

Malfunction Abatement Plan

The Andersons Albion Ethanol LLC

The Andersons Albion Ethanol LLC
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Malfunction Abatement Key Personnel

Maintenance Manager.....Ralph Ramon
Plant Manager.....Doug DeLand
Production Manager.....Harley Darnell
Manager, Safety, Environmental, & Regulatory Compliance.....David Iverson
Manager, Quality Assurance & LaboratoryCatherine Woodliff
Ethanol Safety Administrator.....Evan Dankert

The Andersons Albion Ethanol LLC plant in Albion, Michigan is intended to operate continuously (24 hours per day) following their Standard Operating Procedures (SOP). An analysis of the chemical hazards involved with the production of fuel ethanol has also been performed and is addressed in the Process Safety Management (PSM) program.

The malfunction abatement plan describes the potential emission sources and the preventative maintenance in place to minimize the possibility of malfunctions. In the event that a malfunction occurs at the facility, the response portion of this plan will be implemented.

I. Possible Sources of Emissions and Controls

The various emission units at the plant and their emission characteristics are described below. Potential emissions from Albion Ethanol will be controlled by handling procedures, inventory management, abatement equipment (e.g. pressurized vessel for anhydrous ammonia, floating roof tanks for ethanol storage, etc.), and control equipment (e.g. wet scrubbers).

Ethanol Plant Corn Handling – Corn will be unloaded from trucks into dump pits (located both at the grain elevator and at the ethanol plant). The ethanol plant has two permanent storage bins that will feed eight hammer mills. Dust collection systems have been installed on the grain receiving and handling systems with pickups on each pit, conveyor, elevator, and bin to limit particulate emissions to the atmosphere. Ground grain from the hammer mills will be conveyed to a slurry tank within the process building. The particulate matter generated from the hammermilling processes will be collected and controlled using baghouses.

Fermentation Process and Vessels – The fermentation process uses a mixture of corn, yeast, and water to ferment grain alcohol (ethanol). The yeast in the mixture aids in converting corn sugars to ethanol and carbon dioxide. The fermentation process is performed in large batch process vessels, called fermenters. Emissions from fermentation are ethanol and a variety of trace volatile organic compounds (VOC), produced as part of the grain fermentation process. The evolved carbon dioxide (CO₂) can serve as a carrier of the organic compounds. The fermentation equipment is controlled with high efficiency scrubbers. The scrubbers' capture efficiency will negate potential emissions impacts.

Dried Distiller Grains and Solubles (DDGS) Dryers – The DDGS dryers are used in series with a centrifuge and process evaporator to dry the spent grains (also known as DDGS) from the distillation process. The DDGS dryers are natural gas fired rotary drum dryers that use hot air to evaporate the water from the DDGS. Emissions include a variety of VOC and particulate matter inherent with the grain drying process. These air emissions are controlled through two thermal oxidizer/heat recovery steam generator units.

Methanator – The biomethanator unit is an anaerobic biological water treatment system that converts organic material in the process water into fuel gas (primarily methane) which supplements the fuel gas for the dryer. When the dryer is not in operation, the methane is routed to the bio-methanator's high efficiency flare system.

Dried Distiller Grains and Solubles (DDGS) Cooling & Loadout – Upon leaving the dryers, the DDGS must be cooled prior to storage and load-out. DDGS is pneumatically conveyed to a storage area to cool and be readied for shipment via truck or railcar. DDGS is cooled using a cooling cyclone, emissions from which are controlled by a high efficiency baghouse. Loadout occurs in a shed adjacent to the storage building. The DDGS is transferred to the truck or railcar via a traveling conveyor. Both trucks and railcars are loaded in the shed. DDGS loadout is ventilated to a high efficiency baghouse for PM and PM10 emission control.

Storage Tanks and Ethanol Loading facilities – Onsite storage tanks are used to store fuel-grade denatured ethanol, 190 and 200 proof ethanol, and denaturant (natural gasoline). Emissions from these tanks include various VOCs and ethanol. Any potential VOC emissions from the storage tanks are minimized by internal floating roofs according to Federal New Source Performance Standards (NSPS). Emission control at the truck and rail loadouts is by a high efficiency flare system.

Grain Elevator (Receiving, Drying, Internal Handling, Shipping) – Grain is received, dried, handled, and shipped from the grain elevator located adjacent to the ethanol plant. To limit particulate emissions to the atmosphere, internal handling is enclosed, the particulate matter generated from grain receiving is collected and controlled using a baghouse, grain shipping uses telescoping spouts, and the grain dryer utilizes perforation plate technology.

Combined Heat and Power System (CHP) – This system is used to generate electricity and steam for use at this facility. The CHP system consists of a combustion turbine and a duct burner with a heat recovery system generator

(HRSG) to generate steam from the heat provided by the turbine exhaust and/or the heat provided by the duct burner.

II. Maintenance Schedules for Maintaining Process and Control Equipment

The maintenance manager is responsible for overseeing the inspection, maintenance, and repair of air cleaning devices at this facility.

Daily operational checks as well as weekly, monthly and quarterly maintenance schedules are performed and recorded based on the air operating permit requirements and manufacturer specifications. These schedules are managed according to operation and maintenance plans and Best Management Practices as summarized below.

Process/Air Cleaning Devices	Frequency of Inspections	
Elevator Receiving Baghouse	Magnehelic Gauge = Daily	Visual = Monthly
Ethanol Corn Receiving Baghouse C-20	Magnehelic Gauge = Daily	Visual = Monthly
Corn Milling Baghouse C-30	Magnehelic Gauge = Daily	Visual = Monthly
Corn Milling Baghouse C-30A-1	Magnehelic Gauge = Daily	Visual = Monthly
Corn Milling Baghouse C-30A-2	Magnehelic Gauge = Daily	Visual = Monthly
Corn Milling Baghouse C-30A-3	Magnehelic Gauge = Daily	Visual = Monthly
Corn Milling Baghouse C-30A-4	Magnehelic Gauge = Daily	Visual = Monthly
DDG Cooling Drum Baghouse C-70A	Magnehelic Gauge = Daily	Visual = Monthly
DDG Loadout Baghouse P-90 & P-91	Magnehelic Gauge = Daily	Visual = Monthly
Loadout Flare P-50	Heat = Weekly	
Thermal Oxidizer C-10	Temperature = Continuous	Visual = Monthly
Thermal Oxidizer C-10A	Temperature = Continuous	Visual = Monthly
CO2 Scrubber C-40	Pressure = Weekly	Water Flow = Weekly
CO2 Scrubber C-40A	Pressure = Weekly	Water Flow = Weekly
Purge Scrubber C-120	Pressure = Weekly	Water Flow = Weekly
Combined Heat & Power System (CHP)	4,000 hours (see attached Appendix II)	8,000 hours (see attached Appendix II)

The following items must be maintained for each applicable unit:

- Record magnehelic gauge readings daily
- Record status of drive motors, conveyors, and fans weekly
- Record water pump status, liquid levels, differential pressure, and water flow rate weekly
- Review control systems, circulation pump operation and packing, and the mechanical components of the conveyors monthly
- Check baghouses and perform inspections quarterly

Monthly visible emissions observations will be recorded for the following control equipment:

- Ethanol grain handling baghouse vent
- DDGS cooling drum baghouse vent
- DDGS loadout baghouse vents
- Grain elevator dryer
- Grain elevator receiving baghouse vent
- Corn Milling baghouse vents
- Thermal Oxidizer stacks

Replacement Parts Kept on Site for Major Air Cleaning Devices:

Dust Filters	Flares	RTOs	Scrubbers
Complete set of replacement dust bags	Thermocouple unit	Complete set of replacement belts	Complete replacement pump
Complete set of replacement drive belts	PLC input and output card	Set of replacement fuses	Replacement pump motor
Set of replacement fuses	Temperature switch	Set of replacement drive bearings	Valve positioner
Set of replacement wiper tips for airlock	Flamer Scanner		Valve I/P controller
Replacement seals for fans	Flame relay		
	Flame amplifier		
	Pilot spark plug		
	Pilot insulator		
	Solenoid valve (for vapor line)		
	Bailey blower and drive		

Air Cleaning Device Operating Variables:

Dust Filters	Flares	RTOs	Scrubbers
Magnehelic gauge - If over 8" differential pressure, change bags. If notice visible emissions, change bags.	Flare is either on or off. When on, time/heat is recorded. If off, material loadout shuts off.	Must maintain a minimum temperature of 1400°F or not less than 50°F below the average temperature during the last stack test	Low water level of 25% and high water level of 65%. Minimum scrubber flowrate of 55 gpm or determined during last stack test

III. Equipment Failure and Response

The following steps will be taken in the event of process or control equipment failure:

Response Issues:

- Source of emissions determination: Is the plant operating normally? If not, the facility will use the alarms and recorder data to determine the source of the potential abnormal process condition and evaluate it for the source of emissions from the facility. Notify the Maintenance Manager; Plant Manager; Manager, Safety, Health, & Regulatory Compliance; Manager, Quality Assurance & Laboratory; and Ethanol Safety Administrator after checking the operational status of the facility.
- If the emission is caused by the facility, the Maintenance Manager will take corrective action.
- If, with the approval of the facility manager, the abnormal operating conditions cannot be corrected within a reasonable time period, then a shut down of the emission source may be initiated.
- Along with the Maintenance Manager, the other Malfunction Abatement Key Personnel, will determine what steps are necessary (e.g. additional training, change in procedure, etc.) to prevent a repeat occurrence of the same problem.

Ethanol Plant Corn Handling

The corn handling equipment shall not operate unless the associated baghouse is maintained and operating correctly.

DDGS Cooling Drum

The DDGS cooling drum and associated equipment shall not operate unless the baghouse is maintained and operating correctly.

DDGS Loadout

The DDGS loadout equipment shall not operate unless the baghouses are maintained and operating correctly.

Methanator/DDGS Dryer/Thermal Oxidizers

The methanator shall not operate unless the off-gases are routed to the dryers, thermal oxidizers or methanator flare. While off gases are being routed, the control devices shall be maintained and operating correctly. If the dryer/thermal oxidizers or dryer multi-cyclones are not operating, the facility will produce a wet cake at a rate limited by the storage limit in our air permit.

Cooling Water

The cooling water equipment shall not operate unless it is maintained and operating correctly.

Grain Elevator

No emissions units at the elevator shall operate unless the program for continuous fugitive emissions control in appendix B of the air permit has been implemented and maintained.

Corn Milling

The milling equipment shall not operate unless the associated baghouses are maintained and operating correctly.

Fermentation Vessels

If there were a failure or malfunction of the CO₂ scrubbers, fermentation continues for up to 48 hours for batch completion. However, fermentation would be suspended immediately thereafter, until the scrubbers are operable.

Ethanol Loadout

The ethanol loadout equipment shall not operate unless the control equipment (flare) is maintained and operating correctly.

Combined heat and power system

The CHP shall not operate unless the SoLoNO_x dry low NO_x burner is installed, maintained, and operating correctly.

IV. Record Keeping

- The plant electronic or written logs will also serve as the record of compliance. Such records may include work orders or revised procedures for maintenance of process and/or control operations.
- The Andersons Albion Ethanol LLC shall keep and maintain all records as required by the air permit at the facility for a minimum of 5 years.