot be issued because of the information indicating CO emissions above the major source threshold.

As is apparent from these comments, the level of CO control that will have to be achieved by the oxidizers at the proposed plant will depend upon the uncontrolled CO emissions from the feed dryers. Oxidizers can be operated over a range of efficiencies, depending on the operating temperature that is maintained with the fuel burners. In this regard, the 90% control requirement in the permit is a minimum requirement for the performance of the oxidizers, independent of the level of CO emissions generated by the dryers. The thermal oxidizers must also be operated to comply with the hourly CO limit specified by the permit, 5.28 lb/hr., oxidizers can be operated over a range of efficiencies.

58. Based on the limits on natural gas usage, the potential NOx emissions of the oxidizers are

17.6 tons/year, rather than 15.77 tons/year as limited by the permit.[8] This would push the plant closer to the 100 ton major source threshold for NOx.

The discrepancy identified in this comment has been corrected in the issued permit, with appropriate emission and operating limits set for the dryer-boiler-oxidizer systems that will be used at the plant. The difference between the NOx emission limit in the draft permit and the NOx emissions calculated in this comment is due to a discrepancy in the data for the rated heat input of the original oxidizers. The emission limits in the draft permit were calculated based on each oxidizer having a rated heat input of 18 million Btu/hour. However, the draft permit limited the rated heat input of each oxidizer to of 20 million Btu/hour, as was used in this comment to calculate NOx emissions.

59. Similarly for CO, with the emission factor from AP-42, 0.082 lbs /million Btu, the CO emissions from the oxidizers would be 14.4 tons/year, which would exceed the CO limit of 14.28 ton/year set by Condition 2.6.6(b)(i).

The CO emission limits in the draft permit were not calculated using the AP-42 emission factor for natural gas combustion in a boiler. They were instead appropriately calculated based on a controlled CO emission factor for feed drying expressed in terms of lbs of CO per ton of feed dried.

60. The calculations for controlled PM-10, VOM and CO emissions from the steam tube dryers at the proposed plant are not the same as those for the Marquis plant, which use different controlled emission factors.[9] Both applications were prepared by ICM, who is the designer of both the proposed plant and the Marquis plant. In support of the claimed factors, the application claims the "ICM Emission Guide." However, the ICM Emission Guide is not part of the record and reliance on it should be disallowed until it is provided.

The emission factors for the feed dryers used by ICM in these two applications are different because the selection of factors is influenced by emissions of other units at the source, as they affect the total emissions of the plant. As the boilers originally planned for the proposed plant had higher CO emissions than the boilers at the Marquis plant, a more stringent CO factor had to be used for the feed dryers to keep the plant's total CO emissions below the major source threshold. On the other hand, as the emissions of road dust from the proposed plant were originally lower than those of the Marquis plant, a less stringent PM factor could be used for the feed dryers while maintaining the plant's PM emissions below the major source threshold. Incidentally, the emission calculations for the feed dryers are now based on higher emission factors, as appropriate for the direct fired feed dryers that will be used at

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[8] With steam tube dryers, all of the NOx emissions from these systems are from the oxidizers. The natural gas usage of the oxidizers is limited to 176 million cubic feet per year, presumably per oxidizer, by Condition 2.6.5(a)(iii) of the draft permit. Applying an emission factor of 0.1 lbs NOx/million Btu and 1000 Btu per standard cubic foot of gas, yields NOx emissions of 17.6 tons per year, total, for two oxidizers. This is more than 15.77 tons per year, the applicable NOx emission limit in Condition 2.6.6(b)(i).

[9] The controlled emission factors (which are expressed in terms of pounds per ton of dried feed) for the steam-tube dryers at the proposed Illini BioEnergy and Marquis plants, respectively, are as follows: 0.080 vs. 0.260 for CO, 0.080 vs. 0.10 for VOM, and 0.075 vs. 0.033 for PM-10. In addition, it is not clear whether these PM-10 factors include condensable particulate.

the plant.[10]

The fact that a copy of the ICM Emissions Guide was not included in the material provided in the application, or otherwise made available to the Illinois EPA, means that it was not relevant to the review of the application by the Illinois EPA or for the public comment period prior to the issuance the permit for the proposed plant.

61. The background emission data for feed dryers provided in the application does not support the emission factors used in the application for the dryers at the proposed plant.[11] This background data is for direct-fired dryers, not steam-tube dryers. One consequence of using steam-tube dryers is lower temperature in the dryers, which can improve the quality in the dried feed. From an emissions viewpoint, lower dryer operating temperature increase uncontrolled VOM emissions from soluble organic compounds contained in "syrup" and wet cake without lesser potential for combustion of such VOM within the dryer. They also tend to lower CO and condensible particulate. In addition, the dryer process rates during testing, or other basis for comparing the relative magnitude of emissions, were not provided. It is also doubtful that any of the test results include data for condensible particulate.

As discussed in this comment, because of higher operating temperatures, in the absence of control equipment, the uncontrolled VOM, CO and PM emissions from direct fired dryers tend to be higher than the uncontrolled emissions of steam tube dryers. However, the oxidizer control system has an equal if not more important role in the controlled emission factors for a feed dryer, as relevant for actual emissions. This is because the performance of oxidizers can be readily adjusted, based on the operating temperature, so that a range of controlled emission rates can be achieved. Accordingly, as generally observed by this comment, emission test data from existing feed dryers at other plants is of uncertain value in assessing the dryers at the proposed plant, since it does not differentiate between the "uncontrolled" emissions generated by the dryer and the control efficiency that is provided by the oxidizer control system.

62. If one were to rely on the test data for CO from the VeraSun plant in Aurora, South Dakota, the controlled CO emission factor for the feed dryers would be on the order of 0.4 lbs per ton feed, which is higher than the factor cited in the application.

An emission factor of 0.5 lbs/tons is now being used for the feed drying system, which is consistent with the emission factor targeted by this comment.

63. The application should be considered incomplete until sufficient information is submitted justifying all claimed controlled emission factors for the oxidizers. Without such information, one can not tell whether such factors should be relied upon. This denies the

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[10] The controlled emission factors for the directed fired dryers at the plant are 0.500, 0.125 and 0.120 of pounds per ton of dried feed, for CO, VOM and PM-10, respectively. This PM-10 factor does include condensable particulate.

[11] The application includes results from emission tests of feed dryers at the following ethanol plants: VeraSun Aurora, South Dakota; Glacial Lakes Energy, Watertown, South Dakota; Badger State, Monroe, Wisconsin, and MGP, Lakota, Iowa.

public due process rights during the public comment period. It is not appropriate to wait until the plant is built and emissions are tested to make changes to comply with emission limits. The proposed plant is supposed to be subject to a preconstruction review to determine emissions as Illinois EPA determinations on such matter s must not be "faith based" proceedings. Illini BioEnergy should be required to submit emissions tests results for steam tube dryers controlled with oxidizers or the full engineering calculations of any emission estimates if actual test results are not available.

The emission factors used to calculate emissions of the oxidizers are reasonable. They are consistent with factors used for other new ethanol plants and the Illinois EPA's general experience with oxidizer systems. They should be achievable if equipment is properly designed, installed and operated. Comments have not been submitted showing that the emission factors used for the oxidizers are not achievable or are unrealistic. While the commenter might desire more supporting information for the selected emission factors, the Illinois EPA does not believe that such information would serve to facilitate compliance. Compliance will be facilitated by emission testing, emission monitoring, operational monitoring and recordkeeping, as required by the issued permit, to assure that the oxidizers comply with the control requirements and emission limits that are contained in the issued construction permit.

The public has not been deprived of "due process rights." The public has been provided with the opportunity to review the application for the proposed plant and to comment on a draft permit for the plant prepared by the Illinois EPA. Submitted public comments have been reviewed and the conditions of the issued permit reflect consideration of public comments.

64. Although Condition 2.6.5(a)(iv) in the draft permit requires the oxidizers to have low-NOx burners, the emission calculations in the application use a NOx emission factor of 0.1 lb/million Btu. This emission factor is not representative of the actual performance of low-NOx burners. Condition 2.6.5(a)(iv) will not be practically enforceable if Illini BioEnergy does not have to submit information and vendor performance/guarantee information for review by Illinois EPA or otherwise allow for an inspection by the Illinois EPA during the construction of the oxidizers.

The issued permit sets a limit for NOx emissions of the oxidizer/boiler systems that is consistent with use of low-NOx burners, i.e., 0.051 lb/million Btu, 30 day average. This directly addresses the practical enforceability of Condition 2.6.5(a)(iv) by specifying a performance requirement for the low-NOx burners.

65. The draft permit does not contain a physical limit on natural gas usage of the feed dryer-oxidizer systems to assure compliance with NOx emission limits for these systems.

The draft permit contained "physical limits" for the oxidizers. In addition to limiting NOx emissions of the oxidizers, the draft permit would have limited the rated heat input of each oxidizer to 20 million Btu/hour and the annual natural gas usage of each oxidizer to 176 million cubic feet per year. Similar limits are set for the dryer-oxidizer-boiler systems in the

issued permit.

66. For any limit expressed in lb/million Btu, the dryer/oxidizer systems will pose special and complex problems if compliance monitoring relies on "F factors" developed by USEPA. The introduction of the dryer gases, in addition to natural gas combustion in these systems, means that natural gas F factors cannot be used. There must be a clear and Illinois EPA approved procedure for determining F factors for compliance purposes at this plant. Alternatively, monitoring of gas flow must be required in association with any continuous emissions monitors.

As noted by this comment, for the dryer/oxidizer systems, it will likely not be possible to use F Factors in the procedures to convert monitored data for NOx into the terms needed to determine compliance with the NOx emission standards and limits. However, the procedures that are to be used in place of an F factor should not and need not be established by the permit. This is because the oxidizer/boiler systems that would now be used at the plant are subject to the NSPS. Accordingly, the necessary source-specific procedure would be approved by USEPA, rather than the Illinois EPA, as the USEPA reviews and approves source-specific monitoring and compliance procedures for units subject to NSPS. Accordingly, it would be premature for this permit to require monitoring of gas flow along with emissions monitors.

67. The permit should set a physical limit on the input to the dryers or the production of dry feed. The emissions of PM, CO and VOM from the dryer/oxidizer systems are determined by the process rate of the dryers, as well as the control efficiency of the oxidizers. In addition, any such limit must address the ability to produce dry feed at different moisture rates since limits for fully dried feed are not equivalent to a limit on partially dried feed. Both hourly and annual limits on the dryer process rate should be set to address both hourly and annual emission limits.

The permit limits the amount of feed that is produced by the plant on an annual basis. This limit on production is adequate to limit the amount of material handled by the feed dryers and constrain their potential emissions. It is not necessary to set further restrictions on operation of the dryers. Testing is to be conducted under "worst-case" operation conditions, i.e., operating conditions that generate maximum levels of uncontrolled emissions. As emission testing confirms compliance of the feed dryers under such conditions, compliance is also confirmed under less demanding operating conditions.

68. Records for natural gas usage in the oxidizers must be kept on an hourly basis, for every operating hour, to assure compliance and to have emission limits for CO and NOx be practically enforceable if continuous monitoring is not performed. Condition 2.6.8-2(a) requires that natural gas usage be recorded only on a month basis. However, monthly recordkeeping does not assure compliance with the hourly emission limits for the RTOs.

As has been explained in response to similar comments on the boilers, hour-by-hour recordkeeping for natural gas usage of the oxidizers is not necessary or appropriate to address compliance with the applicable CO and NOx emission limits.

69. Fuel gas from the biomethanators is used as fuel in the oxidizers but the draft permit does not consider the Btu input from this gas in potential to emit limit for the oxidizers.

The use of fuel gas from the biomethanators is addressed as the heat input capacity of combustion units at the plant is limited and this fuel gas displaces natural gas that would otherwise be fired in these units.

70. The permit should require all emission testing to be done at maximum process rates. In addition, further test conditions during a series of emissions tests should also show compliance with VOM and CO control requirements, stack gas concentration and percentage reduction requirements at the lowest oxidizer heat input rate for the unit that is expected in regular operations.

As already explained, emissions testing must be performed at levels that reasonably represent the maximum levels of emissions, which generally requires operation at the maximum operating rate or production rate of process equipment.

71. Continuous emissions monitoring, using Quality Assurance and Quality Control protocols similar to those in the NSPS, should be required for NOx and CO emissions from the thermal oxidizers. Given the small margins from the major source thresholds, continuous monitoring is the only means by which the plant can ensure that emissions do not cross such thresholds.

Continuous monitoring for NOx emissions will be required for the oxidizers pursuant to the NSPS, as reflected in the issued permit. This is a consequence of the change in design of the plant, wherein oxidizer/boiler systems will be used, rather than stand-alone oxidizers. As a result, these systems are subject to the NSPS for boilers, 40 CFR 60, Subpart Db, including requirements of the NSPS for continuous monitoring for NOx.

Continuous monitoring for CO emissions of the oxidizers was appropriately addressed by the draft permit. The draft permit provided that continuous monitoring would have to be begun for CO if, based on the results of emission testing, CO emissions of the oxidizers did not normally comply with the applicable limit by at least 20 percent (Condition 2.6.8-1). A similar provision is included in the issued permit (Condition 2.1.8), as the underlying rationale is unaffected by whether stand-alone oxidizers or oxidizer/boiler systems are used at the plant. This approach to CO monitoring is appropriate as the determination whether such monitoring is needed for the oxidizers is made based on their actual performance, rather than on the conservative design data in the application.

72. The permit should not allow continuous emissions monitoring of NOx or CO emissions from the boilers or oxidizers to be discontinued. The emission factor used emissions of NOx and CO are below the applicable USEPA factor in AP-42. If a control device is needed to assure compliance with emission limits, continuous emission monitoring should be required to assure continuous compliance.

The federal NSPS, which in the issued permit establishes the requirements for monitoring NOx emissions from the oxidizer/boiler systems, allows NOx monitoring to be conducted either with traditional continuous emissions monitoring or, following appropriate technical demonstration and approval, with parametric monitoring. A similar approach is also generally appropriate for emissions of CO. If emissions of CO from the oxidizer/boiler systems can be reasonably addressed without continuous emissions monitoring, continuous monitoring should not be required. This is particularly true as this may necessitate routine operation of a unit with a greater margin of compliance from applicable limits and standards than would be provided with continuous emissions monitoring, which could enable operation and emissions that are very close to applicable requirements.

The presence of a control device on a unit is only one factor that should be considered when deciding whether continuous emissions monitoring is appropriate. Other relevant factors include the type of unit, the type of control device, the applicable limit or standard, the expected actual emission rate, the size of the unit, and compliance procedures other than emissions monitoring that can be implemented for the unit.

73. For the oxidizers, the permit should require continuous monitoring for flue gas oxygen concentration and flow rate, as well as combustion temperature. Monitoring of these two additional parameters is needed to verify the presence of operating conditions for proper combustion and confirm compliance with hourly emission limits. Combustion monitoring traditionally embraces both temperature and oxygen monitoring to ensure good combustion conditions are maintained. Monitoring of flue gas flow is needed to address residence time in the oxidizer.

For afterburners, including oxidizer/boiler systems like those at the proposed plant, operational monitoring of combustion chamber temperature is generally sufficient to confirm proper operation for effective combustion. Additional operational monitoring, as suggested by this comment, is not typically required. It is only considered if specific circumstances are present, e.g., low oxygen content in the exhaust stream from the process stream or an afterburner whose capacity is not sufficient if all process units served by the device are being operated. These circumstances are not present for the oxidizers at the proposed plant.

74. Condition 2.6.5(c) should be rewritten to create primary reliance on temperature and oxygen concentration during an actual test as showing compliance once such an emission test has been completed, instead of allowing the operator to rely on manufacturer's recommendations.

In the issued permit, Condition 2.6.5(c) has been rewritten to require the temperature of the combustion chamber of the oxidizer during normal operation be maintained at a temperature that is consistent with that during emissions testing, as recommended by this comment. Provisions for pre-heating of the oxidizers have not been changed, as emission testing likely will not address this phase of operation, so that this phase is appropriately governed by the manufacturer's recommended operating procedures. The issued permit does not set requirements related to oxygen concentrations in the exhaust. As dryers rely on

air flow for effective drying, they also assure ample oxygen in the exhaust for effective operation of the oxidizers.

75. The monitoring required for these parameters should include numerical tolerances on the accuracy of the measuring devices, requirements for testing to verify accuracy and the specification of required standards (such as USEPA Performance Specifications or ASTM standards) for quality assurance/quality control testing. These provisions should not simply rely on "manufacturer's recommendations." Reliance on "manufacturer's recommendations" is too vague to be enforceable in practice.

As previously explained, for certain operational monitoring and instrumentation, a requirement that a source follow manufacturer's recommendations is enforceable. If circumstances warrant, it is a simple matter to compare the actual practice or actions by a source to those that are recommended by the manufacturer. It is not necessary for the permit to establish specific protocols for measurement of parameters, for which operational measurements are routinely and reliably made by sources as part of their standard operating practices.

76. The operating ranges for combustion temperature and oxygen in the oxidizers must reflect evaluation of continuous monitoring for both NOx and CO, since simultaneous compliance with both requirements will increase one pollutant while decreasing another.

While the oxidizers must simultaneously comply with applicable emission limits for NOx and CO, this does not pose special concerns. Unless otherwise provided by a specific standard or limit, all emission units must simultaneously comply with all applicable requirements and limits. This is routinely considered when emissions calculations are performed for a unit that emits both NOx and CO, as a set of emission factors is used that can both be met simultaneously. If the factor for either pollutant is adjusted, the effect of the adjustment is considered with revised emission calculations for the other pollutant. As a result, the limits that are eventually set for a unit should be such that both limits can be met and they are not mutually exclusive. In addition, emissions testing, or emissions testing and monitoring, are conducted in a manner that confirms that both limits are met.

77. For monitoring of combustion chamber temperature, the accuracy of the monitor required by Condition 2.6.8-1, i.e., plus or minus 15 ºF, is too great since a deviation of the oxidizer is defined as operations at a temperature 50 ºF below that during the last emissions test in which compliance was shown. In addition, the temperature monitoring requirement does not contain an enforceable and clear, recognized test method and frequency by which the temperature monitor accuracy will be verified and confirmed.

The specified level of accuracy is reasonable, as it represents a measurement accuracy of about 1 percent, when considered on the Fahrenheit temperature scale. (For similar provisions under the federal NSPS, refer to 40 CFR 60, Subpart RR.) If any adjustment were to be made in response to this comment, consideration would have to be given to increasing the criterion for a deviation.

78. For monitoring of operating parameters, every monitored parameter should invoke recordkeeping to ensure that such data is available for enforcement purposes. In addition, for such operational monitoring, each operating parameter that will be relied upon for ensuring compliance must feature a method by which the variance in a monitored parameter can be associated with a threshold for noncompliant operation of a unit.

The issued permit specifies that records must be kept of the data measured by required monitoring devices and instrumentation. (See Condition 1.4 of the permit.) The permit also specifies that certain "key" operating parameters will be used as direct indicators of compliant operation for specific control devices, with acceptable values or ranges of those parameters based on the values of the operating parameter during emissions testing. However, it is not necessary for all operating parameters for which monitoring or instrumentation is required to be treated in such manner. Monitoring or instrumentation of operating parameters can also be required to collect data that can be used to document the plant's operating practices and generally facilitate ongoing review of plant operation by the Illinois EPA.

79. The draft permit would require that the cyclones for the feed dryers be designed to maintain "effective control of emissions across the full range of operation of the dryers...," Condition 2.6.5(b). However, the application does not contain detailed information for these cyclones to enable this to be evaluated. At the very least, the Illinois EPA should review the planned design of the cyclones, including the control efficacy of the cyclones vs. flow rate. In addition, the permit should require testing of uncontrolled and controlled PM emissions of dryers operating at part load, in addition to testing at maximum load.

This condition appropriately addresses the dryer cyclones. The cyclones are "pre-cleaning" devices that reduce the loading of PM and dust in the exhaust entering the oxidizers, which are the principal PM control devices. As the performance of cyclones is affected by gas flow rate, the condition merely observes that this function must be fulfilled across the full range of dryer operation, so the performance of the oxidizers is not adversely affected. There are several ways that this could be achieved, if necessary to protect the performance of the oxidizers, including operating the dryers in a set load range. The permit does not need to require testing of the PM emissions of the dryers at less than full load to implement this condition. If reduced load operation of the dryers poses concerns based on their actual operation, such that emission testing of the oxidizers is appropriate, the permit provides that testing must be promptly conducted upon written request from the Illinois EPA.

80. The permit should require a preventive maintenance program to eliminate any operational problems that would degrade the efficiency of the dryer cyclones. This is because dryer particulate may be "sticky" and adhere to ductwork, altering the flow characteristics of the ductwork and, perhaps, the cyclones.

It is not appropriate for the permit to specifically address the maintenance potentially needed for the dryer cyclones and ductwork to address "sticky particulate." As part of the required good air pollution control practices, the permit generally requires that all emission units and associated air pollution control equipment at the plant be maintained to facilitate

proper operation for control of emissions. This comprehensively addresses all aspects of equipment maintenance, including maintenance due to sticky particulate from the dryers, if actually present, and maintenance to address other factors relevant to proper operation of the dryer control system.

Feed Cooler (Condition 2.7)

81. The conflicting nature of the information provided in the application about the disposition of the exhaust from the feed cooler baghouse prevents meaningful comment on the emission calculations and permit provisions since it is impossible to know for sure what configuration this unit will have. For example, the stack parameter table in the application indicates a flow of 50,000 acfm, but Form APC220 indicates an exhaust discharge of 13,000 acfm. The schematic diagram for the cooler (apparently taken from The Andersons' Clymer plant) shows that the exhaust from the cooler baghouse is split, with some going to combustion units and the rest to the atmosphere. However, the PTE sheet and the process description do not show this and the General Process Flow Diagram for the proposed plant shows 100% of the baghouse exhaust going to the atmosphere.

    If the feed cooler at the proposed plant will be the same or similar to the cooler at the Marquis plant, then the difference in permitted VOM emissions must be reconciled (14.63 tons/yr for Marquis and 8.92 tons/yr for Illini Bio-Energy). Without a definitive determination whether Illini Bio-Energy is using cooler baghouse exhaust for combustion air, I cannot get to the basis of the VOM emission limits and whether they are legitimate, whether they incorporate scaling, whether the permit should require monitoring of the exhaust flow from the cooler, etc.

    The exhaust distribution and emission calculations for the feed cooler must be clarified. Because the public record concerning this matter was inchoate at the time of the public notice, this clarifying information must be subject to a further public comment period. Under the circumstances, it is impossible for Illinois EPA to evaluate the present application and to know whether the proposed cooler will comply with all relevant requirements. It would be an error to issue a permit under these circumstances. It would be a further error to issue a permit without the public having the opportunity to evaluate the clarifying information elements as it would deny the public of due process.

Notwithstanding conflicting information in the application, consistent with standard ICM design, the plant is designed for only a portion of the exhaust flow from the feed cooler baghouse to vent directly to the atmosphere. For this purpose, the issued permit is based upon only 13,000 cfm of the exhaust flow, out of the 50,000 cfm total, being vented directly to the atmosphere. The permit limits the volume of the direct atmospheric discharge from the feed cooler to a level that is consistent with the level during emissions testing. When the discharge is restricted in this manner, it is not necessary or appropriate to limit the discharge to 13,000 cfm, as the required or permissible maximum flow of this discharge could either be greater or smaller than 13,000 cfm. The permit also requires continuous monitoring for the actual volume of this discharge. (See Condition 2.7.8-1.) The permitted emissions of VOM from the feed cooler are based on an emission factor of 0.05 lb/ton,

applied to the entire production of feed. The permitted annual VOM emissions for the feed cooler are lower than those of the feed cooler at the Marquis plant because those emissions were calculated using a higher emission factor, 0.082 lbs/ton.

The conflicting nature of information in the application concerning the feed cooler does not warrant a further public comment period. The purpose of the public comment period for the proposed plant was to allow the public an opportunity to comment on the Illinois EPA's proposed issuance of a permit for the proposed project, as has occurred. Clarification of the nature of the feed cooler, as is occurring in response to this comment, does not trigger the need for a further public comment period.

Handling of Wet Cake (Condition 2.7)

82. The application does not include specific details on how wet cake will be managed. (Wet cake is feed material that is sold without being dried.) Without information on wet cake process management, e.g., the temperature of the material as it is handled and the extent of indoor vs. outdoor management, the application is not complete and fails to adequately calculate the potential emissions of the proposed plant.

The emissions calculations in the application conservatively assume that all stillage would be processed into dried feed. This is conservative because processing of stillage and syrup into dry feed in the feed dryers generates more VOM emissions than handling the stillage wet, for sale as wet cake.

83. If uncovered wet cake is stored outdoors, this practice would pose a risk for water pollution due to stormwater runoff from the pile. If such stormwater were then controlled in a retention pond, the potential emissions of the pond must also be considered, in addition to the emission from the outdoor storage pad itself.

Any outdoor storage or handling of wet cake at the plant must be conducted in a manner to control any stormwater runoff, which is subject to regulations that govern wastewater discharges from manufacturing plants. A common approach to stormwater management is collection of potentially contaminated storm runoff in a retention pond, to allow treatment if needed. Retention ponds at ethanol plants have not been identified as a source of concern for emissions.

Ethanol Loadout (Condition 2.9)

84. In its application, Illini BioEnergy did not commit to use of submerged fill pipes or bottom loading for the ethanol loadout operations. The draft permit also would not require either of these techniques to reduce the generation of VOM emissions from these operations. Accordingly, the plant could engage in splash loading of transport vehicles, which would significantly increase loading losses to be controlled, without violating any limitation on the design basis for limiting the potential to emit.

Both tank truck and railcar ethanol loading at the proposed plant would be conducted with

submerged filling or bottom loading. A condition has been included in the issued permit to specifically require these practices. However, as discussed in later comments, whether ethanol is loaded out by splash or submerged loading is only one factor in the calculation of VOM emissions from loadout, which are also affected by other factors such as the previous cargo of the transport vehicle and how that cargo was handled.

85. The draft permit would improperly excuse the ethanol loadout operations from having to use submerged loading pursuant to 35 IAC 215.122(a). This rule provides that loadout operations with a throughput of more than 40,000 gallons/day that would emit more than 8 lbs/hr of organic material must be equipped with submerged loading pipes, submerged fill, or a device that is equal or more effective in controlling emissions that is approved by the Illinois EPA. However, the Illinois EPA has not supported its determination that the control systems for these loadout operations will be as effective as use of submerged loading, nor is this determination supported by information in the application

The equivalency determination made by the Illinois EPA was not further explained because it is self-evident. The add-on control system for the loadout operations at the plant will be far more effective than use of submerged loading. Based on relevant USEPA emission factors, submerged loading may not have any effect on VOM emissions and at most only reduces emissions by 60 percent.[12] Accordingly, the plant is entitled to be excused from the regulatory requirement for submerged loading pursuant to 35 IAC 215.122(a). Moreover, pursuant to 35 IAC 215.122(c), use of submerged loading for ethanol loadout is also not required by rule because the vapor pressure of the denatured ethanol being handled is less than 2.5 psia at 70 ºF.

Whether the permit for the proposed plant, by permit condition, should require use of submerged loading to specifically control VOM emissions is a separate matter from whether use of submerged loading is required by rule. As already explained, even though the extent to which bottom filling would reduce VOM emissions from the different loadout operations is uncertain, the issued permit requires use of bottom filling. This is because bottom filling would be used at the proposed plant in actual practice.

86. The emission calculations for loadout of ethanol in the application significantly understate VOM emissions because they inappropriately use the saturation factor for "submerged loading - dedicated normal service" for the VOM content of the displaced air. However, Illini BioEnergy did not certify that the transport vehicles to be loaded at the plant would be in dedicated service. The draft permit also would not require that transport vehicles actually be in "dedicated normal service."

The VOM emissions calculations for loadout of ethanol <u>by truck</u> have been revised to

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[12] For loadout of organic liquids, the saturation factors for the displaced air range from 1.00 to 1.45 for splash loading and 0.50 to 1.00 for submerged loading, USEPA, *Compilation of Air Pollutant Emission Factors* (AP-42), Table 5.2-1. No reduction in VOM emissions occurs from submerged loading when an operation is in dedicated vapor balance service, as the saturation factors for both submerged and splash loading are 1.00. The greatest reduction in emissions occurs when an operation is not in vapor balance service, where the respective saturation factors are 1.45 and 0.60 for splash and submerged loading, with an emission reduction of 59 percent from use of submerged loading.

address the error identified by this comment. The revised calculations are based on a saturation factor of 1.0, as is appropriate for loadout when a vapor balance system is used for the prior cargo handled by the transport vehicle.[13] The saturation factor used to calculate VOM emissions from loadout by rail has not been changed. A saturation factor of 0.6 is correct when the prior cargo of the transport vehicles was not unloaded with a vapor balance system and the current cargo is handled with submerged loading.

87. For trucks, the application indicates that emissions have been calculated on a "worst case basis," assuming that all trucks carried gasoline as their prior cargo before being loaded with ethanol. The recent loading history of a tank is an important factor in determining VOM emissions when it is filled.[14] Calculations of potential emissions must reflect the greatest amounts of emissions that can occur consistent with equipment design constraints and enforceable limitations on production, operation and emissions.

The VOM emissions from loadout of ethanol by truck have been calculated with the assumption that all tank trucks loaded at the plant previously handled gasoline. These calculations use the vapor pressure and molecular weight of gasoline, rather than ethanol. This addresses the much higher level of organic vapors in the "empty" cargo tank when the prior cargo of the tank truck was gasoline, rather than denatured ethanol, which has a much lower vapor pressure than gasoline.

The assumption that all tank trucks loaded at the plant previously handled gasoline is a worst-case assumption. In actual practice, it is probable that only a fraction of the tank trucks will have handled gasoline as their prior cargo. In Illinois, most gasoline is used in urban areas, where the population is concentrated, which is also where most of the ethanol from the plant would likely be used. Because of the nature of the gasoline market and distribution arrangements, it is also possible that most trucks loaded at the plant will not have previously handled gasoline and that most of the trucks serving the plant will only handle ethanol and shuttle between the plant and gasoline terminals. However, because some of the tank trucks loaded at the plant reasonably could have previously handled loads of gasoline, the VOM emissions calculation for loading trucks conservatively assume that all trucks loaded at the plant previously handled loads of gasoline.

88. Although the application indicates that tank trucks are assumed to previously have

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[13] When the prior cargo of a transport vehicle was unloaded with a vapor balance system, unless the vapor laden air in the cargo tank has been first purged to the atmosphere, the correct saturation factor when calculating VOM emissions when the cargo tank is next filled is 1.0. This factor is appropriate for the next filling of the tank irrespective of whether the splash or submerged loading is used. Refer to AP-42, Table 5.2.1.

[14] The recent loading history of a tank is a relevant factor for VOM emissions because it determines the nature of organic vapors in the "empty" tank that is being filled. If the tank previously held a nonvolatile liquid, such as fuel oil, it will contain essentially vapor-free air. If the tank just held a volatile liquid, such as gasoline, and has not been vented to remove vapors, the air in the tank will contain vapors from that volatile liquid, which will be displaced during filling along with newly generated vapors from the actual material currently being loaded into the tank. In this latter case, depending on the relative volatility of the two different materials, the previous liquid and the current liquid will have a different contribution to total emissions. In addition, Cargo carriers that transport only one material are designated as being in "dedicated service." Cargo tanks that handle multiple materials, with dissimilar properties, e.g., ethanol and gasoline, are designated as being "switch loaded." Actual practice varies based on a number of factors, notably, the compatibility of the materials, the nature of the markets and transportation patterns for materials.

transported gasoline, the application is unclear on how that gasoline was handled. Whether that gasoline was handled with a vapor balance system is important. In particular, the emission calculations in the application incorrectly assume that the tank trucks would be in "normal service" for gasoline, whereas "vapor balance service" should be assumed. The norm is now "vapor balance service" for trucks delivering gasoline to service stations, with stations routinely equipped with vapor balance systems that capture the gasoline vapors displaced during filling the tanks at the station.[15] Vapor balance service, and not normal service, is thus both the worst case and the most probable scenario that should be used to calculate potential emissions from loading of tank trucks at the plant.

As indicated in this comment, given current practice in Illinois for the handling of gasoline, it is appropriate to assume that all tank trucks serving the plant handled gasoline as their prior load and also that the gasoline was unloaded with a vapor balance system. This is another aspect of the conservative, worst-case assessment of emissions from the loadout operation. However, as previously discussed, this is not the "most probable scenario" for truck loadout.

89. "Vapor balance service" should also be assumed for the calculation of VOM emissions from loading railcars. The draft permit does not restrict the plant to only loading railcars that are in normal service, i.e., not in vapor balance service. If the plant would load railcars that are in dedicated service, the permit should specify whether all or some of the railcars must be in "normal service" with the emission calculation revised accordingly. Absent clear, enforceable provisions to assure that the assumptions used in calculating potential emissions will be present during actual operation of the plant, it should be assumed that all railcars will be in "vapor balance service" rather than "normal service."

Vapor balance systems are not used at the facilities at which ethanol from the plant would be delivered by rail. First, given the volumes of ethanol handled at such facilities, ethanol is often stored in floating roof tanks. This eliminates the displacement of vapor during filling of the receiving tank so that a vapor balance system would not provide any additional control of emissions. Second, the low vapor pressure of ethanol, as compared to gasoline, is such that vapor balance systems would not be as cost-effective for control of VOM emissions even if the ethanol was stored in fixed roof tanks.[16] The circumstances are different from those for distribution of gasoline by truck, for which vapor balance systems are used. Gasoline is handled by a regional fleet of trucks that transport gasoline to a large number of service stations, each storing relatively small amounts of gasoline in fixed roof tanks.

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[15] "Vapor balance systems" control emissions by collecting the vapor containing air displaced from the receiving tank during unloading at a service station or other delivery destination and returning this air to the "empty" cargo tank. This reduces emissions at the delivery destination, since displaced vapors are not released to the atmosphere during unloading. However, the transport vehicle then carries the vapors back to the loading terminal or origin, where the vapors are controlled when the cargo tank is refilled. A cargo tank that has been unloaded with vapor balance service normally is saturated with organic vapors. The presence of these vapors when the cargo tank is refilled results in greater generation of emissions than occurs when the cargo tank is in "normal service." i.e., was not unloaded with a vapor balance system.

[16] Vapor balance systems for railcars would entail costs for both the elements of the vapor balance system at the receiving facilities and elements of the system on each railcar that would be connected to these systems.

90. The potential emissions of the loadout operation are understated because the application incorrectly uses a saturation factor of 0.60 to calculate the uncontrolled loading losses. This factor is only appropriate for "submerged loading - normal service." The calculations should be based on the worst case mode of operation assuming "splash loading - vapor balance service." for tank trucks and "splash loading - normal service" for railcars.

The emission calculations for the truck loadout operation have been corrected in response to this comment. A saturation factor of 1.00 is now used for truck loadout, consistent with use of "submerged loading – vapor balance service," rather than 0.60 for "submerged loading – normal service."[17] However, the saturation factor used in the calculations for railcar loadout has not been changed. A factor of 0.60 is correct for railcar loadout because vapor balance systems are not used at the facilities that receive ethanol by rail.

91. The VOM emission calculation for the loadout operations are flawed because they assume 100 percent capture and do not consider leaks. The application does not contain adequate support for this assumption. While the application states that these calculations follow Section 5.2 of USEPA's *Compilation of Air Pollutant Emission Factors*, "Transportation and Marketing of Petroleum Liquids," this is not the case for capture efficiency. The relevant portion of AP-42 indicates "…only 70-90 percent of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 90 percent for tanker trucks required to pass an annual leak test. Otherwise, 70 percent should be assumed." USEPA AP-42 Emission Factors for Transportation and Marketing of Petroleum Liquids, Section 5.2.2.1.1, Loading Losses. The emissions calculations in the application and the provisions in the draft permit do not contain support for assuming 100 percent capture, nor does the draft permit include provisions that would ensure that 100 percent capture is achieved.

In response to this comment, the VOM emissions calculations for the ethanol loadout operations have been revised to address efficiency of the vapor collection systems, to account for leakage. For truck loadout, a capture efficiency of 98.7 percent is now used. For rail loadout, a capture efficiency of 95 percent is now specified. The USEPA's recommendations in AP-42 for capture efficiency of vapor collection systems are based on out-dated information from the late 1970's and should not be relied upon. Newer data from the 1990s shows that vapor collection systems achieve approximately 99 percent capture of emissions when accompanied by a requirement for annual vapor tightness testing and otherwise about 96 percent capture efficiency.[18]

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[17] This error was likely the result of the terminology in AP-42, where the meaning of the term "normal service" is "not in vapor balance service." As already discussed, due to changes in practices for unloading gasoline at service stations, at the present time gasoline is normally or routinely handled with vapor balance systems.

[18] Data from the early 1990's reviewed by USEPA shows that annual vapor tightness testing programs achieve between 98.7 and 99.2 percent collection efficiency. As further explained by USEPA, earlier data showed lower levels of collection efficiency. "Based on field tests in the late 1970's, an annual vapor tightness testing program was estimated to reduce the leakage rate from baseline levels at 30 percent leakage to about 10 percent leakage." USEPA, *Gasoline Distribution Industry (Stage 1) - Background Information for Promulgated Standards*, EPA-453/R-94-002b, November 1994. More recent data assembled for USEPA indicates that the control efficiency of vapor balance systems range from 93 to 100 percent, with a recommended emission factor that reflects a capture efficiency of 95.9

92. The permit should require that all transport vehicles loaded at the plant meet appropriate capture efficiency and vapor "tightness" requirements, with compliance verified by monitoring and recordkeeping.

The permit generally requires that the vapor collection systems for the loadout operations be properly operated and that loadout be conducted in accordance with good air pollution control practices to minimize emissions. Recordkeeping is also required to document proper operation and maintenance of loadout equipment and associated control systems. For railcar loadout, given the nature of fittings on railcar, the issued permit also includes specific provisions for routine inspection of the connection between the railcar and the vapor collection system to verify a proper seal as needed for proper operation of the system.

The permit does not need to include specific provisions to address the leak tightness of tank trucks because of the assumption that is being made that the prior cargo handled by tank trucks was gasoline. A corollary of this assumption is that the trucks that actually handled gasoline are subject to regulatory requirements for tank trucks handling gasoline. In other words, as the emission calculations for truck loadout assume that all tank trucks serving the plant previously handled gasoline using vapor balance systems, as now commonly required or used at service stations, the permit also relies upon the related regulatory requirements for vapor tightness that would also apply to these tank trucks. These rules generally require tank trucks that transport gasoline to pass annual vapor tightness tests. These rules also set specific requirements for vapor collection systems on tank trucks and set deadlines for repair of leaks in these systems.

The permit also does not need to include specific provisions to address the leak tightness of tank trucks that did not actually handle gasoline as their prior cargo, but instead handled ethanol. As such tank trucks only handle ethanol, these trucks will not be subject to the regulatory requirements for transport of gasoline. However, compliance with those requirements is not needed to achieve the level of capture efficiency that is necessary to meet the specified rate of VOM emissions for loadout by truck. This is because the vapor pressure of ethanol is lower than that of gasoline, which has been used in the VOM emissions calculations for truck loadout. In other words, because the level of "uncontrolled" emissions from handling ethanol is lower than that of gasoline, when the prior cargo of a truck was ethanol, the capture system need not be as effective to achieve levels of VOM emissions to the atmosphere that are equal to or lower than those when gasoline was previously handled by a tank truck.

93. The draft permit would not prohibit the plant from loading a tank truck or railcar if it has not passed an annual test for vapor tightness or if components of the vapor collection system on the vehicle itself (i.e., (piping, seals, valves, vacuum breakers, etc.) are not properly operating. Effective operation of the vapor collection systems depends on both the fixed components at the loadout rack as well as elements on the transport vehicle. Allowing the plant to load trucks and railcars with vapor leaks will result in significantly

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percent. *Emission Inventory Improvement Program*, Volume III: Chapter 11, "Gasoline Marketing (Stage I and Stage II)," Eastern Research Group, January 2001.

higher VOM emissions from the loadout operations.

Whether the permit may allow loading of transport vehicles with less than complete capture of displaced vapors depends upon whether achievement of complete capture is relied upon by the permit and the emission limits in the permit account for leakage from the vapor collection systems. As already discussed, the emission limits for the loadout operations in the issued permit account for emissions from leakage from the vapor collection systems.

94. The correction of the various errors in the calculations of VOM emissions from the loadout operations results in the plant becoming a major source of emissions. For example, if 90 percent capture efficiency is assumed, the potential "uncaptured" VOM emissions from loadout operations would be 9.9 tons/year. These additional emissions would put the proposed plant over the 100 ton major source threshold. HAP emissions may also be similarly affected because uncaptured emissions of HAPs from the loadout operations were also not accounted for.

The correction of the errors in the emission calculations for the loadout operations does not result in the proposed plant becoming a major source. While the emissions allowed from the loadout operation by the issued permit are greater than would have been allowed by the draft permit, the issued permit also sets tighter limits on VOM and HAP emissions at other operations. As a result, the proposed plant still will not be a major source of emissions.

The conservative nature of these emission calculations for the loadout of ethanol should also be noted. The calculations assume that all trucks loaded with ethanol at the plant will previously have handled a cargo of gasoline. The calculations conservatively account for less that complete capture of vapors displaced from cargo tanks during loading. The calculations also assume that the flare will only provide 98 percent control, which is a minimum value for the performance of a properly operated, well-designed flare. USEPA reports that the average value of control efficiency for a properly operated flare is well over 99 percent.[19]

95. In addition to requiring loading rack and the biomethanator flares to comply with the relevant provisions of the NSPS specifically for flare systems, 40 CFR 60.18, the permit should also require compliance with the General Provisions of the NSPS, 40 CFR 60, Subpart A for the flares.

The permit requires the flares at the proposed plant be designed and operated to comply with the relevant provisions of the NSPS for flares because these provisions are a commonly accepted statement of proper design and operation of a flare to control emissions. In addition, the flares at the plant would not otherwise have been subject to these requirements as a matter of rule, i.e., they do not control NSPS-affected units. However, this rationale does not support generally applying other requirements of the NSPS, as found elsewhere in

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[19] USEPA has determined that the average efficiency of flares operated to comply with 40 CFR 63.11(b) is well over 99 percent. 40 CFR 63.11(b) has similar requirements as 40 CFR 60.18, which the flares at the proposed plant must meet. USEPA, *Gasoline Distribution Industry (Stage 1) - Background Information for Promulgated Standards*, EPA-453/R-94-002b, November 1994.

the General Provisions of the NSPS, 40 CFR 60, Subpart A, to these flares.

96. The permit should restrict the number and type of vehicles that are loaded with ethanol at the proposed plant.

In response to this comment, a limit on the amount of ethanol loaded out from the plant by truck has been included in the issued permit. (The draft permit already limited the total amount of ethanol loaded from the plant, with a limit on the ethanol production of the plant.) The amount of ethanol handled by rail has not been limited. This is because rail loadout has lower VOM emissions than truck loadout, on a per gallon basis, so that the amount of ethanol that is actually handled by rail does not need to be limited separately.

97. The application did not properly address PM emissions from the ethanol loadout operations. While the flare that controls VOM emissions from these operations will be of "smokeless design," this does not mean zero PM emissions, as was assumed in the application. At a minimum, PM emissions should have been estimated using the emission factor for total PM (filterable and condensible) from combustion of natural gas. The flaring of gasoline and ethanol vapors should emit at least the same amount of PM as combustion of natural gas, on a heat input basis.

The draft permit accounted for PM emissions from the flare with emissions calculated in a manner consistent with that recommended by this comment. These provisions are also included in the issued permit.

98. The permit should limit shipments of ethanol from the plant by truck to no more than 15 million gallons per year. This is because the emission calculations for the loading rack (VOM), as well as the emission calculation for fugitive PM from roadways, are based upon shipping no more than this amount of ethanol by truck, rather than by rail. This is acknowledged by Condition 2.8.6(c) of the draft permit, "…These limits are based on the information in the application including … maximum ethanol loadout to truck (15 million gallons per year)…." However, this condition is not written in a way that actually limits the amount of ethanol shipped by truck. Without such a limit, the potential emissions from ethanol loadout and roadways would not be limited to the emission limits in the draft permit and the potential emissions of the plant would exceed the 100 ton per year major source threshold.

The issued permit includes a condition limiting the amount of ethanol that may be loaded out from the plant by truck. This condition limits this amount to 35 million gallons per year, consistent with supplemental information and revised emission calculations provided by Illini BioEnergy. While this condition is not required by USEPA policy given the nature and circumstances of the proposed plant, this condition will simplify the Illinois EPA's supervision of the plant's operation. In particular, rail cars are routinely used to transport bulk liquid commodities that are not transported by interstate pipeline, (or, in the case of ethanol, cannot be transported in such pipelines), with tanker trucks used for local deliveries and secondary distribution.

Biomethanator (Condition 2.9)

99. The permit should limit the operation of the biomethanator flare to no more than 4380 hours per year to support the emission calculations.

It is not appropriate to limit the operation of the biomethanator flare as requested by this comment. This is because the flare serves as a safety device, for disposal of biogas when it cannot be used as fuel. In addition, as the preferred disposition of biogas is used as fuel at the plant, any "extra" flaring of biogas would only occur due to major interruptions in the other operations at the plant, which would be accompanied by a net reduction in emissions from the plant.

100. For the flare, the application started from the VOM emission factor from AP-42, 0.14 lbs of total organic carbon (TOC) per million Btu, and adjusted the factor based on the methane and ethane content of the flared gas (63%). This reduced the emission factor to 0.052 lb VOM/million Btu, which was then used to calculate VOM emissions from the flare. This adjustment was made on an assumption that only regulated VOM should be considered in the VOM emissions of the flare.

    This approach is flawed. It underestimates VOM emissions from this flare because it takes full credit for what USEPA indicated in AP-42 was 8 volume percent emissions of ethane/ethylene, but ethylene is a VOM. Further, ethane is not a likely product of incomplete combustion of ethanol vapors because of the presence of oxygen and its position in the ethanol molecule. The VOM emissions of this flare should be recalculated using the AP42 factor without any adjustments.

The adjustment to the AP-42 emission factor for emissions from flaring of waste gas, as addressed by this comment, is required. This is because AP-42 provides an emission factor, as cited above, in terms of total hydrocarbons (THC). The adjustment was properly made based on the supporting data for the emission factor that is provided in AP-42. While one can speculate on the specific effects of burning different organic compounds on the VOM and THC emissions of a flare burning waste gas, this does not provide a sound basis to treat methane as a VOM, as this comment is effectively recommending.

Incidentally, the VOM emissions from vapors collected during ethanol loadout were not calculated with the AP-42 emission factor addressed in these comments. The VOM emissions from the vapors displaced during loadout were conservatively calculated based on the loadout flare achieving 98 percent destruction of the captured vapors. This is based on information in AP-42 and other USEPA documents indicating that properly operated flares achieve at least 98 percent efficiency, meaning that hydrocarbon emissions are less than 2 percent of hydrocarbons in the gas stream sent to the flare.

101. The application did not show any PM emissions from the biomethanator flare but the draft permit shows 0.44 tons/year of PM. The application did not account for condensible PM emissions from other flares.

As noted in the comment, the Illinois EPA accounted for the PM emissions from the flare,

assuming potential PM emissions of 0.44 tons/year, including both filterable and condensible PM. This value is adequate, as "smokeless flares," as required at the proposed plant have not been identified as significant sources of PM emissions.

Equipment Components (Condition 2.10)

102. The emission calculations in the application for plant components do not consider emissions from pressure relief valves, open ended lines and sampling connections. These three types of components must be listed and subject to Leak Detection and Repair requirements. In addition, if rupture disks are used on pressure relief valves, the maintenance and use of such disks must be addressed by permit requirements.

Pressure relief valves, open ended lines and sampling connections are all types of components that are addressed by Condition 2.10 of the permit. If these components are in VOM service, they are subject to the Leak Detection and Repair Program required by Conditions 2.10.5 and 2.10.7.

Cooling Tower (Condition 2.12)

103. To assure compliance with applicable emission limits for the cooling tower, the permit must require monitoring and periodic inspections of the cooling tower. The permit should also require monthly monitoring of the total dissolved solids (TDS) content of the circulating cooling water to ensure that the TDS content does not exceed 2500 ppm. The tower must also be subject to a requirement that the TDS content of the cooling water does not exceed 2500 ppm.

The issued permit includes additional requirements for the cooling tower, as generally recommended by this comment.

104. The permit must require cooling tower blowdown and appropriate water addition whenever the TDS content in the circulating cooling water reaches 2500 ppm.

Illini BioEnergy is generally required to take necessary steps to operate <u>all</u> emission units at the plant in compliance with applicable limits and control requirements. For the cooling tower, it is not necessary or appropriate to specifically identify the particular action recommended by this comment, particularly as it would suggest that the TDS content of the cooling water is allowed to exceed 2500 ppm before corrective action is initiated.

105. The permit should require quarterly measurements of the ethanol content of cooling water, measured at a point in the distillation area directly downstream of the condensers. This is needed to verify that that the condensers are not leaking, due to corrosion or other degradation.

It is not appropriate for the construction permit for the proposed plant to mandate specific requirements of the type suggested in this comment. In the absence of actual experience at a specific plant demonstrating failure to properly implement particular maintenance

practices, a permit is issued based upon the presumption that all equipment will be properly maintained and repaired as necessary to prevent or promptly correct failures that would lead to increased emissions, such as the type of equipment failures described in this comment. This includes not only maintaining the integrity of heat exchangers, but also maintaining the integrity of other features at a plant, including enclosures, tanks, ductwork, fans, and stacks.

106. The permit should physically limit the potential emissions of the cooling tower by limiting the cooling water recirculation rate on an hourly and on an annual basis, consistent with the rates used in the emission calculations. Such a limit is important because cooling may be one of the constraints for the proposed plant.

The cooling tower is an ancillary operation at the source, which will function to support production of ethanol. As such, the "extent of operation" of the cooling tower is adequately addressed by the limits on the ethanol production of the plant. It is not necessary or appropriate to also constrain the operation of the plant by separately limiting the amount of water that may be circulated through the cooling tower.

Roadway Emissions (Condition 2.13)

107. The application does not explain the basis for the 1.5 mile per trip factor used in the emission calculations for roadways. The poor quality of the site plan in the application prevented me from determining the location of truck weigh scales and verifying that the mileage factor used in the emission calculations represents the planned layout of the plant, as described on the site plan.

As shown on the site-plan in the application, the facilities at the plant would be surrounded by a loop road, which would allow one-way truck traffic for the plant. The complete length of this roadway would be somewhat less than 1.5 miles. The truck weigh scales would be next to the office building, near the entrance to the plant, as clearly evident on the site plan in the application.

108. It is not clear from the application whether some of the trucks delivering grain will then be loaded with feed to be transported from the plant.

While mixing of shipments of grain and feed in this manner is unlikely, given the difference in materials, such a practice is to be encouraged. It would reduce PM emissions at the plant, as travel by empty trucks is reduced. It would also be more fuel efficient.

109. The potential to emit for fugitive road PM emissions is understated for tank trucks. The draft permit limits shipments of ethanol product to 15 million gallons per year by truck. However, the emission calculations in the application for fugitive PM/PM10 from roads only address shipment of 9.5 million gallons of ethanol product by truck. The application separately addresses delivery of 5.5 million gallons of denaturant per year, consistent with 5% denaturant in 110 million gallons per year of finished product. The permit combines these two entries to allow shipment of up to 15 million gallons of ethanol per year. While

it is possible that trucks bringing denaturant to the plant would leave loaded with ethanol, there is no assurance that this will happen. A worst case potential to emit calculation for roads must separately consider denaturant and ethanol tank trucks.

It is reasonable to assume that trucks carrying denaturant to the plant will then leave loaded with ethanol, as the Illinois EPA has done in setting the operational limits for the loadout of ethanol. Terminal facilities that supply denaturant to the plant will also receive and distribute ethanol product from the plant. Incidentally, the issued permit limits shipments of ethanol product from the plant to 35 million gallons per year, as another change to the plans for proposed plant made by Illini BioEnergy was to revise the emission calculations to address shipment of more ethanol from the plant by truck.

110. When calculating potential PM emissions from the roadways at the proposed plant, the application used a silt loading factor of 0.4 gram/meter^2, which yielded potential PM emissions of 33.74 tons/yr. However, the use of a factor of 0.4 gram/meter^2 for the average silt loading on roadways at an industrial plant is not correct and is not supported by AP-42, as incorrectly claimed in the application. Even if plant roadways were public roads, the lowest silt loading provided by USEPA in AP-42 as the "ubiquitous baseline" for public roads with less than 500 average daily traffic volume is 0.6 gram/meter^2. This factor is also subject to multipliers during the winter if roads are treated for anti-skidding. Calculation of roadway emissions for the proposed plant, using a silt loading of 0.6 gram/meter^2 and all other factors being the same, yields potential PM emissions of 43.9 tons/year from the plant, which would make the plant a major source for PM emissions.

The supplemental information submitted by Illini BioEnergy for the proposed plants includes revised emission calculations for roadways that are based upon a silt loading of 0.6 gram/meter^2. In conjunction with this change, Illini BioEnergy rebalanced or reallocated the PM emissions of different operations at the plant to maintain its status as a non-major source under the PSD rules.

The issued permit also requires that measurements be conducted for the silt loading on roadways at the plant. These measurements, together with other provisions of the permit, should assure that the PM emissions of roadways at the plant are appropriately controlled so as to maintain PM emissions with the limits set by the permit. In this regard, the roadways at the plant are not public roads and will be subject to requirements for regular sweeping, flushing or other dust control measures to minimize dust emissions.

111. Use of a silt loading of 0.4 gram/meter^2 also is not supported by actual experience. A review of the data for silt loading used for other grain processing plants and the permitting practices of other Midwestern states shows roadway silt loadings that range from 0.5 to 7.4 gram/meter^2. This review shows that the 0.4 gram/meter^2 silt loading used for the proposed plant is too low.

The material provided with this comment confirms the need for measurement of the actual silt loadings on plant roadways, as required by the issued permit. This material also supports the preparation of revised emissions calculations for the proposed plant, as Illini

BioEnergy chose to prepare and submit.

112. The draft permit does not contains measures that will ensure that the 0.4 gram/meter^2 silt loading and the associated limit on PM emissions from roadways will actually be met. There are no specific requirements for periodic sweeping and cleaning of roadways that would allow such a level of silt loading to be achieved. Mere reliance on a future plan, with applicant-discretionary measures that are not enforceable in practice, cannot ensure compliance with the associated emission limit. At a minimum, if a permit is issued based on a silt loading of 0.4 gram/meter^2, the permit must require that such silt loading be achieved in practice, together with quarterly testing requirements.

The issued permit includes additional requirements for the fugitive dust control program to assure that the program developed by the plant includes emission control measures that should assure that associated limits on PM emissions are met. Given the variety of control measures that could be used by the plant, for a plant that has not even been constructed, it is not appropriate for the permit to specify particular measures that must be used to control PM emissions from roadways.

The reliance upon a fugitive dust control that is developed and maintained by Illini BioEnergy is appropriate. This requires effective control of emissions while still providing necessary flexibility to address the factors that affect the emissions of fugitive dust from roadways, i.e., the volume and type of vehicle traffic, the efficacy of the selected treatment method(s), and weather conditions. In particular, a set frequency of road cleaning would not address: (1) Periods when there is not truck traffic on roadways, e.g., Sundays; (2) Variation in the effectiveness of different cleaning techniques; and (3) Weather conditions that control dust, i.e., precipitation, or increase dust, i.e., hot weather. A plan can be developed and maintained to account for these factors. For example, during hot weather when the volume of truck traffic is high, Illini BioEnergy would be required to clean roadways at an appropriate frequency to control dust during such conditions, perhaps even cleaning roads several times per day.

113. Without a clear physical limit on the potential to emit, achievement of the emission limit in the draft permit for roadways cannot be ensured. The emission calculations assume most ethanol and feed will be shipped from the plant by rail. However, the permit does not guarantee that truck traffic will not exceed these levels. The permit should include limits on annual truck VMT, reflecting the assumptions underlying the PM emissions calculations for the plant.

When calculating PM emissions of roadways the application conservatively, i.e., generously, accounted for the truck traffic at the proposed plant, with about 1/3 of the output of the plant shipped by truck. Accordingly, it is not necessary to explicitly limit the amount of truck traffic. The amount of truck traffic is adequately restricted by explicit limits on the overall receipts of grain and production of ethanol by the plant and by the physical location of the plant, which restricts the amount of material that can be transported by truck.

114. The permit should limit receiving of grain by truck in order to limit fugitive dust emissions

from roadways. This is because the relevant emission calculations are based in part on truck delivery of no more than 1,045,000 tons of grain, which is 95% of the maximum 1.1 million tons of grain to be processed at the plant. However, nothing about the design of the plant prevents it from having 100% of grain shipments delivered by truck. The permit should limit the 12 month rolling average of grain deliveries by truck to not more than 41,800 truck deliveries.

The application conservatively, i.e., generously, accounted for the truck traffic at the proposed plant when calculating PM emissions from roadways. Accordingly, it is not necessary to explicitly limit the amount of truck traffic. The amount of truck traffic is adequately restricted by explicit limits on the overall receipts of grain. In addition, as explained in response to the above comment, the permit effectively requires that Illini BioEnergy control PM emissions from roadways based on 10 percent more than the maximum volume of truck traffic that the plant would handle. This more than compensates for the assumption in the emission calculations for roadways that 5 percent of the grain for the plant would be delivered by rail.

115. Fugitive particulate emissions from storage and handling of wet cake and from "track-out" off of storage pad for wet cake onto roadways must be addressed. It should not be assumed that wet cake stored outdoors will stay dry under all conditions. Trackout is a potential source of fugitive emissions from either outdoor or indoor storage of wet feed.

The required fugitive dust control program for the plant would extend to these operations as they either directly or indirectly contribute to emissions of fugitive particulate from the plant.

Other Provisions of the Permit

116. The application does not address the emission implications from wastewater collected in the knockout drum and its subsequent handling. The knockout drum reduces PM emissions from the oxidizers associated with liquids and aerosols entrained in the waste gas. The application should include the analytical work showing that VOM emissions would not result from reuse of knockout pot water.

As indicated in the comment, the knockout drum removes entrained liquids from a gas stream that is controlled by the oxidizer systems. Since the knockout drum eventually "vents" its gas stream to the oxidizers, it is not reasonable to expect other emissions from this unit. In other words, VOM present in water droplets captured in the knockout pot would be stripped and transferred to the gas stream going to the oxidizers. The water stream itself would not be a separate source of emissions, as it would be reused at the plant.

118. The plant can be expected to have natural gas fired space heating units in various buildings. Although these units may be exempt from permitting, they still count towards the total emissions of the plant for comparison with the major source threshold. Illini BioEnergy must disclose the total emissions associated with such space heating units as part of a complete application.

The usage of natural gas by space heating units at the plant is addressed by the permit, as the permit limits total usage of natural gas by the plant and the total emissions of different pollutants from the plant.

COMMENTS IN SUPPORT OF THE PROPOSED PLANT

119. The proposed plant is an excellent chance for growth and prosperity in Hartsburg and the surrounding area.

120. The project is desirable because it will increase the price for corn, supporting local farms and the rural economy.

121. I look forward to investing in this project, which will add to the value of the corn that I grow.

122. The proposed plant will use modern "dry mill" technology, which does not have the odors problems associated with older plants using wet mill technology.

123. The plant is important because the ethanol made by the plant is an alternative to fossil fuel. The United States needs to step up production of alternative fuels to reduce dependence on foreign oil and because the reserves of fossil fuel are limited.

FOR ADDITIONAL INFORMATION

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

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