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Enforcement Alert

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Protecting the Quality of Our Nation's Air

EPA Targets Air Pollution From Ethanol Facilities: VOC Emissions Higher Than Previously Believed

The United States Environmental Protection Agency (EPA), working closely with several state agencies, recently determined that ethanol facilities emit some air pollutants

in greater quantities than previously reported. These emission tests conducted by Minnesota, Indiana, and Illinois sources triggered concern because emissions of several criteria pollutants were much higher than permitted by those states and EPA. For example, volatile organic compound (VOC) emissions were found to be approximately 10 times higher than the limits in the facilities' permits and included at least 2 previously unidentified hazardous air pollutants (HAPs), acrolein and acetaldehyde. In addition, a recent test conducted by an Illinois source showed that carbon monoxide (CO) emissions were even higher than the VOC emissions. This led EPA to believe that ethanol facilities were failing to accurately estimate emissions from hundreds of process units and constructing or expanding other units without the installation of air pollution control technology required under the Clean Air Act (CAA). Originally, ethanol facilities were permitted with limits based on the emission characterizations of only ethanol and methanol; it was not until odor problems were identified by some state regulators that total volatile organic compounds (VOCs) were measured and analyzed.

Industry-wide, these uncontrolled facilities are "major sources" of air

pollution and are, therefore, subject to the CAA's New Source Review/Prevention of Significant Deterioration (NSR/PSD) requirements. In addition, certain New Source Performance Standards (NSPS) under the CAA apply. As such, the ethanol facilities should have applied for appropriate preconstruction and operating permits at the time they were constructed and they should have installed the required equipment to reduce emissions of air



About

Enforcement Alert

Enforcement Alert is published periodically by the EPA's Office of Regulatory Enforcement, Office of Enforcement and Compliance Assurance to inform and educate the public and regulated community about important environmental enforcement issues, recent trends, and significant enforcement actions.

This information should help the regulated community anticipate and prevent violations of federal environmental law that could otherwise lead to enforcement action. Reproduction and wide dissemination of this publication are encouraged. To receive this newsletter electronically, see <http://www.epa.gov/compliance/resources/newsletters/civil/enfalert/index.html>.

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Ethanol Process

Ethanol (also known as ethyl alcohol or grain alcohol) is a clear, colorless liquid made by fermenting and distilling a material, most commonly corn. In recent years, ethanol has been used primarily as an "oxygenate" for gasoline. Ethanol adds oxygen to gasoline, allowing the gasoline to burn more completely thereby creating less air pollution.

Ethanol production facilities can be characterized as wet mills or dry mills. Dry mill facilities are

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pollutants.

Recent EPA Enforcement Settlements With Ethanol Facilities

12 Minnesota Dry Mills

Once EPA determined that air emissions were not permitted, the Agency approached a number of ethanol producers to resolve these alleged violations. During the summer of 2002, 12 ethanol facilities in Minnesota entered into negotiations with EPA Region 5 and the U.S. Department of Justice (DOJ). Consent decrees for all 12 facilities were lodged on October 2, 2002. The settlement terms for the Minnesota facilities require that every facility install Best Available Control Technology (BACT) and meet BACT-level emission limits. As part of the settlement, each facility was allowed to decide whether it wanted to continue

to be a major source or whether it wanted to take an emissions cap that would keep it at "synthetic minor" source levels. Regardless of the facility's decision, the facility was required to install BACT. Of the 12 Minnesota facilities, 2 chose to remain major sources and will submit PSD permit applications under the terms of the consent decree. The 10 remaining facilities believe that with BACT-level controls they will be able to remain under synthetic minor source emission thresholds. All 12 will limit their HAP emissions under major source levels of 10 tons per year (tpy) for each pollutant and 24 tpy combined. All 12 sources currently have installed, or are in the process of installing, the required control equipment. These settlements will result in emission reductions of 2,400 tpy of VOCs (includes 250 tpy of HAPs); 2,000 tpy of CO; 180 tpy nitrogen oxides (NO_x); and 240 tpy particulate matter (PM) and PM-10. Each facility also paid a civil

penalty ranging from \$18,000 to \$42,000.

Archer Daniels Midland

Archer Daniels Midland Company (ADM) is the largest producer of ethanol in the United States supplying 50 percent of the market. ADM also produces other corn products including sweeteners, starch, oil, and meal from its 7 corn mills. ADM is thought to be the largest producer of domestic vegetable oils with 28 plants, where it employs a solvent extraction process to separate oils from soybeans, sunflowers, cottonseeds, peanuts, and canola. On April 9, 2003, DOJ, along with state and local government co-plaintiffs, and EPA, announced a landmark settlement with ADM that will cover operations at 52 facilities in 16 states. The settlement is the result of an unprecedented joint federal and state enforcement effort with



Proper Emissions Sampling from Ethanol Facilities

Because ethanol and methanol were originally thought to be the primary VOCs emitted from process units in this industry, previous testing was typically done using EPA Methods 18 or 308. These methods are used exclusively to quantify the emissions of specific VOCs.

Because of the complex nature of their organic compound emissions, ethanol facilities began using tests such as EPA Method 25 to quantify the emissions of all organic compounds. However, such methods only quantify the total mass of the carbon in the VOCs being emitted. Additional analysis is needed to convert that number to the total mass of VOCs being emitted.

EPA's Headquarters, Regions 5 and 7, and the Office of Air Quality Planning and Standards, in conjunction with companies experienced in stack testing for VOCs, created a method to quantify the average molecular weight-to-carbon weight ratio for each dryer tested. This method, now called the Midwest Scaling Method, involves the use of EPA Method 18 as well as portions of National Council of the Paper Industry for Air and Stream Improvement (NCASI) Methods 94.02 and 98.01. In addition, EPA simplified this method by identifying a handful of compounds deemed to have the most significant effect on the average molecular weight-to-carbon weight ratio. This ratio can be applied to the results of tests that quantify the emissions of organic carbon to yield the total VOC emission rate.

EPA has recently settled a number of VOC emission cases.



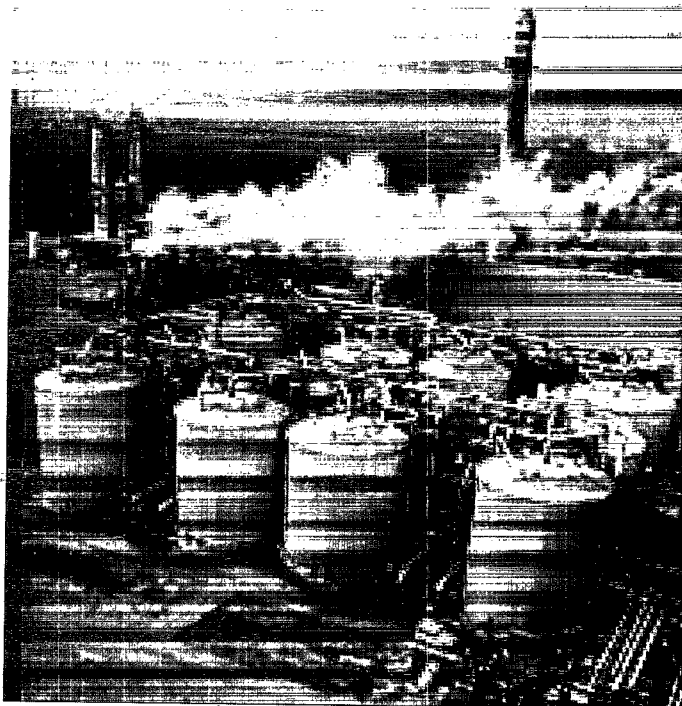
14 states and counties joining EPA to resolve these violations. This is the first major NSR/PSD settlement involving the grain and oilseed processing industry. Under the settlement, ADM will implement broad-sweeping environmental improvements at its facilities nationwide that will result in a total reduction of air pollutants of at least 63,000 tpy, including: 21,000 tpy of VOCs; 23,000 tpy of CO; 11,000 tpy of SO₂; 7,000 tpy of NO_x; and 1,000 tpy of PM. ADM will install BACT-level controls on a large number of units, shut down some of the oldest, dirtiest units, and take stringent emission limits on other units. ADM will pay a civil penalty of \$4.6 million, and implement an additional \$6.3 million worth of Supplemental Environmental Projects.

EPA Resolves to End Noncompliance in the Ethanol Industry

On June 3, 2002, EPA Region 5 hosted a meeting for ethanol facilities located in EPA Regions 5, 7, and 8. In addition to owners and operators of ethanol facilities, participants included management from the air program offices of the 3 EPA Regions, representatives from state program offices, an ethanol industry group, the Renewable Fuels Association, EPA's Office of Enforcement and Compliance Assurance, and DOJ. At the meeting, Region 5's Regional Administrator Tom Skinner outlined the issues of concern for ethanol facilities related to the proper characterization

of emissions. The Regional Administrator also described EPA's approach for resolving violations at ethanol facilities that would voluntarily approach EPA soon after the meeting. Although the message was delivered in Region 5, the industry-wide approach was coordinated with the affected Regions and EPA Headquarters and, as such, represented a national EPA undertaking.

Following that meeting, the Minnesota settlements were the first settlements reached, and the settlement with ADM followed shortly thereafter. EPA and the states continue to negotiate with other ethanol facilities across the country. EPA will ensure that environmental benefits are achieved by requiring that the ethanol industry come into compliance with the CAA as quickly as possible, and will ensure that there is consistency and a level playing field across the ethanol industry.



Ethanol Process/From p.1

usually dedicated to producing ethanol and are generally smaller than wet mills, which typically produce products in addition to ethanol. The ethanol production process can be broken down into three main process steps: feed preparation, fermentation, and purification.

During the fermentation process, leftover solids are generally processed further in a product dryer to make animal feed. Dryer emissions can contain nitrogen oxides, carbon monoxide, particulate matter, and a variety of VOCs such as ethanol, acetaldehyde, methanol, acrolein, acetic acid, and lactic acid. In addition, the VOCs emitted from dryers can contain up to 40 percent HAPs. It is these dryer emissions that have historically been underestimated by the ethanol industry.





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Useful Compliance Assistance Resources

Office of Enforcement and Compliance Assurance:

<http://www.epa.gov/compliance>

Office of Air and Radiation:

<http://www.epa.gov/oar/oaqps/>

Emission Factor and Inventory Group:

<http://www.epa.gov/ttn/chief/>

Air Enforcement Division:

[http://www.epa.gov/compliance/about/offices/
division/aed.html](http://www.epa.gov/compliance/about/offices/division/aed.html)

Archer Daniels Midland Settlement Agreement

[http://www.epa.gov/compliance/resources/
cases/civil/caa/admfs.pdf](http://www.epa.gov/compliance/resources/cases/civil/caa/admfs.pdf)

Minnesota Dry Mills Settlement Agreement

[http://www.epa.gov/compliance/resources/
decrees/civil/caa/mnenergycd.pdf](http://www.epa.gov/compliance/resources/decrees/civil/caa/mnenergycd.pdf)