



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604**

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Ingredion Incorporated, Bedford Park, Illinois

FROM: Victoria Nelson, Environmental Engineer
AECAB (MI/WI)

THRU: Sarah Marshall, Section Supervisor
AECAB (MI/WI)

TO: File

BASIC INFORMATION

Facility Name: Ingredion Incorporated (Ingredion)

Facility Location: 6400 South Archer Avenue, Bedford Park, Illinois

Date of Inspection: June 6, 2023

EPA Inspectors:

1. Victoria Nelson, Environmental Engineer
2. Veronica Fischer, Environmental Engineer
3. Dakota Prentice, Environmental Engineer

Other Attendees:

1. Rob Mead, Ingredion, Manager of Environmental and Regulatory Affairs
2. Rafael Caleffi, Ingredion, Plant Manager

Contact Email Address: Rob Mead – Robert.mead@ingredion.com

Purpose of Inspection: To evaluate compliance with the Clean Air Act, the Illinois State Implementation Plan, and the facility's construction and Title V permits

Facility Type: Corn Wet Mill, Corn Oil Extraction, and Starch Processing

Regulations Central to Inspection: National Emission Standards for Hazardous Air Pollutants: Solvent Extraction for Vegetable Oil Production, at 40 C.F.R. Part 63, Subpart GGGG

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Arrival Time: 10:00 AM Central Time
Departure Time: 2:15 PM Central Time

Inspection Type:

- ☒ Unannounced Inspection
- ☐ Announced Inspection

OPENING CONFERENCE

- ☒ Presented Credentials
- ☒ Stated authority and purpose of inspection
- ☒ Small Business Resource Information Sheet not provided. Reason: Not a small business.
- ☒ Provided CBI warning to facility

The following information was obtained verbally from Rob Mead unless otherwise noted.

Process Description:

At its Bedford Park facility, Ingredion operates a corn wet mill, produces industrial and food-grade starches, extracts and refines corn oil, and manufactures high fructose corn syrup and dextrose. Co-products from the corn wet mill include corn gluten meal and fiber that are sold as animal feed.

At the corn wet mill, corn is steeped in a sulfurous acid solution to soften the kernel and make it easier to separate corn into its base components. Steeping occurs in semi-continuous batches at three tank batteries (33 tanks total) with counter-current flow of steepwater. The steep tanks are housed in a building and emissions are routed to the atmosphere. The corn parts, including germ, gluten, fiber, and starch, are separated through a series of mechanical separation steps. Ingredion buys additional germ from off-site suppliers to support production. Once separated, germ, gluten, and fiber are dried. The fiber and germ dryers vent to a thermal oxidizer. The thermal oxidizer vents to the gluten dryer. Emissions from the gluten dryer vent to a caustic scrubber. Starch drying is controlled by a wet scrubber. Separated starch is further refined at other process areas on-site to manufacture industrial starch products, high fructose corn syrup, and liquid and anhydrous dextrose.

Separated germ goes to the corn oil extraction process on-site. Germ from the wet mill is stored on-site prior to preparation for the extraction process. Four lines crack and roll germ. The prepped germ then goes to the extraction unit where n-hexane is used as solvent. A mineral oil scrubber is used to control n-hexane emissions from the extraction process. Following extraction, the germ flake goes to the desolventizer, toaster, dryer, and cooler system (DTDC). After the DTDC, the germ flake is ground, dewatered, and dried. The meal grinder and dryer are vented to atmosphere. The germ meal is sold as animal feed.

Staff Interview: Ingredion's "Argo" Plant in Bedford Park, Illinois has 420 employees and operates 24 hours a day, 7 days a week. Light steepwater from the wet mill is used to fortify the

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germ and fiber animal feed co-products for additional nutritional value. The steeping process generates acrolein, acetaldehyde, ethanol, methanol, and other organic acids.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:

EPA inspectors toured the corn oil refining operation and screened external stacks for hydrocarbon emissions using optical gas imaging. EPA observed hydrocarbon emissions from the dryer cooler unit downstream of the extraction unit. The stack vents to atmosphere from the baghouse controlling the dryer cooler.

EPA inspectors also toured the building where steeping is contained. On the top floor of the building, the tops of the steep tanks are accessible. EPA inspectors were carrying a Forensics Detectors single gas monitor that alarmed when inspectors exited the stairwell and walked a few feet onto the top floor. EPA inspectors returned to the stairwell immediately and proceeded to the exit of the building. The single gas monitor alarmed a second time when a door to the stairwell opened at the third floor and two operators exited.

On August 3, 2023, following the inspection, Robert Mead from Ingredion communicated to EPA that Ingredion conducted industrial hygiene measurements in the steep building. Ingredion told EPA that the industrial hygiene sampling did not detect ethylene oxide.

Photos and/or Videos: were taken during the inspection.

EPA inspectors collected video recordings using optical gas imaging. *See Appendix A: Video Log.*

Field Measurements: were not taken during this inspection.

See Appendix B: Field Measurement Data. During the inspection, EPA inspectors carried a Forensics Detectors single gas detector calibrated for ethylene oxide.

RECORDS REVIEW

1. Facility process flow diagram

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Requested documents:

- Facility process flow diagram
- Copies of recent construction permits
- Copy of the most recent Title V permit

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- 2015 Fiber Dryer Thermal Oxidizer Stack Test
- Specification Sheet for Steepwater
- Emissions estimate for fiber storage
- Annual emissions calculations for 2021 and 2022
- Solvent loss calculations for the last three years
- Cooling water sampling reports
- Additional information on acidulation

Concerns: EPA inspectors observed hydrocarbon emissions from the meal grinder stack following the solvent extraction unit.

Additionally, EPA noted concerns with the personal monitor readings observed at the top level of the building housing the steep tanks. EPA inspectors experienced difficulty breathing in this area of the facility.

DIGITAL SIGNATURES

Report Author: **VICTORIA NELSON** Digitally signed by
VICTORIA NELSON
Date: 2023.08.04
08:09:37 -05'00'

Section Supervisor: **SARAH MARSHALL** Digitally signed by
SARAH MARSHALL
Date: 2023.08.04
08:26:18 -05'00'

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APPENDICES AND ATTACHMENTS

1. Appendix A: Video Log
2. Appendix B: Field Measurement Data

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CONFIDENTIAL BUSINESS INFORMATION ATTACHMENT

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Ingredion claimed the seven FLIR videos as Confidential Business Information.

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APPENDIX A: VIDEO LOG

1. Inspector Name: Victoria Nelson	2. Archival Record Location: Region 5 Electronic Records Center
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Video Number	File Name	Date	Description of Image
1	SEQ_2967.avi	6/6/2023	Germ preparation scrubber stacks with potential hydrocarbon emissions.
2	SEQ_2968.avi	6/6/2023	Germ meal dryer/cooler baghouse stack with hydrocarbon emissions.
3	SEQ_2969.avi	6/6/2023	Mineral oil scrubber stack with hydrocarbon emissions.
4	SEQ_2970.avi	6/6/2023	Building exhaust fan with potential hydrocarbon emissions.
5	SEQ_2971.avi	6/6/2023	Feed, fiber, and germ dryer stacks
6	SEQ_2972.avi	6/6/2023	Non-contact cooling water tower with potential hydrocarbon emissions.
7	SEQ_2973.avi	6/6/2023	Starch C Dryer scrubber stacks in the foreground.

APPENDIX B: FIELD MEASUREMENT DATA

EPA inspectors toured the facility with a Forensics Detectors single gas detector calibrated for ethylene oxide with identification number B39144. The personal monitor is an electrochemical cell that can measure up to 20 ppm. The monitor was calibrated on February 28, 2023.

At the top (fourth) floor of the building where steeping is housed, the monitor alarmed and showed a reading of 8.3 ppm. While in the stairwell of the same building, the monitor alarmed a second time and measured 6.0 ppm when a door to the third floor was opened and two operators entered the stairwell. The personal monitor might have cross-sensitivity with carbon dioxide and acetaldehyde.