

217/782-2113

CONSTRUCTION PERMIT

PERMITTEE

Adkins Energy, LLC
Attn: Todd Block
4350 West Galena Road
P.O. Box 227
Lena, Illinois 61048

Application No.: 03040053

I.D. No.: 177802AAA

Applicant's Designation: RTO

Date Received: April 17, 2003

Subject: Spent Grain Dryer changes and Afterburner

Date Issued:

Location: 4350 West Galena Road, Lena

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of a revised feed drying system with afterburner as described in the above-referenced application. This permit is subject to standard conditions attached hereto and the following special condition(s):

1.0 Feed Drying System and Afterburner

1.1 Description

A natural gas fired dryer will be used to prepare distillers dry grain and solubles (DDGS), a type of cattle feed, from wet cake produced by this ethanol plant. The dryer will be equipped with cyclones to control emissions of particulate matter. An afterburner will be used to control emissions of carbon monoxide (CO), volatile organic material (VOM), and hazardous air pollutants (HAP). An existing scrubber, located between the cyclones and afterburner, may also be used to control PM10 emissions. This control system will also control the associated feed cooler, which is exhausted through the dryer after passing through a baghouse for initial control of its PM10 emissions.

This new dryer system replaces the original dryer system installed at the plant, which was not equipped with an afterburner or other combustion-type control device. The shells of the original dryer and cooler are used in the new dryer system but other changes will be made, such as changes to ductwork to facilitate increased air circulation.

The afterburner controlling the new dryer system will be a regenerative thermal oxidizer (RTO). In an RTO, heat recovered from the afterburner exhaust gases is used to preheat the incoming vent stream to reduce fuel consumption in the afterburner. This is done by alternating the direction of gas flow through ceramic beds located next to the combustion chamber.

Adkins also plans to use the new afterburner as the principle control device for distillation process emissions, which are currently treated by the distillation scrubber. The distillation scrubber will not be removed from the plant and will continue to be used during periods when the afterburner is not available. The new afterburner would also be used to control VOM and HAP emissions from the existing centrifuges, which are used to mechanically separate water from the solids in the whole stillage and produce the wet cake.

1.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
EU0	Feed Dryer	Cyclones, Scrubber, Afterburner
EU0	Feed Cooler (Baghouse)	

1.3 Applicability Provisions and Applicable Regulations

- a. An "affected unit" for the purpose of these conditions is an emission unit described in Conditions 1.1 and 1.2.
- b. Affected units are subject to 35 IAC 212.321, which provide that:

No person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units ... at a source or premises, exceeds the allowable emission rates specified in 35 IAC 212.321(c).

- c. The emission of smoke or other particulate matter from the affected units shall not have an opacity greater than 30 percent. Compliance with this limit shall be determined by 6-minute averages of opacity measurements in accordance with USEPA Reference Method 9. [35 IAC 212.109 and 212.123(a)]

1.4 Non-Applicability of Regulations of Concern

- a. For the affected units, this permit does not address the applicability of 35 IAC 215.301 because the VOM emissions of the feed dryer are required to be controlled such that organic material emissions are less than 8.0 pounds/hour. (Refer to Condition 1.6(a))
- b. This permit does not rely upon the reductions in emissions that result from venting the centrifuges to the afterburner.

1.5 Operational and Production Limits and Work Practices

- a.
 - i. Natural gas shall be the only fuel fired in the feed dryer.
 - ii. The rated firing rate of the feed dryer shall not exceed 60 million Btu/hour.
 - iii. The feed dryer shall be equipped, operated, and maintained with low NO_x combustors.
- b.
 - i. Natural gas shall be the only fuel fired in the afterburner.
 - ii. The rated firing rate of the afterburner shall not exceed 8.0 million Btu/hour.
- c.
 - i. During operation of the feed dryer, the key operating parameter of the feed dryer/control system shall be maintained at levels that are consistent with levels at which emission testing demonstrated compliance with applicable requirements, including the following:
 - A. Maximum temperature at inlet of feed dryer: °F
 - B. Minimum Pressure drop across the cyclones: inches H₂O.
 - C. Minimum Water flow rate of the scrubber: gallon per minute.
 - D. Minimum pressure drop across the scrubber: inches H₂O.
 - ii. During periods when feed is present in the dryer or emissions from other units are vented to the afterburner, the minimum afterburner combustion chamber temperature shall be maintained at a temperature that is consistent with the temperature at which emission testing demonstrated compliance with applicable requirements.
 - iii. The combustion chamber of the afterburner shall be preheated to the manufacturer's recommended temperature or a temperature that is consistent with the most recent emission test in which compliance was demonstrated, prior to sending the wet cake to the feed dryer or venting other units to the afterburner.

- iv. Notwithstanding the above, for the purpose of evaluation of the control system and further emission testing, the Permittee may operate the control system at different operating parameters in accordance with a plan submitted to the Illinois EPA describing the evaluation and testing program.
- d.
 - i. When feed is present in the dryer, the dryer shall only be vented to the bypass stack for the afterburner as necessary for operating safety, e.g., purge of the dryer/afterburner system in the event of a burner flameout.
 - ii. Other units controlled by the afterburner shall be vented either to the afterburner or to their existing stacks.
- e.
 - i. During a scheduled shutdown of the feed dryer/afterburner, the transfer of the distillation process emissions to the distillation scrubber shall be accomplished prior to the shutdown of the afterburner.
 - ii. The Permittee shall maintain the distillation scrubber such that it can be readily operated to provide control of distillation process emissions, including operating the scrubber on a periodic basis if needed to reasonably ensure ready availability of the scrubber to control the distillation process.
- f. The Permittee shall operate and maintain the feed dryer and associated control system in accordance with written procedures developed and maintained by the Permittee.
- g.
 - i. If the initial emission testing or subsequent testing of the feed dryer/afterburner, which shows compliance, shows compliance with requirements for VOM emission by less than 20 percent of the permitted VOM emissions (e.g., afterburner control efficiency is only in the range of 95.0 to 96.0 percent) the Permittee shall implement a Control Improvement Program (Program) for the affected process with the objective of achieving compliance by a margin of at least 20 percent.
 - ii. The Permittee shall submit a copy of the Program to the Illinois EPA for its review and comments within 30 days after receiving test results that triggers this requirement for a Control Improvement Program (Program).

- iii. A. If the emission testing demonstrated that the compliance margin was between 10 and 20 percent, the Program shall be completed in one year.
 - B. If the emission testing demonstrated the compliance margin was less than 10 percent, the Program shall be completed in six months.
 - C. Following completion of the Program, the Permittee shall again test VOM emissions from the affected unit.
 - h. The Permittee shall obtain a Construction Permit from the Illinois EPA prior to physically removing the Venturi scrubber from the control system for the feed dryer.

1.6 Emission Limitations

- a.
 - i. The VOM emissions from the feed dryer shall be controlled by at least 95 weight percent or to a concentration of no more than 10 ppmv, whichever is less stringent.
 - ii. The CO emissions from the feed dryer shall be controlled by at least 90 weight percent or to an outlet concentration of no more than 100 ppmv, whichever is less stringent.
 - b. Emissions of the feed dryer/afterburner shall not exceed the following limits. These limits are based on information in the application, including the information from the dryer design and construction contractor based on previous dryer testing and proposed changes. These emission estimates include the maximum natural gas firing in the dryer and afterburner of 60 and 8 million Btu/hr, respectively. (See also Condition 1.12, addressing the Shakedown Period.)

Pollutant	Limitation	
	(Lb/Hr)	(Ton/Yr)
NO _x	8.0	35.04
CO	9.5	41.61
VOM	4.0	17.52
PM ₁₀	7.5	32.85
SO ₂	7.5	32.85

- c.
 - i. This permit is issued based on the source not being a major source for Hazardous Air Pollutants (HAP), so that this source is not subject to the requirements of Section 112(g) of the federal Clean Air Act.

- ii. A. The acetaldehyde emissions of the feed dryer/afterburner shall not exceed 0.5 lb/hr and 2.2 tons/yr.
- B. The emissions of individual HAPs, other than acetaldehyde, from the feed dryer/afterburner shall not exceed 1.45 lb/hr and 6.35 tons/yr.
- C. The emissions of total HAPs, other than acetaldehyde, from the feed dryer/afterburner shall not exceed 2.2 lb/hr and 9.65 tons/yr.

Note: These limits have been established in conjunction with limits for other units at the plant established in Operating Permit 03060057 to ensure that the plant is not a major source for HAPs.

1.7 Testing Requirements

- a. i. Within 60 days after achieving the maximum daily production rate at which the feed dryer will be operated, but not later than 180 days after initial startup, the Permittee shall have tests conducted as stated below, as follows, at its expense by an approved testing service while the feed dryer and cooler are operating at maximum dryer load and other representative operating conditions.

E M I S S I O N S					Efficiency	
PM	VOM	NO _x	CO	HAP	VOM	CO
X**	X*	X	X*	X	X***	X

* If the afterburner is not designed to provide 1.0 seconds residence time at 1600°F in the combustion zone, emission testing shall be conducted under two operating scenarios to evaluate compliance with the minimum combustion chamber temperature and minimum residence time at which the Permittee intends to normally operate the afterburner.

** Particulate matter tests shall be accompanied by measurements of condensable particulate matter, as collected in the back half of the Method 5 sampling train or by separate measurements using USEPA Method 202 (40 CFR Part 51, Appendix M).

*** Efficiency testing need not be performed if the Permittee is demonstrating compliance based on the concentration of VOM in the exhaust, provided however that test ports for testing of the inlet emissions shall still be present.

- ii. Notwithstanding above, this period of time may be extended by the Illinois EPA upon written request by the Permittee as needed to reasonably accommodate unforeseen difficulties in the shakedown of the plant.
 - iii. In addition to the emission testing required above, the Permittee shall perform emission tests as requested by the Illinois EPA for an emission unit within 45 days of a written request by the Illinois EPA or such later date agreed to by the Illinois EPA.
- b. The following methods and procedures shall be used for testing of emissions, unless another method is approved by the USEPA or Illinois EPA. Refer to 40 CFR 60, Appendix A, for USEPA test methods.

Location of Sample Points	USEPA Method 1
Gas Flow and Velocity	USEPA Method 2
Flue Gas Weight	USEPA Method 3
Moisture	USEPA Method 4
Particulate Matter	USEPA Method 5
Volatile Organic Material	USEPA Method 18 and 25/25A*
Carbon Monoxide	USEPA Method 10
Nitrogen Oxides	USEPA Method 19
Hazardous Air Pollutants	USEPA Method 18*

* Testing shall also be conducted in accordance with industry-specific guidance from USEPA on testing VOM and HAP emissions at ethanol plants.

- c. The following measurements shall also be made during emission testing based on representative sampling and analysis:
- i. Amount of water in wet cake as entering the dryer and in dry feed as leaving the dryer, lb water/lb material.
 - ii. Calculated amount of water removed in the feed dryer, lb/hour.
- d. At least 60 days prior to the actual date of testing, a written test plan shall be submitted to the Compliance Section of the Division of Air Pollution Control for review. This plan shall describe the specific procedures for testing, including as a minimum:

- i. The person(s) who will be performing sampling and analysis and their experience with similar tests.
 - ii. The specific conditions under which testing will be performed, including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for the emission unit and any control equipment will be determined.
 - iii. The specific determinations of emissions and operation that is intended to be made, including sampling and monitoring locations.
 - iv. The test method(s) that will be used, with the specific analysis method, if the method can be used with different analysis methods.
- e. The Illinois EPA shall be notified prior to these tests to enable the Illinois EPA to observe these tests. Notification of the expected date of testing shall be submitted a minimum of 30 days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of 5 working days prior to the actual date of the test. The Illinois EPA may at its discretion accept notifications with shorter advance notice provided that the Illinois EPA will not accept such notifications if it interferes with the Illinois EPA's ability to observe testing.
- f. Copies of the Final Report(s) for these tests shall be submitted to the Illinois EPA within 14 days after the test results are compiled and finalized but no later than 45 days after completion of sampling. The Final Report shall include as a minimum:
- i. A summary of results.
 - ii. General information.
 - iii. Description of test method(s), including description of sampling points, sampling train, analysis equipment, and test schedule.
 - iv. Detailed description of test conditions, including:
 - A. Plant operating rates, i.e., ethanol and feed production rate.
 - B. Dryer system operating information, i.e., feed rate, inlet and outlet temperatures.

- C. Amount of water removed in the feed dryer, lb/hr, with supporting calculations.
- D. Operating parameters of control system during testing.
- v. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration.
- g. Copies of emission test reports shall be retained for at least five years after the date that an emission test is superseded by a more recent test.

1.8 Monitoring Requirements

- a. The Permittee shall install, operate, and maintain the following monitoring devices, which shall be operated at all times that the feed dryer is in operation:
 - i. Inlet temperature and outlet temperature of the feed dryer.
 - ii. Differential pressure (pressure drop) across the cyclones.
 - iii. Combustion chamber temperature of the afterburner.
- b. The Permittee shall install, operate, and maintain devices to monitor the valve or damper position on the flow control devices directing the various exhaust streams to the afterburner, which shall be operated at all times that the plant is in operation. The position of these valves shall be monitored electronically by the plant operating system.

1.9 Recordkeeping Requirements

The Permittee shall maintain records of the following items:

- a. Design information for the feed dryer/afterburner:
 - i. The design heat input of the feed dryer.
 - ii. Moisture removal capacity, lb water/hour.
 - iii. The design heat input of the afterburner, Btu/hr.
- b. Operating records for affected units
Feed production as shipped (wet feed: tons/month, and dry feed: tons/month).

- c. The Permittee shall keep an operation log and a log for inspection, maintenance, and repairs for the feed dryer and associated control system, including the time when feed is present in the dryer, the afterburner is not in operation, or the afterburner is by passed.
- d. An operating log and a log for inspection, maintenance, and repairs for distillation process and centrifuges. The operating log shall include detailed information for each period when emissions are not vented to the afterburner, including the period of times when distillation emissions are vented through the bypass stack and the distillation scrubber when operating at less than its full capability, if any.
- e. Records for venting the feed dryer through the bypass stack and upsets in feed dryer operations or other operations that could generate additional emissions, with a description of the incident, an estimate of the additional CO, VOM and HAP emissions that occurred, with supporting calculations and background information.
- f. Monthly and annual NO_x, CO, PM, SO₂, and VOM emissions from the feed dryer/afterburner, with supporting calculations.
- g. All records and logs required by this permit shall be retained at readily accessible location at the source for at least three years from the date of entry and shall be available for inspection by the Illinois EPA upon request. Any records retained in electronic format (e.g., computer) shall be capable of being retrieved and printed on paper during normal source office hours so as to be able to respond to an Illinois EPA request for records during the course of a source inspection.

1.10 Reporting Requirements

- a. The Permittee shall promptly notify the Illinois EPA of any deviations from the requirements of this permit for the affected units as follows. These notifications shall include the information specified by Condition 1.10(b).
 - i. If there is an exceedance of applicable requirements for the afterburner, as determined by the monitoring required by Condition 1.8 that lasts longer than two hours, the Permittee shall immediately notify the Illinois EPA.
 - ii. The deviations addressed above and all other deviations shall be reported with the quarterly compliance report.

- iii. If there is any deviation of the requirements of this permit, not addressed by the above reporting requirements, as determined by the records required by this permit or by other means, the Permittee shall submit a report with the quarterly compliance report.
 - iv. Notwithstanding the above, if a deviation will occur from required maintenance, repair or other activity that can be scheduled in advance, the Permittee shall also notify the Illinois EPA prior to undertaking such activity that if it is feasible to do so. Such notification shall be submitted at least 5 days in advance unless the activity is scheduled less than 5 days in advance.
- b. i. Reports of deviations shall include the following information:
- A. Identify the deviation, with date, time, duration and description.
 - B. Describe the effect of the deviation on compliance, with an estimate of the excess emissions that accompanied the deviation, if any.
 - C. Describe the probable cause of such deviations and any corrective actions or preventive measures taken:
- ii. If there are no deviations during the calendar quarter, the Permittee shall still submit a compliance report, which report shall state that no deviations occurred during the reporting period.
- c. Quarterly compliance report shall be submitted no later than 45 days after the preceding calendar quarter. This report shall also provide a listing of all deviations for which immediate or 30-day reporting was required, but need not include copies of the previously submitted information.
- d. Two copies of required reports and notifications concerning equipment operation or repairs, performance testing, or a continuous monitoring system shall be sent to:

Illinois Environmental Protection Agency
Division of Air Pollution Control
Compliance Enforcement Section (#40)
P.O. Box 19276
Springfield, Illinois 62794-9276

and one copy shall be sent to the Illinois EPA's regional office at the following address unless otherwise indicated:

Illinois Environmental Protection Agency
Division of Air Pollution Control
5415 North University
Peoria, Illinois 61614

1.11 Compliance Procedures

- a. Compliance with the emission limits of Condition 1.6(b) shall be based on the records required by Conditions 1.8 and 1.9 and appropriate emission factors.
- b. For VOM and CO emissions from the feed dryer/afterburner cooler, periods of excess emissions shall include any 1-hour period in which the average combustion chamber temperature, when process units controlled by the afterburner are operating, was more than 50°F below the temperature during testing that demonstrated compliance with applicable requirements.

1.12 Authorization to Operate

- a.
 - i. Under this permit, the feed drying system may be operated for a period of 180 days from initial startup of the feed dryer to allow for equipment shakedown and emission testing as required.
 - A. Notwithstanding above, this period of time may be extended by the Illinois EPA for up to an additional 180 days upon written request by the Permittee as needed to reasonably accommodate unforeseen difficulties in the shakedown of the plant provided that results of preliminary emission testing for VOM and CO have been provided to the Illinois EPA.
 - B. For this purpose, startup of the feed drying system shall be considered the first time that wet feed is processed in the dryer.
 - ii. Upon completion of emission testing, the feed drying system may be operated for an additional period of 45 days.
 - iii. Upon successful completion of emission testing of the feed drying system demonstrating compliance with applicable limitations, the Permittee may continue to operate feed dryer and associated equipment for additional period of 180 days.

- b.
 - i. The afterburner shall be designed so that an initial startup and basic shakedown of the afterburner can be completed before initial startup of the feed drying system.
 - ii. The shakedown of the afterburner for control of emissions from the distillation process and the centrifuges shall not be begun until reliable operation of the feed dryer and afterburner has been demonstrated. During this shakedown, if necessary to provide for immediate availability of the scrubber during upset of the afterburner, the Permittee shall continue to operate the distillation scrubber at a minimum level until such time as shakedown is completed and reliable operation of the feed dryer, distillation process and afterburner has been demonstrated.
- c. The specific operating requirements in Condition 1.5(c) and the hourly emission limitations in Condition 1.6(b) are not effective during shakedown of the feed dryer/afterburner. During shakedown of the feed dryer, the Permittee shall operate the feed dryer and associated control equipment to the extent reasonably practicable to control emissions. The emissions of the feed dryer/afterburner shall not exceed the following limitations during each day and calendar month. For this purpose, unless extended in writing by the Illinois EPA based on a showing by the Permittee, the shakedown period shall end on the last day of the fifth complete month after the feed dryer first processes wet cake or the date that emissions testing is performed, whichever occurs first.

Pollutant	Limitations	
	(Lb/Hr)	(Ton/Month)
NO _x	192	2.98
CO	228	3.53
VOM	96	1.49
PM ₁₀	180	2.79
SO ₂	180	2.79
Acetaldehyde	24	0.37

- d. Notification and Reporting
 - i. The Permittee shall provide the Illinois EPA 30 days advance notification prior to start up of the feed dryer/afterburner to allow for inspection.
 - ii. The Permittee shall provide the Illinois EPA immediate notification of any event(s) that disrupts the orderly shakedown of the feed dryer/afterburner.

- iii. The Permittee shall provide monthly progress reports to the Illinois EPA that include the following:
 - A. Overall operating level (gallons ethanol produced), feed production, and percent feed dried;
 - B. Emissions from the feed dryer/afterburner, with supporting calculations;
 - C. Activities accomplished/significant events;
 - D. Current schedule for emission testing;
 - E. A summary of any emission measurements conducted at the plant; and
 - F. Outreach activities planned/provided for local communities or interested parties.
 - iv. The Permittee shall provide the Illinois EPA notice as to when shakedown of the feed dryer is considered complete.
- 1.13 a. This approval to construct does not relieve the Permittee of the responsibility to comply with all Local, State and Federal Regulations which are part of the applicable Illinois State Implementation Plan, as well as all other applicable Federal, State and Local requirements.
- b. In particular this permit does not excuse the Permittee from the obligation to undertake further actions at the source as may be needed to eliminate air pollution, including nuisance due to odors, such as raising the height of stacks, installing back-up control system, or altering process conditions in the dryer.

If you have any questions on this permit, please call Minesh Patel at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

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cc: Region 2