Ethanol Production Facility Water Quality Management
Corn ethanol production facilities
Water Quality Management for Ethanol Facilities

- Facility water balance
- Project siting
  - Inflow quality issues
  - Outflow quality issues
Facility Water Balance

WB = design flow outline for facility, describing all the water flows in and out, and in-between with the various treatment steps

- Clearly define WB upfront
- Consistency between various regulatory approvals (e.g., DNR, MPCA)
Facility Water Balance

Plant water design flows

gpm

Makeup water supply
Utility wastewater discharge

Minnesota Pollution Control Agency
Facility Water Balance

- DDGS drying water losses
- Cooling tower water losses

Minnesota Pollution Control Agency
Facility Water Balance

- DDGS drying water losses
- Cooling tower water losses
Project siting: location, location, location

- Feedstock supply (corn)
- Transportation (rail, highway)
- Energy source (natural gas line)
- Co-products market (wet cake, dried distillers grains)

Water

- Quantity
- Quality
  - Raw water supply alternatives
  - Wastewater disposal alternatives
Project siting: raw water supply quality

- Groundwater aquifers
- Surface waters
- Wastewaters

“Water supplies with significant amounts of dissolved materials ... can substantially increase the water treatment and environmental management costs for an ethanol facility” (Planning and Constructing an Ethanol Plant in Minnesota: A Guidance Document)

Minnesota Pollution Control Agency
Project siting: raw water supply quality
Project siting: raw water supply quality

Dissolved Salts in MN Ethanol Facility Raw Well Water Supplies

- Hardness, mg/L as CaCO3
- Alkalinity, mg/L as CaCO3
- Sulfate, mg/L

Plants: A, B, C, D, E, F, G, H
Project siting: raw water supply quality

- Affects design of treatment processes for facility water uses
- Affects design of facility wastewater treatment
- Affects design of facility solid wastes management
Project siting: raw water supply quality

Alternative makeup water supplies

- Bicarbonates, mg/L
- Hardness, mg/L as CaCO3
- Sulfate, mg/L

Concentration, mg/L

Municipal supply  Proposed new well field

Minnesota Pollution Control Agency
Project siting: wastewater disposal considerations

- WQ protection level of surface receiving waters
- Dry weather receiving stream flow rates
- Downstream lakes, wetlands
- Karst considerations
- Existing WQ impairments of downstream waters
- Background WQ conditions
Project siting: location, location, location

✓ Feedstock supply (corn)
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? Water
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More Information

http://www.pca.state.mn.us/energy/fuels/ethanol-facilities.html
Questions?
Ethanol facility wastewater discharge