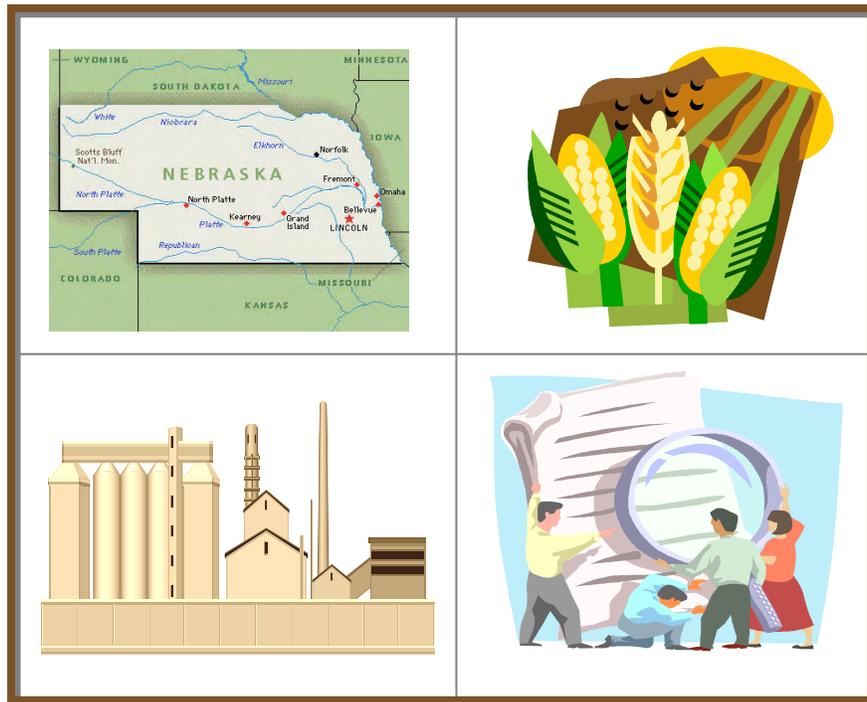


Air Quality and Ethanol Production Nebraska's Experience



**“Good Communication is the Key
to a Successful Permitting Process.”**



Nebraska Department
of Environmental Quality

September 2007

07-004

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Overview

Ethanol (also known as ethyl alcohol or grain alcohol) is a clear, colorless liquid made by fermenting and distilling organic material, most commonly corn. One bushel of corn produces between two and three gallons of ethanol.

In recent years, ethanol has been used primarily as an “oxygenate” for gasoline – in other words, ethanol adds oxygen to gasoline, which allows the gasoline to burn more completely. Burning gasoline with ethanol generates less carbon monoxide pollution from motor vehicles.¹ However, the production of ethanol creates volatile organic compounds (VOCs), which is a major component of ozone formation or smog.

Another oxygenate, methyl tertiary butyl ether (MTBE,) was widely used until recent studies found that MTBE had been contaminating water supplies. Ethanol competes favorably with MTBE because it has higher oxygen content than MTBE. Therefore, only about half the volume of ethanol is required to produce the same oxygen level in gasoline as MTBE. Presently, 18 states have banned MTBE and two states have pending regulations banning MTBE.²

The production of ethanol in the U.S. over the last several years has increased dramatically due to ethanol producer tax credits, U.S. Department of Agriculture incentive programs, and increased market demand. The demand for ethanol in 2004 was 3.57 billion gallons.² As of November 2005, the nation’s ethanol production capacity reached 5.4 billion gallons.³ United States ethanol production in 2004 grew to 3.4 billion gallons of ethanol produced by 81 plants located in 20 states. U.S. ethanol production increased 21% between 2003 and 2004 and has more than doubled since 2000.² Further, the Energy Policy Act of 2005 establishes a minimum renewable fuels standard that grows to 7.5 billion gallons of ethanol by 2012.⁴

All of these factors contribute to the number of existing plants that want to expand their ethanol production and the number of new plants being proposed. Due to the increased activity in the ethanol industry, the Nebraska Department of Environmental Quality (NDEQ) recognizes the need to provide a report to the general public, industry personnel of both existing and proposed ethanol plants, environmental consultants, community officials, and economic development professionals that would encompass varying aspects of the ethanol industry and the Clean Air Act.

This document is a compilation of documents, articles, presentations, and regulatory information related to the ethanol industry. The document will discuss the ethanol production process, air pollution emission points, NDEQ’s air quality permitting process, and air quality permitting and compliance issues. Information about Nebraska’s ethanol plants is also included.

As previously mentioned, this document discusses the ethanol plants air emissions and their air quality permitting responsibilities. Ethanol plants also have water quality permitting requirements and need to contact the NDEQ Wastewater Section at (402) 471-8830 to obtain the appropriate information and assistance.

Ethanol Production

Ethanol is produced using either a dry milling or wet milling process. Both types of mills operate in Nebraska; however, the majority of ethanol plants utilize the dry milling process. Corn and milo are the grains used to produce ethanol in Nebraska.

Dry Milling Process

Grain is delivered to ethanol plants by truck or rail car and then it is ground in a hammer mill and made into “meal.” This process is referred to as “dry milling” because the grain is dry when it is ground into meal. The meal is mixed with water to form a “mash” and enzymes are added, which changes the cornstarch to a fermentable sugar. This step takes place in a high-temperature cooker. Figure 1 illustrates the dry milling process. Dry mill ethanol plants produce 75% of the nation’s ethanol.²

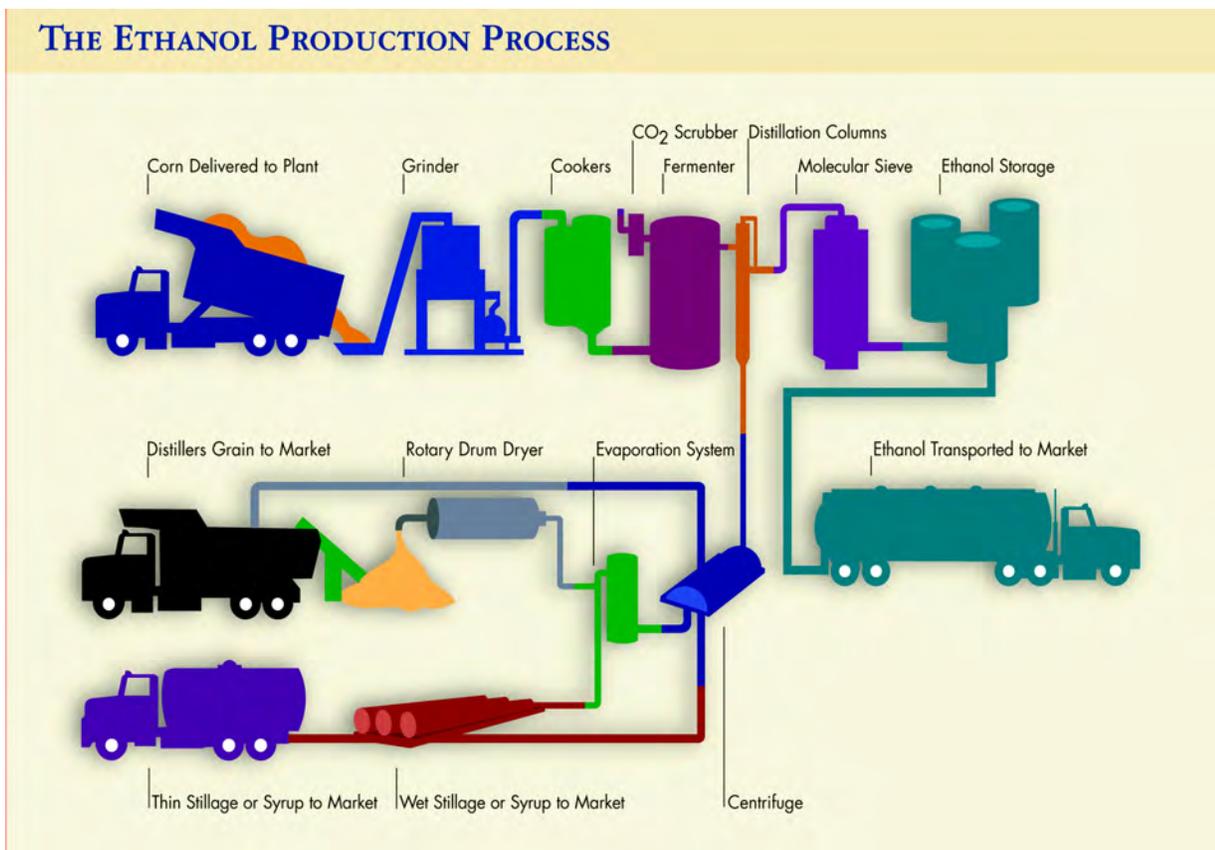


Figure 1

Renewable Fuels Association

After the mash has cooled, it is transferred to fermenters and yeast is added to ferment the sugars, creating ethanol and carbon dioxide. There are two types of fermentation that a plant will utilize, continuous or batch. In a continuous process, the fermenting mash flows through several fermenters until the mash is fully fermented. In a batch process, the mash stays in one fermenter for about 48 hours before the distillation process is started.

The fermented mash, now called "beer," is about 10 percent alcohol and 90 percent water and leftover solids from grain and yeast. The beer is pumped to the distillation system, where alcohol is separated from the solids and water.

The alcohol leaves its final distillation at about 95 percent strength (190 proof). The residual mash, called "stillage," is transferred to the distiller grain processing area and separated alcohol passes through a dehydration system where any remaining water is removed. Most ethanol plants use a molecular sieve to capture the last bit of water in the alcohol. The alcohol at this stage is called "anhydrous ethanol" and is 100 percent alcohol or 200 proof.

Anhydrous ethanol intended for fuel use is denatured with about five percent of a product like gasoline to make it undrinkable and thus not subject to liquor taxes. Once the ethanol has been denatured, it is ready for shipment to gasoline terminals or retailers to be mixed with gasoline and sold as ethanol fuel.

In the distiller grain processing area, the leftover stillage passes to a centrifuge that separates coarse grain from soluble material. Solubles are concentrated by evaporation to make "syrup," which can be sold on its own or mixed back with coarse grain to form "distillers grain." Distillers grain is sold as animal feed in either a wet state called wet distillers grain solids (WDGS), also known as "wet cake," or after drying as dried distillers grain solids (DDGS). Distillers grain solids are high in protein and other nutrients and are a highly valued livestock feed ingredient.

Another major byproduct created by ethanol production is carbon dioxide, given off during the fermentation process. Many ethanol plants collect the carbon dioxide, clean it and sell it for use in the carbonated beverage and dry-ice industries.¹

Wet Milling Process

Grain is delivered to the plant by truck or rail car. After the grain is received, it is soaked or "steeped" in water and a dilute sulfurous acid for one to two days, thus the term "wet milling" is used. Steeping makes it possible to separate the corn into its many component parts. Figure 2 illustrates the wet milling process.

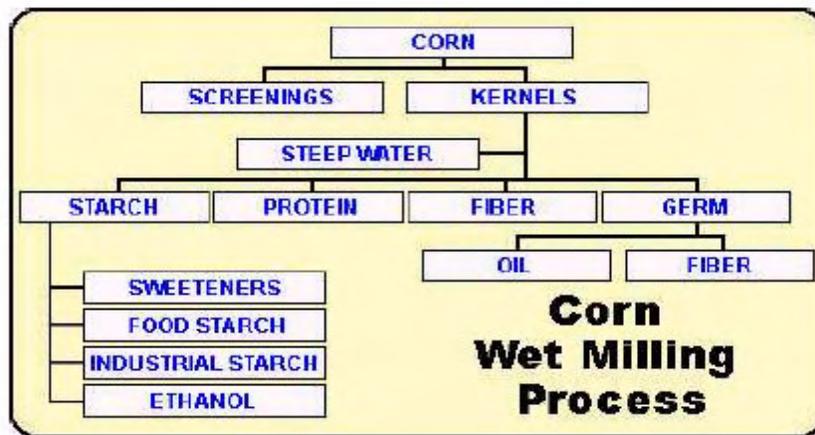


Figure 2

Minnesota Pollution Control Agency

After the corn has finished steeping, the slurry is passed through a series of grinders, centrifuges, screens, and separators. These processes separate the corn into starch, protein, fiber, and germ. Starch and

remaining water are processed into ethanol through a fermentation process very similar to the dry mill process described in the previous section.

Ethanol is just one of many products that wet mills may produce. Other products include food starch, corn gluten, feed for livestock, corn syrup, and corn oil.¹

Air Emissions from Ethanol Plants

Before discussing the details of the permitting process, it is important to be familiar with the regulated pollutants emitted from an ethanol plant.

As grain is delivered to the plant, then handled and milled, tiny particles (particulate matter less than 10 microns in diameter, PM_{10}) are released into the air. PM_{10} is also emitted during the drying process.

During fermentation, distillation and drying, volatile organic compounds (VOCs) are released. Some of these VOCs are known as hazardous air pollutants (HAPs). These include some or all of the following: acetaldehyde, acrolein, ethanol, formaldehyde, 2-furaldehyde, methanol, acetic acid and lactic acid.

Carbon monoxide (CO), nitrogen oxides (NO_x) and sulfur oxides (SO_x) are generated from combustion in the boilers of the plant. CO may also be generated in the drying process.¹

Other emissions may result from activities not associated with the production process such as: Hydrogen sulfide (H_2S) and VOCs released from the wastewater treatment process; PM_{10} from the cooling towers; fugitive PM_{10} and VOC emissions from haul road traffic and equipment leaks, respectively; PM_{10} , NO_x , SO_x , CO, and VOCs from emergency equipment; and potential VOC evaporative loss emissions from the wet distiller's grain solids (WDGS) storage piles (NDEQ has recently required several of the new ethanol plants to quantify their emissions from the WDGS storage piles).

Figure 3 illustrates the typical emission points at a dry mill ethanol plant and the air pollutants emitted from each emission point.

Dry Mill Emission Points

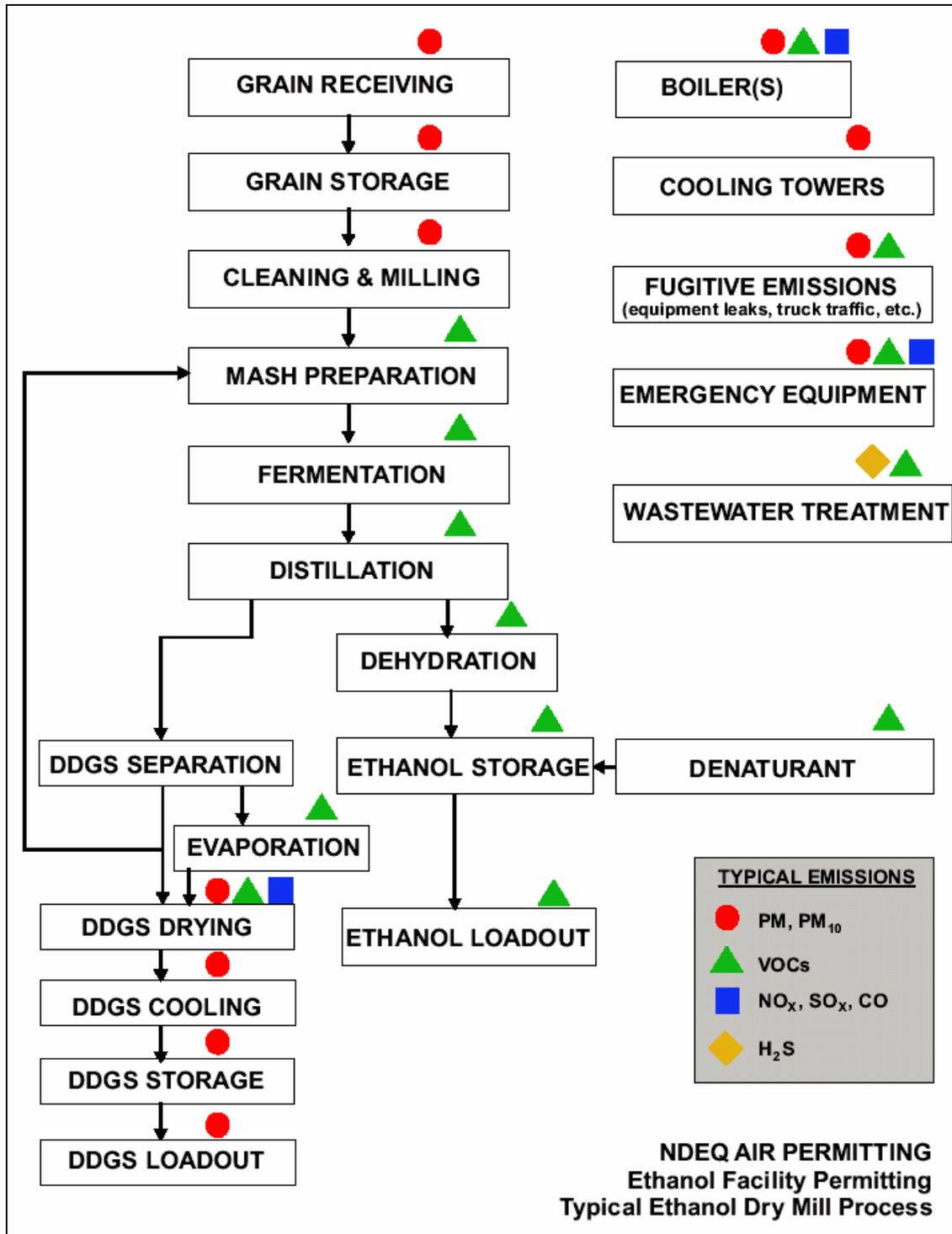


Figure 3

Nebraska Department of Environmental Quality

Air Quality Permit Program

The Nebraska air quality regulations require that facilities with the potential to emit air pollutants above specified levels must obtain construction permits and/or operating permits. This section will discuss the air quality permits an ethanol plant may need and when they must obtain them, permit application tips, and what information may be incorporated in a permit including a discussion of the federal regulations that could apply to ethanol plants.

Construction Permits

Before a new plant is built or before an existing facility expands or modifies its plant, an air quality construction permit may be required. There are two types of construction permits: state construction permits and federal construction permits, known as Prevention of Significant Deterioration (PSD) permits. The type of construction permit that is needed will depend on the quantity of air pollutants that potentially could be released from the new plant or expansion project.

Purpose

First and foremost, air quality construction permits are needed to protect the ambient air quality. Ambient air is the air outside of buildings that the general public has access to. The U.S. Environmental Protection Agency (EPA) has developed national ambient air quality standards (NAAQS) to protect the public health, welfare, and the environment.

Predictive computer modeling is conducted prior to issuing construction permits to evaluate the potential impact emissions from the plant will have on the ambient air quality. A construction permit cannot be issued if the plant will cause or significantly contribute to predicted violations of any ambient air quality standards. Unless modeling is conducted, we cannot offer assurances to the source and to the public that the facility is designed appropriately to protect the ambient air quality. Modeling is the basis of permit limits. It also provides assurances to the facility that the controls they are proposing are appropriate and, with proper planning for the future, they should not have to retrofit their facility at a later date.

Construction permits also impose enforceable requirements that are recognized by the EPA. Construction permits include emission and/or production limits that will ensure air quality protection. The permits contain recordkeeping, reporting, monitoring, and testing requirements to ensure the plant is able to demonstrate that the permits limits can be met.

The public is given notice that a construction permit may be issued and is given an opportunity to comment on activities that affect their environment. The public notice also provides an opportunity for communities to be educated about the environmental impacts of plants locating in their area.

Finally, construction permits are required by the Nebraska Air Quality Regulations – Title 129. Chapter 17 lists the requirements to obtain a state construction permit and Chapter 19 lists the requirements to obtain a federal construction permit. A copy of Title 129 can be obtained by contacting the NDEQ Air Quality Division; Title 129 can also be viewed on the agency website.

State Construction Permits

The NDEQ has had an air quality construction permit program since 1972. Facilities are required to obtain a construction permit before they construct, reconstruct or modify any air contaminant source or emission unit where there is a net increase in the potential-to-emit (PTE) above prescribed quantities. PTE means the maximum emissions that would result from operating the source at full capacity 24 hours a day, 7 days a week, 52 weeks a year taking into consideration federally enforceable requirements (such as previously issued permits or federal rules).

The increases in PTE that trigger construction permits by pollutant are:

- 15 tons per year (tpy) of PM₁₀,
- 40 tpy of SO₂ or SO₃ or any combination thereof,
- 40 tpy of NO_x (calculated as NO₂),
- 40 tpy VOC,
- 50 tpy CO,
- 0.6 tpy Pb (Lead), or
- 2.5 tpy of any single HAP or 10 tpy of all HAPs combined.

If a plant exceeds the HAP threshold requiring a state construction permit, they must conduct a control device review and install the best available air pollution control technology (BACT) based on that review. In lieu of a BACT analysis, the plant may choose to take a permit limit to keep their emissions below the HAP threshold (2.5 tpy of a single HAP or 10 tpy of combined HAPs).

A facility obtaining a state construction permit may be required to conduct an air quality review using computer modeling to predict the impacts that a facility may have on the ambient air. Whether or not a facility needs to model will depend on the rate of emissions increase, facility history, plant location, type of source, and emission point configurations (e.g. stack heights). More information can be found in the NDEQ modeling guidelines located on the agency website or by contacting the NDEQ Air Quality Division Construction Permit Hotline at (877) 834-0474.

Federal Construction Permits

EPA developed the federal construction permit program, known as the New Source Review program, in 1977. NDEQ has incorporated the federal program into the state regulations and has the authority to implement and enforce these rules. This program assures the following: economic growth will occur in harmony with the preservation of existing clean air resources; public health and welfare will be protected from adverse affects which might occur even at pollution levels below the ambient standards; and the air quality in areas of special natural recreation, scenic, or historic value, such as national parks and wildlife areas, will be preserved, protected, and enhanced.⁵

Under the New Source Review program there are two types of construction permits. In areas that have pollution levels below the NAAQS, referred to as attainment areas, sources that meet the appropriate criteria will obtain a Prevention of Significant Deterioration (PSD) permit. In areas that have pollution levels above the NAAQS, referred to as nonattainment areas, sources meeting the appropriate criteria will obtain a nonattainment New Source Review permit. Currently, Nebraska is in attainment with all ambient air quality standards.

In order for a facility to trigger the requirement to obtain a PSD or New Source Review construction permit, they must meet both of the following criteria:

1. The facility must have the PTE of:
 - 100 tons per year (tpy) of any regulated PSD pollutant* if the source is one of 26 specific source categories listed in the PSD rules (40 Code of Federal Regulations (CFR) §52.21(b))
OR
 - 250 tpy of any regulated PSD pollutant* for sources not specifically listed in the PSD rules, and
2. Have net emissions increases of:
 - 25 tons per year of Particulate Matter (PM) or total suspended particulate (TSP)
 - 15 tons per year (tpy) of PM₁₀
 - 40 tpy of SO₂ or SO₃ or any combination thereof,
 - 40 tpy of NO_x (calculated as NO₂),
 - 40 tpy VOC,
 - 100 tpy CO, or
 - 0.6 tpy Pb (lead)
 - Other pollutants with significance thresholds include total suspended particulate (TSP), fluorides, sulfuric acid mist, hydrogen sulfide (H₂S), total reduced sulfur (TRS), and reduced sulfur compounds.

**PSD pollutants include PM, PM₁₀, NO_x, SO_x, CO, VOC, Pb, fluorides, sulfuric acid mist, H₂S, TRS, reduced sulfur compounds, municipal waste combustor organics, metals and acid gases, and municipal waste landfill emissions.*

For information about how ethanol plants are categorized for PSD, contact the NDEQ.

If a plant needs to obtain a federal construction permit under the PSD program it must conduct a control device review and install BACT based on that review. PSD permits may be subject to review by EPA, federal land managers, bordering states, and tribal organizations. The plant must also conduct an air quality review using computer modeling to assure that they will not exceed the NAAQS or impact areas of special natural recreation, scenic, or historical significance. As part of the air quality review, an increment analysis must also be performed.

Increment is the term for the amount of additional pollutant concentration allowed beyond a baseline pollutant concentration level. In other words, increment is the maximum allowable deterioration of air quality. Increment is consumed when applicable emissions increases contribute to an increase in ambient concentrations above the baseline level. This element of the PSD program is key to maintaining compliance with the NAAQS despite increases in industrial activity. For more detailed information on Increment, see the fact sheet titled "Maintaining Good Air Quality Through the Increment Rules of the Prevention of Significant Deterioration Program" on the NDEQ website.

If you have questions related to construction permits, please contact the Air Quality Construction Permit Hotline at (877) 834-0474.

Operating Permits

The ethanol plant may also need to obtain an air quality operating permit. There are two types of operating permits: major source (federal program) and minor source (state program). Again, the potential emissions from the plant will determine whether a facility will obtain a major or minor operating permit.

Purpose

The federal operating permit program, known as the Title V program, was created by the Clean Air Act Amendments of 1990 and was designed to create a “one stop” permit. The Title V operating permit compiles all of the applicable state and federal regulatory requirements, existing construction permit provisions, and recordkeeping, reporting, testing, and monitoring requirements into one permit. The intention behind listing everything in one permit is to assist facilities with maintaining compliance. Oftentimes, a facility will have several construction permits for several pieces of equipment and it is difficult to keep track of all of the requirements in each permit. One permit with all of the facility’s requirements is intended to make it easier to track the requirements.

Notification to the public is also an important aspect of the operating permit program. The public is notified when an operating permit is proposed and is given the opportunity to comment during the 30-day public notice period. This gives the public the opportunity to become educated about the impacts that the facility may have on their environment.

The Department was required with the passage of LB1257 (1992) by the Nebraska Legislature to establish and implement a comprehensive operating permit program for facilities emitting certain air pollutants. While the Federal Title V operating permit program only regulates larger sources, the Nebraska program also regulates smaller sources. We took this action to give sources with lower emissions a mechanism to avoid the more onerous Federal program. This approach was consistent with Federal guidelines on limiting a source’s potential emissions and provided a reasonable option for sources. The success of this program depends on the source being able to keep their actual emissions below the permit limitations.

As pointed out above, the federal program regulates larger facilities (or major sources) of air pollution while the Nebraska operating permit program regulates both larger and smaller facilities (or minor sources) of air pollution. Nebraska’s major source operating permit program is also called the Class I program and the minor source operating permit program is the Class II program. The Class I and Class II operating permit programs are discussed further in the following sections.

Unlike a construction permit that must be obtained prior to construction and is valid for the entire life of the emission unit, an operating permit must be applied for within 12 months after the facility begins operation and is valid for up to five years. The operating permit requirements can be found in Title 129, Chapters 5 and 7 through 12. For a copy of the regulations contact the Air Quality Division or the air quality regulations can be viewed on NDEQ’s website.

Class I Operating Permits

The Class I program (or the Title V program) regulates major sources of air pollution. A Class I source or major source has the potential-to-emit (PTE) quantities greater than:

- 100 tpy of any criteria air pollutant* excluding Pb (lead),
- 10 tpy of any single HAP or 25 tpy of a combination of HAPs or,
- 5 tpy of Pb

* *Criteria pollutants are PM₁₀, NO_x, SO_x, CO, VOCs, and Pb.*

The benefit of operating as a Class I source is the flexibility allowed in your operation because your PTE is not limited (unless a historical construction permit limits your PTE). However, a Class I source will be subject to paying fees based on their actual emissions, may have more stringent monitoring requirements, and has additional reporting and recordkeeping requirements. Class I permits are also subject to review by EPA, nearby states, and nearby local or tribal air quality programs.

Class II Operating Permits

The Class II program regulates minor sources of air pollution. There are two classifications for minor sources: synthetic minor and natural minor.

- Synthetic Minor
 - PTE above Class I emission levels (see previous section)
 - Federally enforceable limits are taken to keep emissions below Class I emission levels
- Natural Minor
 - PTE below the Class I emission levels
 - Actual emissions above 50% of Class I emission levels
 - 50 tpy of criteria pollutant except Pb
 - 5 tpy of any single HAP or 12.5 tons per year of a combination of HAPs or,
 - 2.5 tpy of Pb

The benefits of becoming a Class II source include: no requirements to pay emission fees, and the possibility of less stringent monitoring requirements, less reporting, and less recordkeeping. However, Class II sources have less operational flexibility because they must maintain their emissions below the Class I threshold. Class II operating permits are not subject to review by EPA.

Permit Process

An air quality construction permit must be obtained from NDEQ prior to physical, on-site construction. The construction permit application needs to be submitted to NDEQ as soon as possible once the design of the plant is known. A specialized construction permit application will be available in February 2006 specifically for ethanol plants. It typically takes from four to six months to complete our review and draft the construction permit documents, and is followed by a 30-day public comment period. There are many factors that affect the time it takes to complete the process. These include the completeness of the application, the type and complexity of the facility, and changes in facility plans after the review has commenced.

Operating permit applications must be submitted to NDEQ within 12 months after the facility begins operating. Permit applications can be obtained by contacting the Air Quality Division, or downloaded from the NDEQ website.

Construction Permit Planning Meeting

To facilitate the submittal of a complete and accurate construction permit application and minimize the time it takes for NDEQ to prepare the permit, the Air Quality Division strongly recommends a project planning meeting and a pre-application meeting. This early communication will help streamline the process and reduce the time required to review the application and issue a permit. In addition, this is the time to bring up any innovative technologies and/or approaches the source anticipates using. This gives the Division time to research the proposal prior to the receipt of the application.

The project-planning meeting should be arranged with the NDEQ Environmental Assistance Division as soon as you begin the planning process. The project-planning meeting will involve staff from the Air Quality Division and the Water Quality Division. To schedule a project-planning meeting with NDEQ call (402) 471-6974.

The pre-application meeting should occur one to three months prior to submitting the application and the application should be near completion at the time of the meeting. The pre-application meeting will involve discussions related to the air quality permit application and modeling requirements. For more information related to the expectations of the pre-application meeting, contact the Air Quality Construction Permit Hotline at (877) 834-0474 or view the fact sheet titled “Pre-Application Meetings for Air Quality Construction Permits” on the NDEQ website.

Although the permits will differ, the process is virtually the same for both the construction permit and operating permit, with the exceptions of the pre-application meeting discussed above and construction permit application fee. A construction permit application fee must be submitted with your construction permit application. The construction permit application fees are based on facility-wide potential emissions. More information on the construction permit fees can be found by viewing the fact sheet titled “Construction Permit Application Fees” on the NDEQ website or by calling the Air Quality Construction Permit Hotline.

Application Review

Once the permit application and fee, if applicable, is received by NDEQ, it is reviewed for administrative completeness. The reviewer will determine if a responsible official has signed the application in ink, if the application contains completed forms, and if the applicant has requested confidentiality. If the facility has properly requested confidentiality in accordance with Title 115, Chapter 4 - Public Records Confidentiality, the request will be forwarded to the NDEQ director for approval or disapproval. If the confidentiality request is not filed in accordance with Title 115, the application will be returned to the facility. For more information related to properly requesting confidentiality, view the “Air Quality Confidentiality Claims” guidance document on NDEQ’s website.

Once the application has been deemed administratively complete, it is assigned to a permit writer for a technical completeness evaluation. The permit writer will determine if the application provides enough detailed information to draft a permit that accurately reflects the facility while assuring that all of the regulatory requirements have been addressed. The following information is a guide to what information the permit writer will look for during the technical completeness evaluation.

√ **General Information**

- Is it a new source or modification of an existing source?

- If it is a modification, has the applicant provided information regarding the existing source?
 - Are all of the applicable forms complete with the appropriate information?
 - Have emission points been identified, described, and consistently named?
 - Does the plant diagram show heights and locations of all buildings, delineations of ambient air (e.g. property boundaries), and emission points?
- √ **Emissions Information**
- Are fuel types, fuel use, raw production materials, consumption, production rates, and operating schedule provided?
 - Have both actual and potential emissions of regulated air pollutants been provided?
 - Have the assumptions and calculations of the actual and potential emissions been included?
 - Are citations of emission factors included?
 - Can a major or minor source determination be made?
 - Is the project subject to Prevention of Significant Deterioration (PSD) review?
- √ **Control Equipment and Methodology**
- Has emissions control equipment been identified and described?
 - Is supporting information on control equipment efficiencies included?
 - Did the facility propose limits on plant operation or work practices that may affect emissions?
 - If it is a PSD project, has a Best Available Control Technology (BACT) analysis been provided?
- √ **Monitoring, Recordkeeping, and Reporting**
- Have compliance monitoring devices or activities been identified and described?
 - Has the facility proposed testing of any emission units?
 - Did the facility provide information on existing or proposed record-keeping practices?
- √ **Modeling**
- Is the project subject to modeling? (For a copy of the modeling guidance, see the Air Quality Publications/Guidance Documents on the NDEQ web page or contact the Air Quality Construction Permit Hotline at (877) 834-0474)
 - If yes, has a modeling protocol been submitted and approved?
 - Have the modeling inputs, assumptions, etc. been provided to NDEQ on CD or diskette?
 - Was the modeling conducted in accordance with the approved protocol?
 - If it is a PSD project, have the ambient standards, PSD increment, and other impacts analyses been provided?
 - Was the modeling checklist included with the application? (The “Air Quality Modeling Checklist” can be found in the modeling guidance or separately on the NDEQ web page.)

Draft Permit

Not only must the application be technically complete prior to drafting the permit, the permit writer must review the plant’s historical information such as compliance and/or enforcement status and existing permits limits. The construction permit writer must also assess how the plant modification or expansion will impact existing processes and support facilities.

After the historical issues are reviewed, the permit writer must make sure that all of the calculations are correct, all of the regulatory requirements have been appropriately addressed, and the recordkeeping, testing, and monitoring is adequate to demonstrate compliance. This step is the most complex in the permitting process and will take at least 60-90 days to complete for construction permits.

In drafting the operating permit, the permit writer must make sure that all of the existing construction permit requirements and applicable state and federal requirements are included.

After the operating or construction permit is drafted, the permit will undergo a series of reviews to determine if the emissions were properly evaluated, permit limits are appropriate, and the permit is clear, concise, and consistent. The Air Division staff will review all permit applications received. Additionally, depending on the permit, others may also review the associated documents, including but are not limited to, other NDEQ staff not in the Air Division and contracted personnel. The draft permit will also be provided to the facility for their review. EPA may also elect to review the draft permit if the facility is subject to PSD review or the Class I operating permit program.

Public Notice

Once the draft permit is reviewed and approved, it is prepared for public notice. The public notice is published in a local newspaper and posted on the NDEQ website. The public notice, along with a copy of the draft permit and fact sheet, is sent to the local library to facilitate public viewing. The public comment period lasts 30 days. The public may also request a hearing during the public notice period. If a hearing is requested and granted by the NDEQ director, a hearing notice will be published in local newspapers 30 days prior the scheduled hearing.

Once the public comment period has ended, a response document is drafted to address all of the comments received. The response document is shared with all of those who commented and the facility. If the permit requires substantial changes, the permit may have to undergo another public comment period.

After public comments are addressed, the permit will be prepared for signature. Once the permit is signed copies are distributed to the appropriate parties.

Permit Application Tips

NDEQ understands that there is a significant amount of information that is required in the construction permit and operating permit applications. This is a lengthy process that can often be complicated. Following are some tips that will facilitate the process to help it flow more smoothly for the plant and NDEQ.

Talk with NDEQ as soon as possible. As soon as you begin your plans for an ethanol plant, call the NDEQ Environmental Assistance Division at (402) 471-6974 to schedule a project-planning meeting. The project-planning meeting will typically involve staff from the Assistance, Air Quality, and Water Quality Divisions. By talking early in the process, we can avoid some of the questions that may arise while completing the permit applications and complying with the various environmental regulations.

“Good communication is the key to a successful permitting process.”

Additionally, schedule and conduct a pre-application meeting with the NDEQ Air Quality Division one to three months prior to submitting the construction permit application. The pre-application meeting will facilitate the submittal of a complete and accurate application and decrease the time it takes NDEQ to prepare the construction permit. A construction permit will take several months to process, depending on the complexity of the permit.

Make sure the permit application is complete, accurate, and signed. Complete the application in blue or black ink. Also, have a responsible official sign the application in ink. Contact the NDEQ for the most current applications available. Be sure to include information for all of the equipment that you plan to install. Not only is it important to tell us what you will install, but also it is very important that you install the equipment that you specified in your permit application. By avoiding “as built” differences, you can avoid potential permit violations and having to wait for a permit modification. If your plans change after you have submitted an application, you have an obligation to submit updated information to NDEQ.

Submit the appropriate construction permit application fee. Each construction permit application must be accompanied with a fee. The application cannot be processed unless the appropriate fee is submitted. Construction permit application fees are based on facility-wide emissions and are divided into three tiers. For more information on the construction permit application fees, refer to the “Construction Permit Application Fees” fact sheet on the NDEQ website.

Address confidentiality issues appropriately. If a facility would like to claim information in the permit application as confidential material, the claim must be made at the time of submittal. In order to claim confidentiality, the facility must certify that the information or record is entitled to protection. In addition, the facility must explain its reasons why confidentiality should be granted. The NDEQ director will review the request to determine whether the information or record relates to processes or methods entitled to protection. Facilities may not keep plant-wide emissions data confidential. The director may not withhold records as confidential if they have been disclosed in an open court, open administrative proceeding, open meeting or disclosed by the Department in its duties. For further information on confidentiality, please refer to the “Air Quality Confidentiality Claims” guidance document on the NDEQ website or contact the Air Quality Division.

Include calculations and citations with your permit application. Including emission calculations and emission factor citations with the permit application helps us review your project. Without such citations and calculations, we will have to reproduce the work that you have done to ensure that the facility will meet state and federal requirements. If there are not standard emission factors for a process or processes, utilize the best information available to estimate the emissions such as stack testing data from similar units and/or engineering estimates.

Research. Generally, ethanol plants are subject to various federal standards as well as state regulations. The federal requirements could influence your decisions regarding equipment that you install. The federal regulations ethanol plants may be subject to are discussed in the Permit Content section of this document. The Air Quality Division has created a construction permit template for ethanol plants, which may be useful to understand your potential requirements and may help you provide additional information in your permit application and expedite the permit process. Contact the Air Quality Division to request a copy of the ethanol plant permit template. You can also request to view air quality permits that NDEQ has issued to similar plants. Reviewing other plant’s permits may give you a better idea what to expect in your permit.

Be aware of current regulatory issues. As the ethanol industry continues to expand throughout the nation and more emissions data is gathered, state agencies have to face new and often challenging issues. Some of the current air quality issues that Nebraska and other states are facing are discussed later in this document (Potential Air Quality Issues, Section 5). The issues are best addressed in the early planning stages of the ethanol plant. By communicating with the Air Quality Division and being aware of these current issues, you may be able to save time and/or money.

Get help. Although not required, we encourage plants to consult with persons who are familiar with Nebraska's air quality regulations, air quality construction and operating permits, and the ethanol plant processes. This not only expedites the permit process but also ensures that the permit application is complete and accurate. A Directory of Environmental Consultants and Engineers is available on the NDEQ website.

Read and make comments to the draft permit. Once the application is reviewed and deemed technically complete by NDEQ, the permit writer will draft the air quality permit. The draft permit will be sent to ethanol plant representatives for comment prior to public notice. Make sure the references to equipment are correct and that you will be able to operate under the required conditions. Be sure you understand and are prepared to comply with all of the record keeping, reporting and monitoring requirements in the permit. Making changes to the draft permit is easier than having to amend or modify the permit after it is issued.

Permit Content

Construction permits and operating permits consist of the same basic elements. Each permit will contain general conditions and specific conditions.

General Conditions

The general conditions are provisions which will be applied to every facility that obtains a particular type of permit. Construction and operating permit general conditions will reference provisions in Title 129 that apply to all facilities such as general duty clauses and the open burning and fugitive dust regulations.

The general conditions of a construction permit will include provisions such as commencement of continuous construction, notifications of anticipated startup and actual startup, and submittal of facility changes to the NDEQ. The general conditions explain the provisions to reopen, revoke, reissue, terminate, or modify the permit and the permit renewal requirements.

The following reporting requirements are found in the general conditions:

- All sources with a permit must submit an annual emission inventory by March 31st. The emission inventory is documentation of the facility's actual emissions based on production, combustion, and consumption for the previous year.
- Class I sources must submit their air emission fees (based on the annual emission inventory report) by July 1st every year.
- Sources with an operating permit are required to submit an annual certification of compliance by March 31st verifying compliance with their permit conditions for the previous year.

- Class I sources with an operating permit must submit semiannual excess emissions or deviations reports by September 30th and March 31st (submitted with their certification of compliance report) that document if there have been any deviations from their permit conditions.

Specific Conditions

The specific conditions will contain provisions that are specific to that facility. Both construction and operating permits may contain permit limits; emissions testing, monitoring, recordkeeping, and reporting requirements; and applicable federal rules.

The limits contained in the permit will depend on the type of permit and the limits the facility is willing to take. Permits may impose emission limits, production limits, or limits to ensure compliance with the NAAQS. Examples that might be included in a permit are:

- An emission limit - “PM₁₀ emissions shall not exceed X lb/hour (and X tons/year if applicable).”
- A limit to restrict the plant emissions below the Class I or PSD emission levels.
- A production limit - “Grain handling and milling operations shall not exceed X tons of grain per calendar month or X tons per calendar year.”

It is important facilities understand the permit limits and make sure that they are able to comply with the limits. It is best to address concerns with the permit limits early in the process or at least during the permit draft review. It may be that the permit will have to be altered to better meet the facility’s needs. It is much easier to fix the problem before the permit is issued rather than taking the chance of the facility exceeding their permit limits after the permit is issued.

The specific conditions will list any control equipment that the facility is required to install and properly maintain. There will likely be maintenance, monitoring, and recordkeeping provisions associated with the control equipment.

Facilities may also be required to conduct emissions testing at their plant. Whether or not emissions testing is required will depend on the size of the emission unit(s), how close the emission unit is to the PSD or Class I threshold, how good the emission factor rating is, whether the emissions will be controlled, and what efficiencies are being claimed for the control device.

Emission testing is required no later than 180 days after startup or 60 days after reaching maximum capacity. Facilities required to conduct emission testing must give NDEQ the Air Quality Division 30 days notice prior to testing and should submit an emission testing protocol 30 days prior to the test. If VOC/HAP testing is required, facilities should contact the Air Quality Compliance Section at (402) 471-4141 to discuss the appropriate testing methodology. Emission testing is conducted when the facility is operating at its maximum production rate. Facilities need to keep records of production during the test for verification purposes. For more information related to NDEQ’s air emission testing procedures, refer to the “Nebraska Stack Testing Guidance Document” on the NDEQ website or contact the Air Quality Division.

The specific conditions will include the facility’s monitoring requirements. Some of those requirements may include continuous emission monitors, opacity monitors, Method 9 opacity readings, visual inspections, or leak detection and repair programs.

A list of records that must be kept will be included in the specific conditions. Usually (unless otherwise specified) records must be kept and made available for five years. Records that will typically be required include production records; emission levels and calculations; fuel consumption; grain received, milled, or processed; equipment maintenance; monitoring; and startup, shutdowns, and malfunctions. Records kept should correlate to the production or emission limits in the permit to assure compliance with the permit conditions.

In addition to the reports listed in the general conditions, the specific conditions will list reports that the source must submit. The reports that may be required include performance tests; startup, shutdown, and malfunction; and others required by federal regulations.

Federal Regulations

Ethanol plants may be subject to several federal regulations and the requirements for those regulations will be found in the specific conditions of the permit. However, it is important to note that a facility may be subject to federal regulations not listed in the permit. This may occur when a new rule is promulgated after permit issuance, or when a source becomes subject to a rule after the permit is issued.

New Source Performance Standards

New Source Performance Standards (NSPS) establish technology-based standards that regulate criteria air pollutants from new or modified sources. These regulations were developed to assure that sources are installing the best-demonstrated technology to reduce emissions.⁵

NSPS regulations contain emission limits; control device or equipment requirements; and work practice, performance testing, monitoring, recordkeeping, notification, and reporting requirements. NSPS regulations can be found in 40 Code of Federal Regulations (CFR) Part 60. The following NSPS rules typically apply to ethanol plants.

- Subpart A – General Provisions
 - Sources subject to NSPS requirements may be subject to all or only a portion of the general provisions.
- Subpart Db – Industrial, Commercial, Institutional Steam Generating Units
 - Units with a capacity >100 million Btu per hour (MMBtu/hr)
 - Includes boilers and thermal oxidizers/waste-heat recovery boilers
 - Built, reconstructed, or modified after June 19, 1984
 - Regulated pollutants
 - NO_x, PM, SO₂
 - Opacity
- Subpart Dc - Industrial, Commercial, Institutional Steam Generating Units
 - Units with a capacity ≥10 MMBtu/hr and ≤ 100 MMBtu/hr
 - Includes boilers and thermal oxidizers/waste-heat recovery boilers
 - Built, reconstructed, or modified after June 9, 1989
 - Regulated pollutants
 - PM, SO₂
 - Opacity
- Subpart Kb – Volatile Organic Liquid Storage Vessels
 - Vessels with a capacity ≥ 40 m³ (approx. 10,000 gallons)

- Built, reconstructed, or modified after July 23, 1984
- Regulated pollutant
 - VOCs
- Subpart DD – Grain Elevators
 - Storage capacity \geq 1 million bushels
 - Built, reconstructed, or modified after August 3, 1978
 - Regulated pollutants
 - PM
 - Opacity
- Subpart VV – Synthetic Organic Chemical Manufacturing Industry (SOCMI) Equipment Leaks
 - Ethanol is on the list of regulated SOCMI chemicals.
 - Units built, reconstructed, or modified after January 5, 1981
 - Regulated pollutant
 - VOCs
- Subpart IIII – Compression Ignition Internal Combustion Engines
 - Fire pumps included
 - Units built, reconstructed, or modified after July 11, 2005
 - Regulated pollutants
 - NO_x, SO₂, CO, PM, non-methane hydrocarbons

Facilities should be cognizant of these rules during the planning stages of a new plant or modification. The NSPS requirements may have influence over the equipment and control devices that will be installed.

National Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Pollutants (NESHAPs) regulate HAP emissions from stationary sources through technology-based standards, known as Maximum Achievable Control Technology (MACT) standards. MACT standards are designed to require that a given type of source install the best-demonstrated control technology available. New and existing facilities that fall within listed source categories and are major sources of HAP are subject to the MACT standards (although, there are a few MACT standards that include area sources).⁵ A major source of HAP has the potential to emit 10 tons per year of a single HAP or 25 tons per year of a combination of HAPs. There are 188 regulated HAPs. The list of HAPs can be found in Appendix II of Title 129.

MACT standards contain emission limits; control device or equipment requirements; and work practice, performance testing, monitoring, recordkeeping, notification, and reporting requirements. MACT standards can be found in 40 CFR Part 63. The following MACT standards may apply to ethanol plants.

- Subpart A – General Provisions
 - Sources subject to MACT requirements may be subject to all or portions of the general provisions
- Subpart B – Case-by-Case MACT
 - Major sources of HAP that construct or reconstruct, that are not already covered by a MACT must obtain a construction permit with a case-by-case MACT
- Subpart FFFF – Miscellaneous Organic Chemical Production & Processes
 - Major HAP source that operate miscellaneous organic chemical manufacturing process units that uses or produces HAPs.

- Organic chemicals include:
 - Classified in SIC Code 282, 283, 284, 285, 286, 287, 289 or 386
 - Classified in NAICS Code 3251, 3252, 3253, 3254, 3255, 3256, or 3259
- Promulgation date 11/10/03
- Compliance date
 - Existing sources – 5/10/08
 - New sources
 - Startup before 11/10/03 – comply by 11/10/03
 - Startup after 11/10/03 – comply upon startup
- Subpart GGGG – Solvent Extraction for Vegetable Oil Production
 - Major HAP source using n-hexane to extract oil from soybean, corn germ, safflower etc.
 - Promulgation date 4/12/01
 - Compliance date
 - Existing sources – 4/12/04
 - New sources
 - Startup before 4/12/01 – comply by 4/12/01
 - Startup after 4/12/01 – comply upon startup
- Subpart ZZZZ – Reciprocating Internal Combustion Engines
 - Major HAP source operating a reciprocating internal combustion engine greater than 500 horsepower
 - Proposed amendments to the rule to also cover area HAP sources and engines <500 horsepower 7/27/06
 - Promulgation date 6/15/04
 - Compliance date
 - Existing sources – 6/15/07
 - New sources – 8/16/04 or startup
- Subpart DDDDD – Industrial, Institutional, & Commercial Boilers & Process Heaters
 - Major HAP sources that have any size boiler and/or indirect-fired process heaters
 - Units themselves do not have to emit HAP or be major for HAP
 - Promulgation date 9/13/04
 - Compliance date
 - Existing sources – 9/13/07
 - New sources
 - Startup before 11/12/04 – comply by 11/12/04
 - Startup after 11/12/04 – comply upon startup

It is imperative for a facility to be aware of the MACT standards that may apply to their plant prior to construction. Facilities that construct after a rule that they will be subject to has been proposed must be in compliance with that rule by the time they begin operation of the plant.

Potential Air Quality Issues

As the ethanol industry expands, NDEQ and other states have experienced an increase in issues associated with the permitting of these plants. NDEQ, other states, and the ethanol industry have faced a tremendous learning curve associated with air quality permitting and compliance. This section will explain several of those common issues that have been faced. We hope to give the industry, the public, and local government officials an understanding of the facts behind the issues to prevent further uncertainty and noncompliance.

Ethanol Plant Process Emissions

The primary processes to be controlled include the dried distillers grain solids (DDGS) dryers, fermentation units, DDGS cooling, ethanol loadout and boilers. The primary pollutants from those processes are VOCs (including those that are HAPs), nitrogen oxides (NO_x), and CO. There are various control equipment options available to reduce the pollutants from these processes. The following will discuss the efforts by the EPA and the States to control these processes.

Sources in Nebraska have been typically installing scrubber systems on the fermentation units, a thermal oxidizer on the dryer systems, cyclones for the DDGS cooling systems, a flare for the loadout, and low NO_x burners on the boilers to reduce their emissions to below major source levels. However, since 2002 testing indicates the DDGS dryer and fermentation scrubber emissions may not be adequately reducing the VOC and HAP emissions to the required levels.

In 2002, new information regarding the air emissions from ethanol plant DDGS dryers was revealed by the Minnesota Pollution Control Agency that had a far-reaching affect in Nebraska and across the nation. It was found that ethanol plants emit some pollutants in greater quantities than previously believed.

Until that time, it was believed that methanol and ethanol were the only significant volatile organic compounds (VOCs) emitted from the dryers. The Minnesota Pollution Control Agency conducted VOC testing at several Minnesota plants. The results from those tests indicate that methanol and ethanol are emitted in greater quantities than initially believed and there are numerous other pollutants emitted from the drying process including: acetaldehyde, acrolein, formaldehyde, 2-furaldehyde, acetic acid, and lactic acid. Some of these pollutants are considered hazardous air pollutants (HAPs). Tests were conducted in Illinois that indicated carbon monoxide (CO) emissions from the dryers might also have been significantly underestimated.⁶

More recent tests in Nebraska and other states verified emissions from ethanol processes are substantially higher than anticipated. EPA Headquarters, EPA Regional offices, States and Locals have engaged in negotiations with existing plants for installation of control equipment to reduce these pollutants to permitted levels. Permits for new plants are incorporating these control techniques into their designs.

The recent testing of fermentation scrubbers has shown similar problems. While scrubbers are effective control devices for VOC emissions, they are less effective for certain HAPs, primarily acetaldehyde. Testing shows that there is wide variation in the results from one test to the next and from plant to plant. In addition, there can be wide variation in the results during a test run. The variation is large

enough to where the emissions can be above major source levels. The industry and NDEQ are currently researching more viable options to reduce emissions from the fermentation process.

Compliance With Ambient Air Quality Standards

NDEQ must ensure that a facility constructing or expanding their plant will comply with the national ambient air quality standards (NAAQS). Those standards are set to protect the public health, welfare, and the environment. Predictive computer modeling is the tool used to demonstrate compliance with the ambient standards. The model will utilize meteorological information (worst case), maximum air emissions, stack heights, and property boundaries in the assessment.

If modeling predicts a violation of the ambient standards, the facility must rectify the violation before a permit can be issued. The violation must be addressed by the facility to reduce emissions sufficiently to prevent noncompliance with the ambient standards. The following options are available to address the predicted violation: install additional controls; take operational limitations; reconfigure emission points (e.g. raise stack heights); delineate the ambient air boundary around the facility; or a combination of these options. It is important to ensure that the modeling matches what is contained in the application. Ultimately, the modeling results will be used as a basis for many permitting conditions.

NDEQ has received several questions regarding how to delineate the ambient air boundary around the facility. For a facility to adequately delineate an ambient air boundary they must own the land or have legal right to exclusive use of the land and the public must be effectively excluded from the land. In theory, by delineating an ambient air boundary, the air inside the boundary is “exempt” from being classified as ambient air. In other words, the area inside the boundary does not have to demonstrate compliance with the NAAQS. A continuous physical or active barrier is required to adequately delineate the boundary and prevent knowing or unknowing trespassers from entering the property.

Examples of adequate physical barriers include: 4.5-foot tall 4-strand barbed wire fence; 6-foot chain link fence; or an equivalent proposal by the facility. Terrain features may also be used as a physical barrier as long as: an extraordinary effort is required to cross the particular terrain feature; it is not traversed by a trail, road, or railroad; and it cannot be traversed by an off-road vehicle.

No matter which option is selected the facility must submit a detailed plan on how they will maintain security and verify the integrity of the fence. The plan must include the following:

- Details about how the property will be posted. At a minimum, “No Trespassing” signs will be posted at an interval of every 250 feet and at every opening in the fence. The signs must be visible and easily read during daylight hours from a distance of 125 feet.
- The facility must submit details about how they will monitor the fence for integrity and trespassers, e.g., cameras posted at locations enabling surveillance staff to see each portion of the fence, security patrols making surveillance rounds, or equivalent.
- All gates must be monitored when not in use, e.g., equipped with cameras, have guards that have an unobstructed view of the opening, or equivalent.
- The facility must submit details on how they will monitor gates when not in use.

Active barriers may also be used to delineate an ambient air boundary. However, this option is used as a last resort and will be approved on a case-by-case basis. Adequate active barriers include a combination of surveillance, signs, and security patrols. The option to use an active barrier may not be allowed for PSD sources, Class I sources, sources located in an area that is not in compliance with an ambient standard, or sources that have a potential-to-emit near the PSD or Class I emission levels.

Haul Road Emissions

Fugitive emissions from haul roads are difficult to address. The emission estimation tools available are difficult to accurately determine unless site-specific parameters are developed, which can be expensive and time consuming. In addition, computer-modeling techniques used to predict the impact caused by plant emissions can over predict the impact in ambient air caused by low-level emissions such as haul road emissions.

When a facility calculates their potential emissions to determine their permitting status (major or minor), they must include fugitive emissions such as those from roads, storage piles, and evaporative loss from tanks. In addition, the haul roads could be included in the air dispersion modeling for annual averaging periods unless the facility proposes to utilize best management practices (BMPs) to limit their emissions. Refer to the modeling guidance on the NDEQ website to determine if your facility should include haul roads in your modeling analysis.

It is the applicant's responsibility to propose and include in their permit application an appropriate BMP for their facility. NDEQ may require additional management practices in the construction permit on a case-by-case basis. BMPs for haul roads include: paving unpaved roads; require covers on haul trucks; utilize wheel washes; speed/traffic reductions; conduct frequent washing/vacuuming paved roads; improve road surfaces; apply vegetative cover to non-road areas; pave/treat parking areas, driveways, shoulders; and apply water or chemical surfactants to the roads to minimize dust emissions. This list is not exhaustive and the applicant can propose other practices for NDEQ to consider.

Staged Construction

The intent of Title 129, Chapter 17 is to review new sources of air pollution above certain significance thresholds for compliance with the Clean Air Act (CAA), including compliance with the National Ambient Air Quality Standards (NAAQS). The NAAQS are federal air quality standards designed to protect the public health and environment. Circumventing permitting requirements through staged construction results in a situation where the company's true intent for production and, therefore, pollution are not properly evaluated. Without conducting the proper analysis, including predictive air quality modeling, the company, the Department and the public will not know whether compliance with the CAA and the NAAQS can be attained.

Circumvention of state construction permit requirements (Chapter 17) may also constitute circumvention of the federal construction permit requirements (Chapter 19). The Environmental Protection Agency (EPA) is clear in their circumvention guidance stating *"...attempts to expedite construction by securing minor source status through the receipt of operational restrictions from which the source intends to free itself shortly after operation are to be treated as circumvention of the preconstruction review requirements."*

Circumvention of permitting requirements cannot be evaluated until an application for the expanded or larger scale production level is submitted. If NDEQ determines that circumvention did occur, the source could be subject to enforcement action by the State or the EPA.

Each case will be evaluated individually. However, in general, the following outlines criteria we will evaluate to determine whether circumvention occurred.

- Timing of application for full-scale production plant. Was the full-scale production (expansion) application submitted within 12-18 months after the small-scale plant was operational? Applications made shortly after becoming operational may be evidence of circumvention.
- Applications for funding. Has the company filed applications for loans, utilities, etc... which guarantee a certain level of operation by a certain date? Would the project be funded? What is the economic viability of the source if it operated at the lower production level for an extended period of time? If the source cannot be economically viable at the lower production level for an extended period of time, this may be evidence of circumvention.
- Statements made about consumer demand and projected production levels. Has the company filed business permit applications that state projected operation or production levels? What statements have been made in stockholder reports, SEC reports, etc.? Statements made in these reports and documents show the intent of the company.
- Statements of authorized representatives of the source regarding plans for operation. Has the business made statements to NDEQ about their future plans of operation?
- Plans for equipment. What are the company's plans for the equipment used in the small-scale production? Is the equipment permanent? If the equipment is only temporary, then circumvention may not have occurred.

If you have questions about your specific scenario or permitting requirements, contact the Air Quality Division at (402) 471-2189 or call the Air Quality Construction Permit Hotline.

Burning Alternative Fuels

Due to the rising cost of natural gas, several plants are exploring the use of alternative fuels in their boilers such as coal, biomass, vegetable oil, tire derived fuel, and methane. Facilities have approached NDEQ and inquired as to the related requirements. Most frequently the questions revolve around the need to apply for construction permits. The question becomes whether or not the fuel switching will need a construction permit. If the boiler could already burn the alternative fuel without a modification to the unit, it may not need a permit provided any increase in emissions have been properly evaluated. If a physical modification to the existing unit is needed, a construction permit is likely needed. In either case, you will need to determine the net increase in emissions due to the fuel switch and compare the emissions increase to the construction permit thresholds. Additionally, you may have to: apply for a construction permit revision if your current permit(s) stipulates the fuels that can be burned; conduct modeling if there are significant increases in pollutants not considered in previous modeling; and you may have to conduct testing to verify the assumptions made in your calculations.

Fuel switching may also lead to questions related to staged construction, as discussed in the previous section. NDEQ would follow the outline mentioned previously to determine if, in fact, the switching would qualify as staged construction, thereby circumventing the appropriate regulatory review. Some plants have undergone a best available control technology (BACT) review during their initial permit

application, even though they had planned to limit their emissions below the level requiring the BACT review. This option may save time and additional regulatory review if fuel switching or expansions occur shortly after the initial construction permit is issued.

Support Facilities

As more ethanol plants are built NDEQ and EPA are answering more questions involving “support facilities” and their role in the construction permit process. Some ethanol plants are locating near existing grain elevators instead of building a grain handling facility on site. The issue becomes whether or not the existing grain elevator should be drawn into the permit program with the ethanol plant and thus, considering these as a single source. The federal regulations generally consider pollutant-emitting activities as a single source when the following criterion are met (1) part of the same industrial grouping (Standard Industrial Classification Code), (2) they are contiguous or adjacent, and (3) under common control. One or more of these criteria can be satisfied when an emissions unit serves in a supporting role for a primary activity at a nearby location.⁷

EPA discussed support facilities in the draft preamble to Part 70 revisions published June 3, 1997. They concluded that the support facility determinations depend on several issues including financial, function, contractual, and/or other legal factors including: (1) a mutually beneficial arrangement between the two activities; (2) the degrees the primary facility exerts control over the support facility’s operations; (3) the contractual agreements between the facilities; and (4) whether the support activity would exist at that site but for the primary activity.⁷

Thus, there are many factors affecting whether or not a support facility will be drawn into the permitting program with the ethanol plant. These situations will be evaluated on a case-by-case basis. The facility should contact the NDEQ Air Quality Division to discuss this very early in the planning process to avoid unnecessary delays with the permit issuance.

Other Permitting and Compliance Issues

One of the situations that NDEQ comes across frequently is when a facility builds the plant differently than they had originally intended and their construction permit does not coincide with the actual plant’s emission points. These situations can cause unnecessary confusion for permitting and compliance staff, may be a permit violation, and may require a permit modification. The facility must install the equipment that has been approved in their permit and if there are changes, submit those to NDEQ immediately. Also, a facility must begin continuous construction of the permitted emission unit(s) within 18 months of permit issuance or the permit is no longer valid.

Most violations at ethanol plants result from not reading and understanding the conditions in the construction or operating permit. Once the permit is finalized, the plant representatives will be responsible for compliance with the permit conditions. It is very important for plant staff and managers to understand these requirements to prevent permit violations. Although not required, it is helpful for plants to have at least one full-time person dedicated to maintaining compliance with the environmental regulations and permits.

Some of the common violations include failure to perform testing, testing late, exceeding emission or production limits, failure to keep adequate records, failure to submit required reports on time, and failure to conduct and keep records of control equipment maintenance.

There are a few simple tips that can help a facility maintain compliance:

- Read and reread your permit on a routine basis.
- Understand your permit requirements.
- Keep your records in one place and in a logical order.
- Properly operate and maintain control equipment.
- Designate an “environmental manager” and train a backup.
- Ask the NDEQ questions to avoid misunderstandings and mistakes.
- Plan ahead!

Nebraska's Ethanol Plants

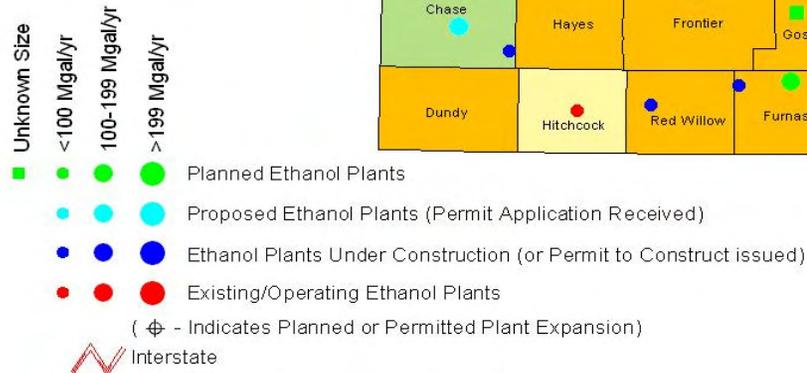
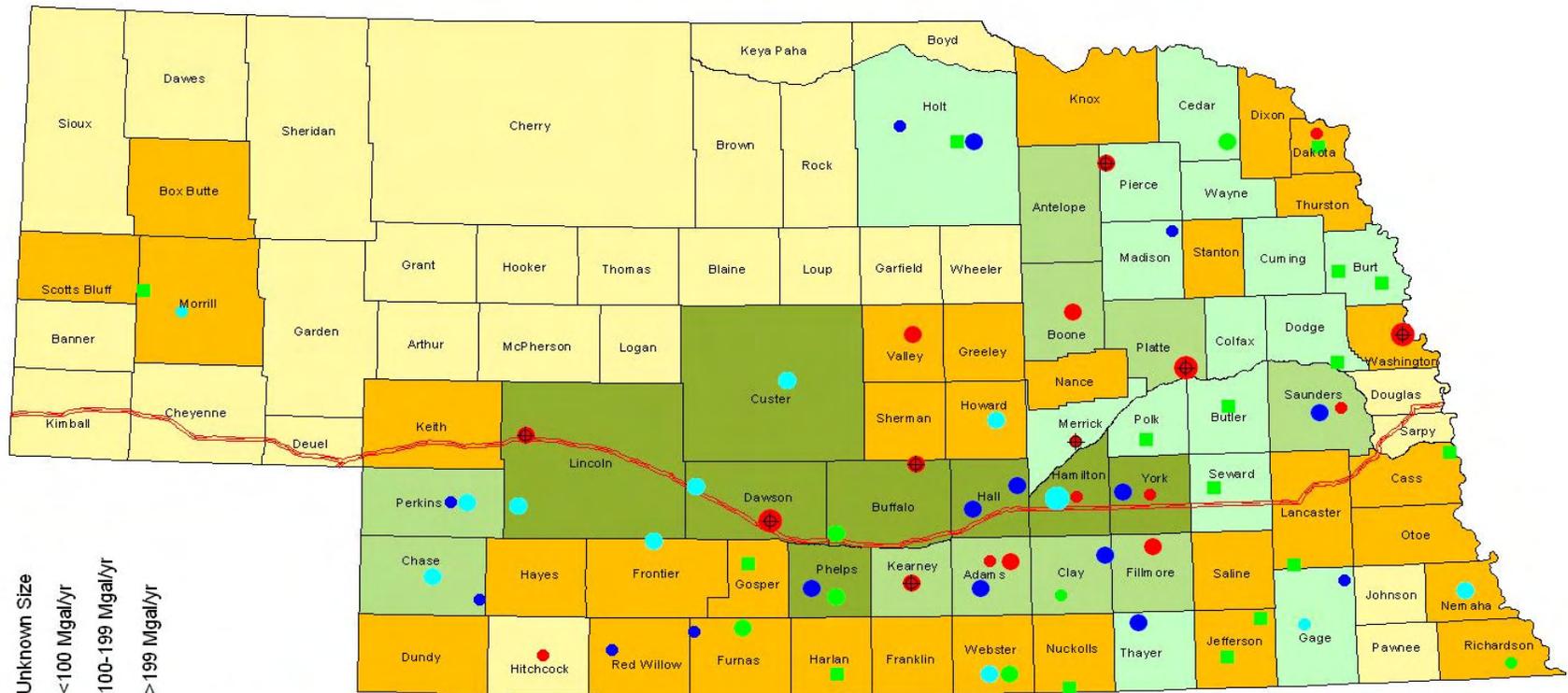
Nebraska is ranked third in the United States in ethanol production capacity, producing an estimated 10% of the nation's ethanol production capacity of 5.4 billion gallons. At the time of publication, ethanol production capacity in Nebraska has reached over 1,206 million gallons, which was 46 percent more than 2006 production based on estimated maximum production.

The increasing demand for ethanol and the incentives made available for ethanol producers has increased the attractiveness of building new ethanol plants. Currently, there are eighteen operating ethanol plants in Nebraska with the ability to process more than 480 million bushels of grain. Figure 4 illustrates the locations of the operating plants, proposed plants, and planned plants.

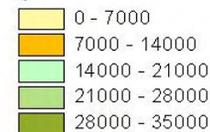
Table 1 describes the operating plants, those under construction, those recently issued construction permits, those that have submitted construction permit applications for review, and plant expansions. Several prospective ethanol plants have spoken with NDEQ representatives or information has been obtained through media contacts discussing planned locations for ethanol plants, but they have not submitted construction permit applications to NDEQ. Potential plant locations include Alma, Arapahoe, Bayard, Broken Bow, Elm Creek, Elwood, Fairbury, Fremont, Hallam, Humboldt, Lural, Oakland, Plymouth, Superior, Stromsburg, Tekama, and Tamora.

Planned, Proposed, Permitted, and Operating Ethanol Plants in Nebraska

As of September 2007



Nebraska Corn Production (per thousand bushels)



Source: Nebraska Agricultural Statistics Service, Nebraska Agricultural Statistics 2001-2002, Updated August 2002



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Information regarding "Planned" ethanol plants is obtained by the NDEQ through discussions with prospective sources and media accounts.

Receipt of an application or issuance of a permit for an ethanol plant does not necessarily mean an ethanol plant will actually be built at the site.

The NDEQ does not guarantee the accuracy or completeness of this map.

Table 1 – Nebraska Ethanol Plants

Plant Name	Location	Source Status	Capacity (gals/yr)
Operating Plants			
Abengoa Bioenergy of Ravenna	Ravenna	Approximate startup 2007	100 million
Abengoa Bioenergy Corporation	York	Approximate startup 1994	55 million
ABE (Advanced Bio Energy LLC)	Fairmont	Approximate startup 2007	100 million
ADM Corn Processing*	Columbus	Approximate startup 1992	100 million
AGP Corn Processing Inc	Hastings	Approximate startup 1995	55 million
ASA Albion, LLC (Demeter)	Albion	Approximate startup 2007	118 million
Cargill Inc.*	Blair	Approximate startup 1995	100 million
Chief Ethanol Fuels Inc	Hastings	Approximate startup 1985	65 million
Cornhusker Energy Lexington	Lexington	Approximate startup 2005	80 million
E3 Biofuels	Mead	Approximate startup 2007	20 million
Husker Ag LLC	Plainview	Approximate startup 2003	32 million
KAAPA Ethanol LLC	Minden	Approximate startup 2003	60 million
Midwest Renewable Energy LLC	Sutherland	Approximate startup 1999	20 million
Nebraska Energy LLC	Aurora	Approximate startup 1995	35 million
Siouxland Ethanol LLC	Jackson	Approximate startup 2006	55 million
Trenton Agra Products LLC	Trenton	Approximate startup 2004	45 million
US Bio Platte Valley, LLC	Central City	Approximate startup 2004	48 million
US Bio Ord, LLC	Ord	Approximate startup 2007	118 million
Plants Under Construction or Permitted to Construct			
Alcorn	Loomis	Permit issued 6/4/2007	125 million
ALTRA (formerly Oregon Trail Ethanol Coalition)	Carleton	Permit issued 4/25/2006	110 million
American Ethanol, Inc	Grand Island	Permit issued 7/26/2007	118 million
American Ethanol, Inc (Permitted under Wahoo Ethanol)	Wahoo	Permit issued 5/15/2006	118 million
American Ethanol, Inc (Permitted under Sutton Ethanol)	Sutton	Permit issued 9/29/2005	118 million
E-Energy	Adams	Permit issued 1/3/2007	50 million
Elkhorn Valley Ethanol LLC	Norfolk	Permit issued 8/2/2007	53 million
Holt County Ethanol	O'Neill	Permit issued 3/3/2006	100 million
Little Blue Energy, LLC	Roseland	Permit issued 1/26/2006	110 million
Mid-Amer. Agra Products	Cambridge	Permit issued 9/12/2006	84 million
Mid-Amer. Agra Products, Wheatland	Madrid	Permit issued 4/13/2007	55 million
NEDAK	Atkinson	Permit issued 3/6/2006	20 million
Northern Utilities LLC	Bradshaw	Permit issued 8/5/2003	110 million
Pioneer Trail Energy, LLC	Wood River	Permit issued 7/6/2007	118 million
S.W. Energy, LLC	McCook	Permit issued 6/4/2007	27.5 million
Wauneta Ethanol, LLC	Wauneta	Permit issued 4/25/2006	60 million
Proposed Plants			
American Ethanol, Inc	Wahoo	Application received 6/2/2006	118 million
American Ethanol, Inc	Sutton	Application received 5/30/2006	118 million
American Ethanol, Inc	Red Cloud	Application received 7/24/2006	118 million

Aventine Aurora West LLC	Aurora	Application received 10/10/2006	220 million
Beatrice Ethanol, LLC	Beatrice	Application received 1/11/2007	77 million
Bridgeport Ethanol, LLC	Bridgeport	Application received 1/17/2007	54 million
Central Bio-Energy, LLC	Imperial	Application received 2/22/2007	114 million
Central Bio-Energy, LLC	St. Paul	Application received 12/15/2006	114 million
Deweese Bio Fuels, LLC	Fairfield	Application received 1/31/2007	55 million
E-Energy	Auburn	Application received 3/16/2007	120 million
E-Energy (Broken Bow)	Ansley	Application received 6/29/2007	120 million
Hi-Line Ethanol, LLC	Moorfield	Application received 2/21/2007	115 million
Mid-Amer. Agra Products, Madrid	Madrid	Application received 2/9/2007	115 million
PEI Lincoln Ethanol, LP	Wallace	Application received 10/26/2006	100 million
Phelps County Ethanol, LLC	Holdrege	Application received 8/29/2006	100 million
Renewable Agricultural Energy, Inc.	Gothenburg	Application received 1/22/2007	114 million

Plant Expansions

ADM Corn Processing	Columbus	Expansion permit issued 10/20/06	+420 million
U.S. Bio Platte Valley LLC	Central City	Expansion permit issued 10/20/06	+48 million
Husker Ag LLC	Plainview	Expansion permit issued 4/9/07	+44 million
Cargill Inc.*	Blair	Expansion permit issued 9/8/06	+140 million
Abengoa Bioenergy of Ravenna	Ravenna	Expansion permit issued 6/4/07	+20 million
Cornhusker Energy LLC	Lexington	Expansion application received 5/1/07	+140 million
KAAPA Ethanol LLC	Minden	Expansion application received 7/14/06	+50 million
Midwest Renewable Energy LLC	Sutherland	Expansion application received 8/31/06	+100 million

*Denotes wet mill process

NDEQ Air Quality Division

Conclusion

This document is intended to pull the pieces of the air quality “permitting puzzle” together and provide assistance to ethanol plants regarding the permitting process. Knowledge of the regulatory processes and requirements is the foundation for environmental compliance.

This document also provides information regarding the ethanol plant processes and air emissions to the public and state and local government officials. An integral part of the permitting process is to provide opportunities for the public to understand and comment on activities that affect their environment.

As the nation becomes more dependent on renewable fuels, such as ethanol, the ethanol industry, the public, and local and state governments must have the knowledge that will prepare them for the future. The public health, welfare, and environment will be protected and economic development will continue if everyone communicates effectively and works together.

For questions and assistance with the air quality regulations, contact the NDEQ Air Quality Division at (402) 471-2189. For general environmental assistance, contact the Environmental Assistance Division at (402) 471-8697. For assistance with the wastewater requirements, contact the Wastewater Division at (402) 471-8830.

The air quality regulations, permit applications, and other helpful air quality fact sheets and guidance documents can be located on the agency website at www.deq.state.ne.us. Be advised that the intent of this document is to provide guidance and the reader should be contacting NDEQ staff for specific information.

**“Good
Communication is
the key to a
successful
permitting process.”**

APPENDIX A - Available Resources

Nebraska Department of Environmental Quality

PO Box 98922 • 1200 'N' St., Atrium, Suite 400 • Lincoln, NE 68509-8922

Phone: (402) 471-2186

Fax: (402) 471-2909

Air Quality Division – (402) 471-2189 Air Quality Construction Permit Hotline (877) 834-0474

Environmental Assistance Division – (402) 471-6974

Waste Management Division – (402) 471-4210 or 471-3388

Water Quality Division – (402) 471-3098 or 471-4287

www.deq.state.ne.us

Nebraska Ethanol Board

301 Centennial Mall South • P.O. Box 94922 • Lincoln, NE 68509

Phone: (402) 471-2941

Fax: (402) 471-2470

www.ne-ethanol.org

Nebraska Department of Economic Development

301 Centennial Mall South • P.O. Box 94666 • Lincoln, NE 68509-4666

Phone: (800) 426-6505

Fax: (402) 471-3778

www.neded.org

Environmental Protection Agency - Region VII

901 N. 5th Street • Kansas City, KS 66101

Air, RCRA, & Toxics Division – (913) 551-7020

www.epa.gov

www.epa.gov/ttn - Technology Transfer Center

Renewable Fuels Association

One Massachusetts Ave. • Suite 820 • Washington D.C. 20001

Phone: (202) 289-3835

Fax: (202) 289-7519

www.ethanolrfa.org

Nebraska Corn Growers Association

1327 H Street • Suite 305 • Lincoln, NE 68508

Phone: (402) 438-6459 Toll Free: 888-CORNGRW

Fax: (402) 438-7241

www.necga.org

National Corn Growers Association

1000 Executive Parkway • Suite 105 • St. Louis, MO 63141

Phone: (314) 275-9915

Fax: (314) 275-7061

www.ncga.com

Minnesota Pollution Control Agency

520 Lafayette Road North • St. Paul, MN 55155-4194

Phone: (651) 296-6300

www.pca.state.mn.us

Air Quality Documents Available

The following is a list of Air Quality fact sheets, guidance documents, applications, forms, and reports located on NDEQ's website the ethanol industry may find helpful. You can also obtain these documents by contacting the NDEQ Air Quality Division. Be sure to check the website often for updates and additions.

Fact Sheets

Acceptable Pre-construction Dirt Work
Air Pollutant Information
Air Quality Acronyms and Abbreviations
Air Quality Models
Compliance Assurance Monitoring
Construction Permit Application Tips
Construction Permit Application Fees
Construction Permits
Deviations
Establishing Air Quality Regulations in Nebraska
Facts about Federal Air Quality Regulations
Fugitive Dust FAQs
Inspection Tips From NDEQ's Air Quality Division
Maintaining Good Air Quality Through the Increment Rules of the PSD Program
Nebraska's Low Emitter Rule
NDEQ's Compliance Assistance Program
Odor
Open Burning
Operating Permits
Permit Shields
Permit-by-Rules
Permitting issues with Staging Construction of Ethanol Plants
Recordkeeping for No Permit Required
Redesignation of Air Quality Control Regions

Guidance Documents

Air Quality Confidentiality Claims
Air Quality Modeling Checklist
Air Quality Permit Process
Atmospheric Dispersion Modeling Guidance for Permits
Certification of Compliance and Deviation Reports
How to Calculate Yearly and Rolling Totals and Rolling Averages
Nebraska's Stack Testing Guidance
Pre-Application Meeting Guidance for Construction Permits
Tax Refund Guidelines for Air and Water Pollution Control Projects
VOC and HAP Emission Calculations for Paints, Solvents, and other Evaporative Loss Sources

Forms and Applications

Air Emission Inventory Forms
Construction and Operating Permit Applications
Low Emitter Forms
Open Burning Permit Applications
Permit-by-Rule Forms

Reports

Air Quality and Ethanol Production
Nebraska Air Quality Reports
Regional Haze Report
Technical Basis for Total Reduced Sulfur Standard

Other

Memo to the Ethanol Industry
Air Quality Compliance Calendar
Hazardous Air Pollutant List
Title 129 – Nebraska Air Quality Regulations (found under Rules and Regulations)
Air Waves Bulletin

APPENDIX B - Document Acronyms & Abbreviations

BACT	Best Available Control Technology
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DDGS	Dried Distillers Grain Solids
EPA	Environmental Protection Agency
H₂S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
MACT	Maximum Achievable Control Technology
MmBtu/hr	Million Btu per hour
MTBE	Methyl Tertiary Butyl Ether
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NDEQ	Nebraska Department of Environmental Quality
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NO₂	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standards
Pb	Lead
PM	Particulate Matter
PM₁₀	Particulate Matter with an aerodynamic diameter less than 10 microns
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
SIC	Standard Industrial Classification
SO₂	Sulfur Dioxide
SO₃	Sulfate
SOCMI	Synthetic Organic Chemical Manufacturing Industry
SO_x	Sulfur Oxides
tpy	Tons per Year
TRS	Total Reduced Sulfur
TSP	Total Suspended Particulate
VOC	Volatile Organic Compound
WDGS	Wet Distillers Grain Solids

APPENDIX C - Citations

- ¹ Ethanol Production in Minnesota Minnesota Pollution Control Agency. May 2002.
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- ² Homegrown for the Homeland - Ethanol Industry Outlook 2005 Renewable Fuels Association. February 2005. <<http://www.ethanolrfa.org/industry/outlook>> December 1, 2005.
- ³ Ethanol Production by State Nebraska Energy Office. November 8, 2005.
<<http://www.neo.ne.gov/statshtml/67.htm>> November 22, 2005.
- ⁴ Energy Policy Act of 2005 – Summary Burns and McDonnell. 2005.
- ⁵ Aspen Law & Business. *Clean Air Act Step-by-Step Compliance*. Aspen Publishers, Inc. (2003)
- ⁶ Air Emissions from Ethanol Plants: Recent Findings Minnesota Pollution Control Agency. May 2002.
<<http://www.pca.state.mn.us/air/publications/ag1-21.pdf>> June 17, 2002.
- ⁷ Letter from JoAnn Heiman, EPA Region 7, to James Pray, Brown, Winick, Graves, Gross, Baskerville, and Schoenebaum, P.L.C., re support facilities, (December 6, 2004).
<<http://www.epa.gov/Region7/programs/artd/air/nsr/nsrmemos/lincoln.pdf>>