QCCP was formed in 2000
- Constructed the second farmer owned ethanol facility in Iowa
- Began ethanol production Feb 2002
- Operates an on-site R&D fermentation facility since 2008
- Currently operates at 35 MGPY with corn oil extraction
- First plant to incorporate Enogen with a commercial agreement (Jan 8, 2013)
- Patent granted on the “Adding Cellulosic Ethanol” process (January 21, 2014)
- Signed a Collaboration Agreement with Syngenta to market ACE + Enogen (March 2014)
- Produced the first commercial cellulosic ethanol from corn kernel fiber on (July 1, 2014)
ADDING CELLULOSIC ETHANOL PROCESS + ENOGEN

Adding Cellulose Ethanol Process

- Whole Stillage PreTreatment
- Whole Stillage Fermentation
- Whole Stillage Distillation

Milling
- Less sulfuric acid required

Mash Cooling
- Less ammonia required

Slurry Tank
- No need to add liquid alpha amylase

Jet Cooker
- Less heat and water required

Liquefaction
- No need to add liquid alpha amylase

Distillation

Molecular Sieve

Ethanol C₂H₅O

Ethanol Transported to Market
ADVANTAGE’S OF ADDING CELLULOSIC ETHANOL PROCESS

- Whole stillage is processed without separating fiber and starch
- Conventional starch ethanol process is unchanged
- Separate cellulosic distillation does not limit conventional distillation
- Fiber is pre-treated during the conventional starch processes
- Because of breakdown achieved in pre-treatment the whole stillage fiber treatment is very mild, the pH is low enough to prevent starch degradation
- Reduced time, chemicals and energy required because of pre-treatment
- Secondary fermentation is able to capture residual starches, sugars and cellulosic component. (in future hemicellulose)
- Allows a plant to load significantly more solids and capture residual starch in second fermentation process
YIELD IMPROVEMENTS DUE TO ACE

- ACE creates additional 6% cellulosic ethanol from corn kernel cellulose
- ACE creates additional 1.1# of distillers oil per bushel of corn processed
- High Protein Feed
- Phase II - ACE will create additional 5% cellulosic ethanol from corn kernel hemi-cellulose
Cellulosic D3 RINS will become available on the commercial market.

Big Oil will not be able to say there are no cellulosic RINS.

The industry has technology available to create > 2 Billion gallons of cellulosic ethanol (with no more corn).
Utilize the viscosity reduction via Enogen and additional fermentation from ACE
- Increase throughput by 10-15% through higher solids loading
- Decrease energy linearly due to less water in the process
- QCCP will begin full scale testing the concept this fall
THANK YOU FOR THE OPPORTUNITY TO PRESENT

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