

COLLABORATION LEADS TO EVAPORATOR OPTIMIZATION

A HUSKER-SUEZ VALUE STORY



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Agenda

- **COLLABORATION**
- **HUSKER'S EXPECTATIONS/GOALS**
- **RESULTS**
- **ADDITIONAL OPPORTUNITIES**

Collaboration Process



The Two Collaborators

HUSKER AG – PRODUCER

- **STARTED IN 2003 – 20 MMGY – NOW 40**
- **EXPANDED IN 2007 – 40 MMGY – NOW 73**
- **TWO SEPARATE ICM DESIGNED PLANTS.**
 - Early ICM design with 3 evaps
 - Traditional 8 vessel double effect design

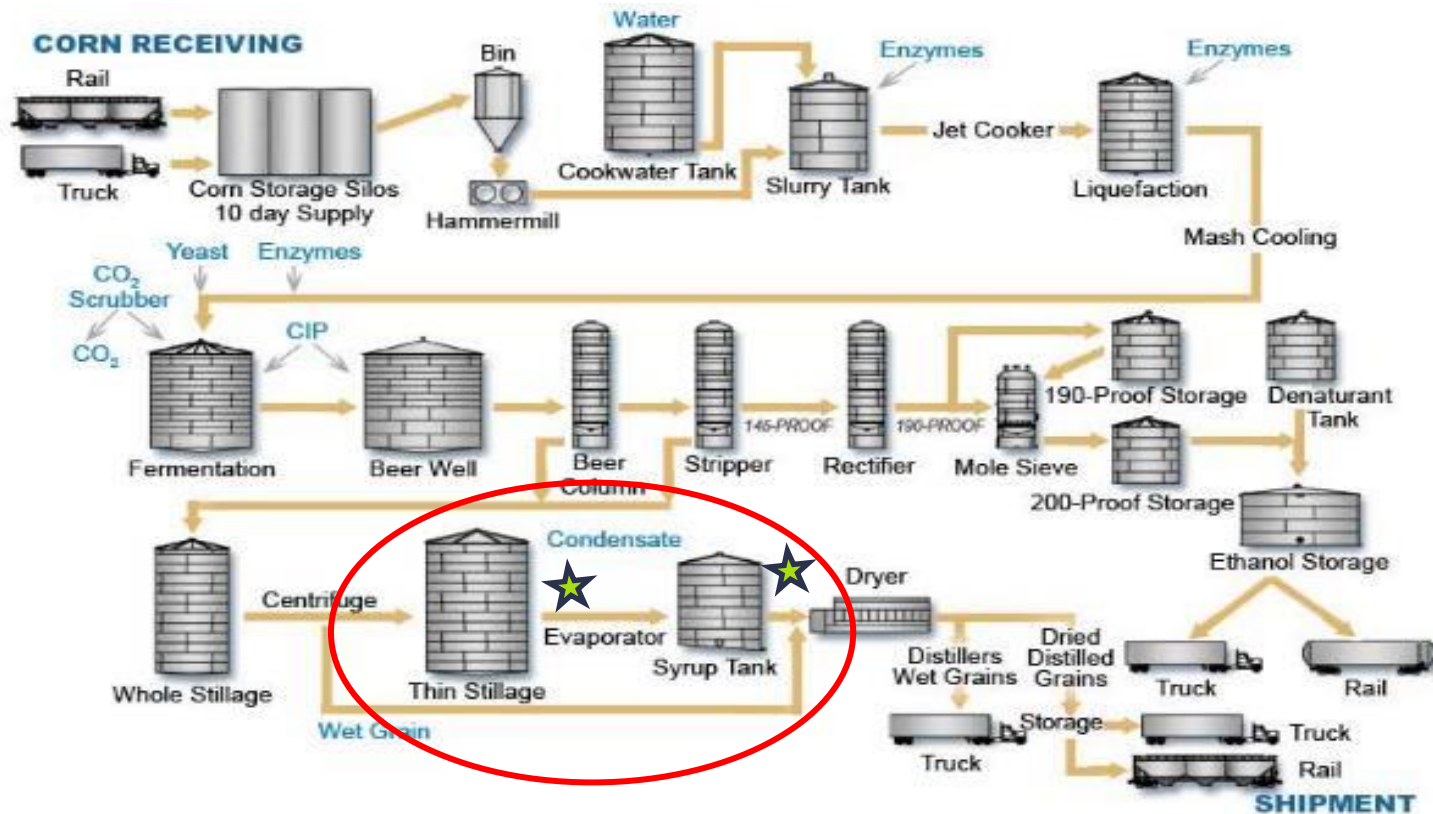


SUEZ – SOLUTIONS PROVIDER (PROCESS & UTILITIES)

- **BETZ**
- **BETZDEARBORN**
- **GE BETZ**
- **GE WATER & PROCESS TECHNOLOGIES**
- **SUEZ WATER TECHNOLOGIES & SOLUTIONS**
- **COMING → VEOLIA**



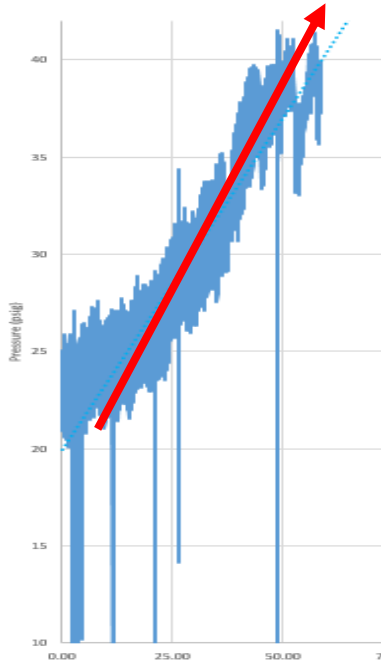
Huskers Ag's Process & Challenged Area



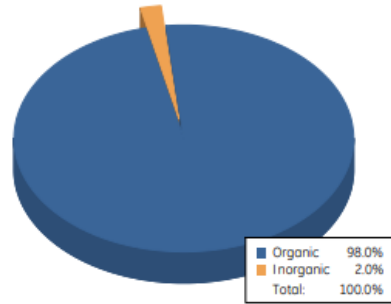
Husker Ag's Goals – Why?

- **LONGER RUN TIMES BETWEEN SHUTDOWNS**
 - **RELIABILITY & MAXIMIZED EFFECTIVENESS OF PROCESS**
- **REDUCED CIP CHEMICAL USAGE**
- **REDUCED EHS SAFETY EXPOSURES**
 - **HYDRO BLASTING AND CIP'S**
- **INCREASE SOLIDS IN SYRUP / REDUCED ENERGY USAGE ON DRYERS**
- **BE ABLE TO MEASURE THE CHANGES**

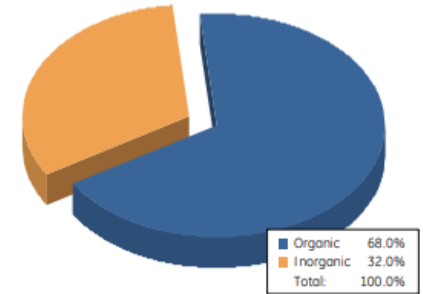
Evaporator Fouling Control Program – Follow the Science!



2018 DEPOSIT RESULTS

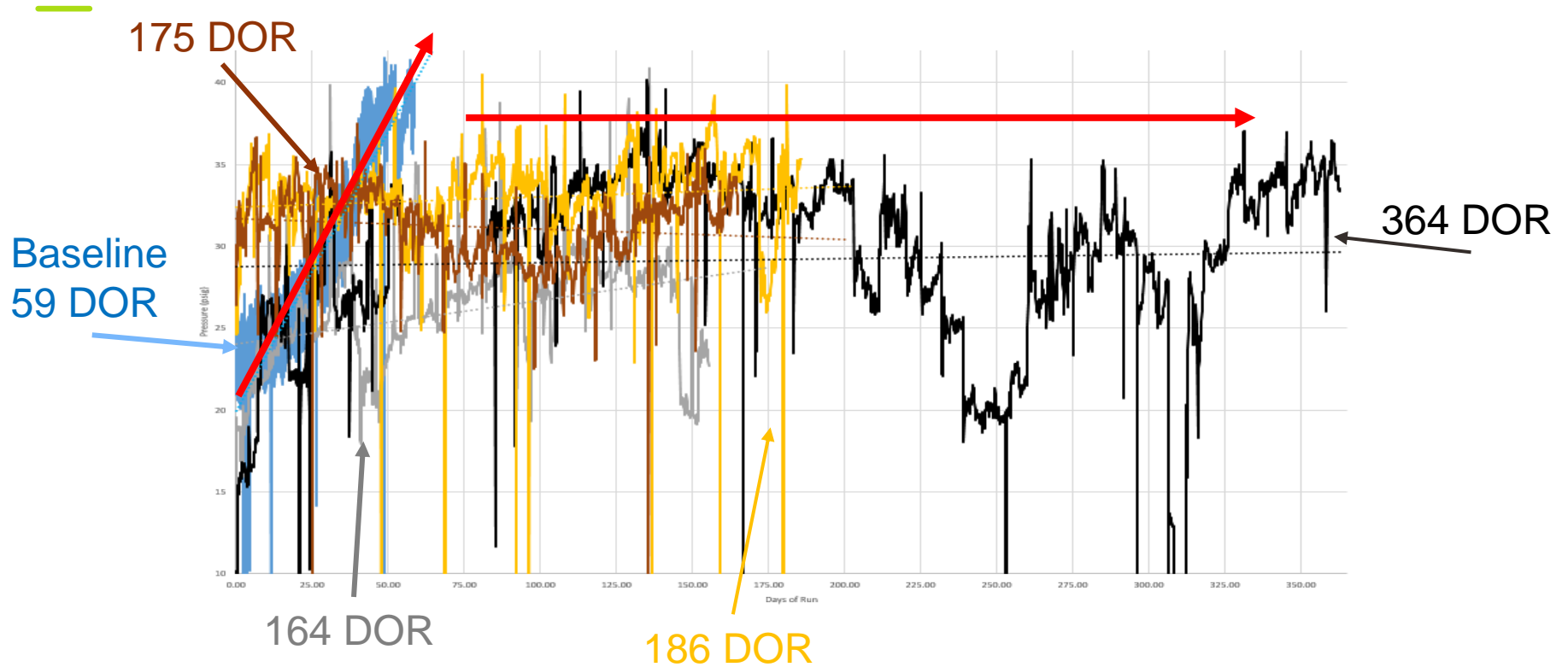


2019 DEPOSIT RESULTS



Change Your Expectations!

80% fouling rate reduction



Reducing Downtime / Maximizing Production – Value changes over time

2018

CORN – \$3.31/BUSHEL

WDDGS - \$52.40/TON

CORN OIL - \$0.25/LB

ETHANOL - \$1.75/GAL

LOST REVENUE \$/DAY - \$214K

REDUCING DOWNTIME BY 3.8 DAYS

2022

CORN – \$7.50/BUSHEL

WDDGS - \$118/TON

CORN OIL - \$0.73/LB

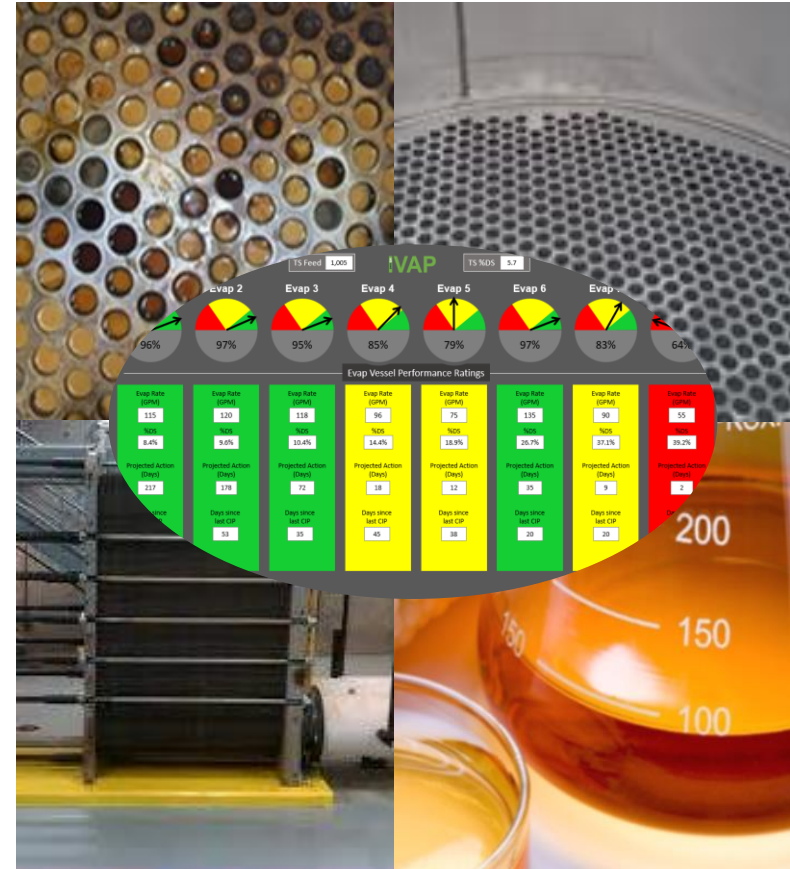
ETHANOL - \$2.65/GAL

LOST REVENUE \$/DAY - \$403K

REDUCING DOWNTIME BY 3.8 DAYS

Adding Value through Collaboration & Innovation...

- **EVAPORATOR DEPOSIT CONTROL PROGRAMS**
- **BEER COLUMN DEPOSIT CONTROL PROGRAMS**
- **CIP (CLEAN IN PLACE) PROGRAMS**
- **PROCESS PREDICTIVE ANALYTICS – IVAP**
- **FERMENTATION OXALATE CONTROL PROGRAM**
- **CORN OIL RECOVERY PROGRAMS**
- **PROCESS HEAT EXCHANGER PROGRAMS**
- **WATER BALANCE IMPROVEMENT STRATEGIES**



THANK YOU



A photograph of a person wearing a white hat and blue shirt, standing in a field of red soil with distinct curved ridges. The right side of the image is partially obscured by a large, stylized yellow graphic consisting of several overlapping, curved shapes.

CONTACT

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