Environmental Assessment and Notice of Wetlands Involvement

Construction and Operation of a Proposed Lignocellulosic Biorefinery,

POET Project LIBERTY, LLC.

Emmetsburg, Iowa

Prepared for

U.S. Department of Energy

by

ENSR | AECOM

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Executive Summary

Under the Energy Policy Act of 2005 (EPAct 2005), the United States (U.S.) Congress has directed the U.S. Department of Energy (DOE) to carry out a program to demonstrate the commercial application of integrated biorefineries for the production of ethanol from lignocellulosic feedstocks. Federal funding for lignocellulosic ethanol production facilities is intended to further the government's goal of rendering lignocellulosic ethanol cost-competitive with corn ethanol by 2012 and, along with increased automobile fuel efficiency, reducing gasoline consumption in the U.S. by 20 % within 10 years.

In February 2006, pursuant to § 932 of the EPAct 2005, DOE issued a Funding Opportunity Announcement (FOA) for applications to design, construct, and operate an integrated biorefinery employing lignocellulosic feedstocks for the production of combinations of (i) liquid transportation fuels; (ii) bio-based chemicals; (iii) substitutes for petroleum-based feedstocks and products; and (iv) energy in the form of electricity or useful heat. POET Project LIBERTY, LLC (POET) applied for, and was one of six companies selected to negotiate for, award of financial assistance to aid in the construction and operation of their planned lignocellulosic ethanol production facility.

Based on this selection, DOE proposes to provide financial assistance (the Proposed Action) to POET for the construction and operation of the lignocellulosic ethanol production facility (Project LIBERTY) near the City of Emmetsburg, Iowa. The financial assistance would cover up to 40% of project costs but would not exceed $80 million.

In accordance with DOE and National Environmental Policy Act (NEPA) implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. The proposal to use Federal funds to support the project requires that DOE address NEPA requirements and related environmental documentation and permitting requirements. In compliance with NEPA (42 United States Code [USC] §§ 4321 et seq.) and DOE's NEPA implementing regulations (10 Code of Federal Regulations [CFR] Section 1021.330) and procedures, this environmental assessment (EA) and notice of wetland involvement (NOWI) examines the potential environmental impacts of DOE's Proposed Action and a No Action Alternative.

POET Biorefining – Emmetsburg (Existing Plant) is an existing dry mill corn-to-ethanol facility located near the City of Emmetsburg, Iowa and is one of many Premier Partner Plants under management by POET Plant Management, LLC. (POET PM) This site has been selected for transformation into a biorefinery that integrates advanced corn dry milling and lignocellulosic conversion technologies to produce ethanol and byproducts. The transformation of this plant into an integrated biorefinery is called Project LIBERTY.

The objectives of Project LIBERTY are as follows:

- Transform an existing conventional dry mill corn-to-ethanol plant into a commercial scale biorefinery that integrates advanced corn-to-ethanol dry milling and lignocellulose-to-ethanol conversion technologies; the lignocellulosic feedstock will be corn cobs and may include corn fiber.
- Implement a sustainable corn cob collection, storage, and delivery system to provide feedstock to the biorefinery.
- Maximize alternative energy production and minimize traditional energy usage.
- Operate the cob collection and biorefinery systems to:
  - Validate the technology at commercial scale.
  - Validate the economics at commercial scale.

- Enable replication of the technology at other existing corn-to-ethanol dry mills or new greenfield lignocellulosic-to-ethanol facilities.

In compliance with the statutory mandate of EPAct 2005 § 932, DOE has implemented a program to demonstrate the commercial application of integrated biorefineries that produce ethanol from lignocellulosic feedstocks. The facility that would be constructed and operated as a result of the Proposed Action would meet the requirements of §932 by using renewable supplies of crop residue to produce fuel-grade ethanol. The Proposed Action also would support DOE's mission to reduce dependency on fossil fuels and commercialize lignocellulose technologies. By providing financial assistance to support the construction of the proposed lignocellulose ethanol production plant, DOE would support national energy needs and the development of alternative fuel sources.

This report presents the EA and NOWI prepared for the DOE NEPA process. This report provides information on:

- The conditions at the Existing Plant;
- The proposed Starch Expansion project for the site;
- The proposed Project LIBERTY project;
- The alternatives considered, including the No Action Alternative; and
- The potential environmental impacts of the proposed Project LIBERTY.

The EA and NOWI study areas include:

- Occupational Health and Safety
- Air Quality and Meteorology
- Geology and Soils
- Biological Resources
- Water Resources
- Waste Management and Hazardous Materials
- Infrastructure
- Cultural Resources
- Land Use
- Noise
- Aesthetics
- Traffic
- Socioeconomics and Environmental Justice

POET has made the following commitments to mitigate potential impacts that were identified during the preparation of this EA. These commitments would be completed following a DOE decision to implement the Proposed Action.

1. POET Design and Construction (POET D&C) would complete an ambient air quality modeling analysis of the air pollutant emissions from the Existing Plant, Starch Expansion, and Project LIBERTY (Combined Biorefinery) to demonstrate that the facility would not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS). In the event that the ambient air quality modeling analysis found that the Combined Biorefinery would cause or contribute to a violation

of the NAAQS, POET D&C would redesign the facility and/or its pollution control equipment to reduce the ambient air quality impacts until the exceedance was no longer indicated.

2. POET D& C will deed land to Palo Alto County for construction of a right turn lane on 470th Street to minimize traffic interruptions on 470th. POET D & C will collect traffic data and complete a traffic Level of Service (LOS) analysis on 380th at the Existing Plant entrance and 470th Street at the proposed Project LIBERTY entrance prior to initiating construction of Project LIBERTY. POET D & C will also collect traffic data and complete a LOS analysis during construction and operation of Project LIBERTY.

3. Project LIBERTY would only use enzymes and yeast strains for fermentation that have been approved for commercial sale. Although the specific yeasts that will be used are still under development, potential impacts are expected to be similar to current commercially available genetically modified strains of brewers yeasts, which have been approved as food additives by the US Food and Drug Administration (FDA) and are classified as Substances Generally Recognized as Safe (GRAS) per 21 CFR 170.36 (for example GRAS NOTICE No. GRN 000120). Once the specific genetically modified yeast strain has been identified, POET would incorporate facility design and operating practices to allow the purchase, transport, storage, and use of any genetically modified yeasts in accordance with applicable federal, state, or local regulations, as well as those specific requirements established by the manufacturer of the genetically modified yeast strains.

4. POET PM would monitor the groundwater elevations in their on-site monitoring wells as an indicator of potential interferences with nearby water wells. In the unlikely event that well interference is observed, POET PM would proactively participate in informal negotiations and/or settlement procedures as outlined by Iowa Administrative Code 567-54. Actions that may be taken include lowering the pump in the affected well, drilling a replacement well, or extending the water line from the Emmetsburg Municipal Utilities District (District) and connecting the affected party to the District system

5. POET PM would review and revise the existing Integrated Contingency Plan (ICP) and Emergency Response Plan (ERP) to address the medical and environmental hazards associated with Project LIBERTY. The revisions would be completed in accordance with federal and Iowa Occupational Health and Safety Administration (OSHA) and United States Environmental Protection Agency (USEPA) regulations and guidance. POET PM would also review and revise the Process Safety Management (PSM) program safety and emergency response procedures for construction activities, excavation and trenching, electrical, hazardous chemicals, hot work permits, fall prevention, proper equipment usage, confined space entry, fire protection and prevention, and hearing and respiratory protection for employees, contractors and visitors. These updates would be completed prior to bringing the additional hazardous materials on site.

6. POET D&C would prepare a Storm Water Pollution Prevention Plan (SWPPP) for Project LIBERTY construction activities. The construction SWPPP would contain Best Management Practices (BMPs) regarding erosion and sedimentation control and spill response and control measures. POET PM would revise the existing SWPPP for operations of Project LIBERTY. The operation SWPPP would contain BMPs regarding storage and handling of materials and spill control measures.

Acronyms, Abbreviations, and Terms

°F	Degrees Fahrenheit
µg/m^3	microgram per cubic meter
A.K.A.	Also Known As
ACLS	Advanced Cardiac Life Support
AED	Automated External Defibrillator
AERMOD	A computer based atmospheric dispersion modeling program used for evaluating the ambient concentration of air pollutants from stationary sources
AGP	Ag Processing, Inc.
AMSL	Above Mean Sea Level
Arith.	Arithmetic
AST(s)	Above Ground Storage Tank(s)
BDT	Bone Dry Ton
BMPs	Best Management Practices
bu/yr	Bushels per Year
CCM	Corn Cob Mix
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CIP	Clean In Place
CO	Carbon Monoxide
CO_2	Carbon Dioxide
Combined Biorefinery	The combination of the Existing Plant, the Starch Expansion, and Project LIBERTY
dBA	Decibels Adjusted
DDGS	Dried Distillers Grains with Solubles
District	Emmetsburg Municipal Utilities District
DML	Des Moines Lobe
DOE	U.S. Department of Energy
DOT	Department of Transportation
E-85	85% Ethanol Fuel
EA	Environmental Assessment
EAC	Early Action Compact
EPAct 2005	Energy Policy Act
ERP	Emergency Response Plan
ESP	Electrostatic Precipitator
Existing Plant	The Emmetsburg existing corn-to ethanol production plant

ft^2	Square Feet
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
FDA	US Food and Drug Administration
FERC	Federal Energy Regulatory Commission
FOA	Funding Opportunity Announcement
g	gravity
GHG	Greenhouse Gas
GMO	Genetically Modified Organism
gpd	gallons per day
gpm	Gallons per Minute
GRAS	Generally Recognized as Safe
HAP(s)	Hazardous Air Pollutant(s)
HID	High Intensity Discharge
ICE	Iowa, Chicago, & Eastern R.R. Corp line
ICP	Integrated Contingency Plan
ID	Identification
IDNR	Iowa Department of Natural Resources
IGS	Iowa Geological Survey
Inc.	Incorporated
KSO_4	Potassium Sulfate
Kw	Kilowatt
lbs	Pounds
LLC	Limited Liability Corporation
MCAN	Microorganism Commercialization Activity Notice
mg/L	Milligram per Liter
mg/m^3	milligram per cubic meter
mgy	Million Gallons per Year
MMBtu	Million British Thermal Units
MMBu	Million Bushels
MMgal	Million Gallons
mph	Miles per Hour
MWh	Megawatt Hours
Na_2CO_3	anhydrous sodium carbonate
$Na_3H(CO_3)_2.2H_2O$	Trona

NAAQS	National Ambient Air Quality Standards
$NaHCO_3$	Nahcolite
$NaSO_4$	Sodium Sulfate
NGA	Natural Gas Act
NEPA	National Environmental Policy Act
NFSAM	National Food Security Act Manual
NI	No Indicator
NNG	Northern Natural Gas Company
NOWI	Notice of Wetland Involvement
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSA	Nearest Sensitive Area
NWI	National Wetland Inventory
OBL	Obligate Wetland
OSHA	Occupational Safety and Health Administration
PC	Prior Converted
PCB	Polychlorinated biphenyl
PGA	Peak Ground Acceleration
PHA	Process Hazard Analysis
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 microns
PM2.5	Particulate Matter less than 2.5 Microns
POET	POET Project LIBERTY, LLC
POET D&C	POET Design and Construction
POET PM	POET Plant Management, LLC.
ppm	Part per Million
proof	**Alcoholic proof** is a measure of how much alcohol (i.e., ethanol) is in an alcoholic beverage. Proof is twice the percentage of alcohol by volume.
PSM	Process Safety Management
PW	Production Well
qty	Quantity
RO	Reverse Osmosis
RTO	Regenerative Thermal Oxidizer
SBR	Sequencing Batch Reactors
SHPO	Iowa State Historic Preservation Office
SOP(s)	Standard Operating Procedure(s)

SO_2	Sulfur Dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SPL	Sound Pressure Level
Starch Expansion	The planned expansion of the Existing Plant to 105 MMgal/yr corn-to-ethanol production capacity
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TK001 to TK005	Aboveground Storage Tanks 001 through 005
Trona	Soda Ash
$\mu g/m^3$	Microgram per Cubic Meter
UPL	Obligate Upland
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WET	Whole Effluent Toxicity

1.0 Introduction

1.1 Background

Under EPAct 2005, the U.S. Congress has directed the DOE to carry out a program to demonstrate the commercial application of integrated biorefineries for the production of ethanol from lignocellulosic feedstocks. Federal funding for lignocellulose ethanol production facilities is intended to further the government's goal of rendering lignocellulose ethanol cost-competitive with corn ethanol by 2012 and, along with increased automobile fuel efficiency, reducing gasoline consumption in the U.S. by 20% within 10 years.

In February 2006 pursuant to § 932 of the EPAct 2005, DOE issued a FOA for applications to design, construct, and operate an integrated biorefinery employing lignocellulosic feedstocks for the production of combinations of (i) liquid transportation fuels; (ii) bio-based chemicals; (iii) substitutes for petroleum-based feedstocks and products; and (iv) energy in the form of electricity or useful heat. POET applied to the FOA, and was one of six companies selected to negotiate for, award of financial assistance to aid in the construction and operation of their planned lignocellulosic ethanol production facility.

Based on this selection, DOE proposes to provide financial assistance to POET for the construction and operation of Project LIBERTY near the City of Emmetsburg, Iowa. The financial assistance would cover up to 40% of project costs and would not exceed $80 million.

In accordance with DOE and NEPA implementing regulations, DOE is required to evaluate the potential environmental impacts of DOE facilities, operations, and related funding decisions. The proposal to use Federal funds to support the project requires that DOE address NEPA requirements and related environmental documentation and permitting requirements. In compliance with NEPA (42 USC §§ 4321 et seq.) and DOE's NEPA implementing regulations (10 CFR Section 1021.330) and procedures, this EA and NOWI examines the potential environmental impacts of DOE's Proposed Action and a No Action Alternative.

1.2 The National Environmental Policy Act

The Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508) and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021) require that DOE, as a Federal agency:

- Assess the environmental impacts of its proposed actions;
- Identify any adverse environmental effects that cannot be avoided should a proposed action be implemented;
- Evaluate alternatives to the proposed action, including a No Action Alternative;
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and
- Characterize any irreversible and irretrievable commitments of resources that would be involved should the proposed action be implemented.

These requirements must be met before a final decision is made to proceed with any proposed Federal action that could cause significant impacts to human health or the environment. This EA and NOWI is intended to meet DOE's regulatory requirements under NEPA and provide DOE and other State and Federal agency decision-makers with the information they need to make informed decisions in connection with the construction and operation of the proposed plant.

This evaluates the potential individual and cumulative effects of the Proposed Action. No other action alternatives are analyzed in detail, although this EA and NOWI provides a discussion of alternate cob

delivery and handling methods and alternate sites that were considered but determined by POET to be unfeasible. For purposes of comparison, this EA and NOWI also evaluate the impacts that would occur if DOE were to decide not to subsidize the construction and operation of the proposed plant (the No Action Alternative).

This EA and NOWI has been prepared under DOE's regulations and guidelines for compliance with NEPA (42 USC §§ 4321 *et seq*.). The Draft EA and NOWI was made available to interested members of the public and to Federal, State, and local agencies for review and comment prior to DOE's final decision on the Proposed Action.

1.3 Proposed Project Overview

The Existing Plant is an existing dry mill corn-to-ethanol facility located near the City of Emmetsburg, Iowa and is one of many Premier Partner Plants under management by POET PM. This site has been selected for transformation into a biorefinery that integrates advanced corn dry milling and lignocellulosic conversion technologies to produce ethanol and byproducts. The transformation of this plant into an integrated biorefinery is called Project LIBERTY.

The objectives of Project LIBERTY are as follows:

- Transform an existing conventional dry mill corn-to-ethanol plant into a commercial scale biorefinery that integrates advanced corn-to-ethanol dry milling and lignocellulose-to-ethanol conversion technologies; the lignocellulosic feedstock will be corn cobs and may include corn fiber.
- Implement a sustainable corn cob collection, storage, and delivery system to provide feedstock to the biorefinery.
- Maximize alternative energy production and minimize traditional energy usage.
- Operate the cob collection and biorefinery systems to:
  - Validate the technology at commercial scale.
  - Validate the economics at commercial scale.
  - Enable replication of the technology at other existing corn-to-ethanol dry mills or new greenfield lignocellulosic-to-ethanol facilities.

1.4 Background and Site History

The Existing Plant was constructed in 2004 and 2005 on an existing greenfield site. The Existing Plant was designed as a dry mill corn-to-ethanol facility with a name plate production capacity of 50 million gallons per year (MMGal/yr) of denatured ethanol. With the exception of planned maintenance outages, the Existing Plant has operated near its permitted production capacity since opening in 2005. In 2007, the Existing Plant constructed three additional grain bins at the site for additional grain storage capacity. Fuel ethanol production was not affected by the grain bin project.

In June 2008, POET D&C began the permitting process for an expansion of the corn-to-ethanol production facility, known as the Starch Expansion. The Starch Expansion will increase the production capacity of the Existing Plant to 105 MMgal/yr of denatured ethanol. Additional information on the Starch Expansion is contained in Section 2.0.

1.5 Purpose and Need

In compliance with the statutory mandate of EPAct 2005 § 932, DOE has implemented a program to demonstrate the commercial application of integrated biorefineries that produce ethanol from lignocellulosic feedstocks. The facility that would be constructed and operated as a result of the Proposed Action would meet the requirements of §932 by using renewable supplies of crop residue to produce fuel-grade ethanol. The Proposed Action also would support DOE's mission to reduce dependency on fossil fuels and commercialize lignocellulose technologies. By providing financial assistance to support the construction of

the proposed lignocellulose ethanol production plant, DOE would support national energy needs and the development of alternative fuel sources.

1.6 Public Scoping

In accordance with the applicable regulations and policies, DOE sent scoping letters to potentially interested local, state, and Federal agencies, including the U.S. Fish and Wildlife Service, the Iowa Department of Natural Resources, the Iowa Department of Transportation, and the Iowa State Historical Preservation Office. DOE also sent scoping letters to other potentially interested individuals and organizations to solicit public comment. DOE published the Scoping Letter on-line at the DOE Golden Reading Room. The scoping letter described the Proposed Action and requested assistance in identifying potential issues that could be evaluated in the EA. In response to the scoping letters, DOE did not receive any comments from individuals, organizations, or agencies raising any specific objections or concerns about the Proposed Action.

Appendix G contains a copy of the scoping letters and the scoping letter distribution list.

1.7 Report Content

This report presents the EA and NOWI prepared for the DOE NEPA process. This report provides information on:

- The existing conditions at the site;
- The proposed Starch Expansion project for the site;
- The proposed Project LIBERTY Biorefinery project;
- The alternatives considered, including the No Action Alternative; and
- The potential environmental impacts of the proposed Project LIBERTY.

The EA and NOWI study areas include:

- Occupational Health and Safety
- Air Quality and Meteorology
- Geology and Soils
- Biological Resources
- Water Resources
- Waste Management and Hazardous Materials
- Infrastructure
- Cultural Resources
- Land Use
- Noise
- Aesthetics
- Traffic
- Socioeconomics and Environmental Justice

2.0 Project Alternatives

This section of the EA and NOWI describes the No Action Alternative and Project LIBERTY.

As discussed in greater detail in Section 2.1, the No Action Alternative consists of the continued operation of the Existing Plant, a 50 MMgal/year conventional corn-to-ethanol plant plus construction of a 55 MMgal/year Starch Expansion. The construction of the Starch Expansion by POET D&C is independent of any decision by DOE to provide federal funds for the design and construction activities related to Project LIBERTY. Additionally, the construction for the Starch Expansion is expected to be complete or nearly complete prior to the proposed start of construction of Project LIBERTY. The Proposed Action does not include funding for activities related to the Starch Expansion. However, potential cumulative environmental impacts include those impacts related to the Existing Plant, the Starch Expansion, and Project LIBERTY (Combined Biorefinery).

As discussed in Section 1.1, the Proposed Action is DOE's proposal to provide financial assistance to POET for the construction and operation of an integrated biorefinery including a 25 MMgal/yr lignocellulosic ethanol production facility, a solid fuel boiler system that will use spent solids from the lignocellulose based ethanol system, and an anaerobic digestion system that will produce biogas from the treatment of wastewater for use on-site. Project LIBERTY would be located near the City of Emmetsburg, Iowa. The financial assistance would cover up to 40% of project costs but would not exceed $80 million.

For purposes of analysis in this EA, the No Action Alternative is used to evaluate the potential impacts that would occur if Project LIBERTY were not built and operated and no supporting infrastructure were constructed. Under the No Action Alternative, no DOE financial assistance would be awarded to POET.

2.1 No Action Alternative

The Existing Plant currently operates a 50 MMgal/year conventional corn-to-ethanol plant near the City of Emmetsburg. This facility was constructed in 2004 and 2005 and has been operating continuously since its initial startup, with the exception of planned maintenance outages. Section 2.1.1 provides detail on the Existing Plant. POET D&C will construct the Starch Expansion, a 55 MMgal/year expansion of the Existing Plant beginning in 2008 as a project independent from Project LIBERTY. After completion of the Starch Expansion, the total capacity of the conventional plant will be 105 MMgal/year of denatured ethanol. Section 2.1.2 provides details on the Starch Expansion.

2.1.1 Existing Dry Mill Operations

2.1.1.1 Location

The Existing Plant is located at 4724 380th Street approximately 1 mile southeast of the City of Emmetsburg, in the south half of Section 32, Township 96N, Range 32W, Palo Alto County, Iowa (Appendix A, Figure 1 Site Location Map). The site is an irregularly-shaped area comprised of approximately 534 acres of land located at approximately 1,200 feet above mean sea level (AMSL) (United States Geological Survey [USGS], 1980). The site is relatively flat with a total elevation change of approximately 10 feet in the form of slightly rolling hills. The slope is generally downhill from northeast to southwest. The site borders are as follows:

To the north: 380th Street, beyond which lies the Ag Processing, Inc. (AGP) soybean processing facility and agricultural land;

To the east: Union Pacific railroad track, beyond which lies agricultural land;

To the south: 390th Street, beyond which lies agricultural land; and

To the west: 470th Street, beyond which lies agricultural land.

The Existing Plant is situated in an area that is generally rural agricultural crop land. Farmsteads and row crops, mostly corn and soybeans, are predominant in the area. The nearest school, hospital, and residential areas are in the City of Emmetsburg, approximately one mile to the northwest of the Project LIBERTY location. AGP, a soybean processing facility, is located immediately to the north of the project site.

2.1.1.2 Existing Plant

The Existing Plant includes the following industrial activities:

- Corn receiving by truck, then transfer and storage in grain bins;
- Corn cleaning;
- Corn processing for use in the fermentation process;
- Batch fermentation;
- Ethanol distillation;
- Denaturant receipt by truck;
- Ethanol and denaturant storage in above ground storage tanks;
- Ethanol load out into trucks and rail cars;
- Spent grain drying, storage, and load out into trucks and rail cars; and
- Supporting operations such as cooling towers and an emergency generator.

Figure 2 – Emmetsburg Process Flow Diagram shows the process flow diagram for the Existing Plant.

Corn from local farming operations is brought to the facility and unloaded in a receiving building from both hopper bottom and end dump trucks. The trucks off-load the grain into a grain receiving pit inside a grain receiving building. The grain is transferred from the receiving pit by an enclosed conveyor or grain auger to a grain leg. The grain leg elevates the grain to a head house and distribution conveyor. The grain is conveyed to the six grain storage bins. The Existing Plant processes approximately 18 million bushels (MMBu) of corn per year.

The Existing Plant removes the corn from the storage bins using an enclosed conveyor or grain auger and transfers it to a grain leg. The grain is fed from the grain leg into a corn scalper which cleans the grain by removing the dirt and debris. Following cleaning, the grain is transferred into a surge bin.

From the surge bin, the corn is gravity fed via spouts into one of four mills. The mills grind the corn to the appropriate size for optimal fermentation. The ground corn is conveyed to a slurry tank, mixed with heated water to form a mash, and pumped to one of five batch fermentation tanks. Yeast and enzyme are added to the mash. The enzymes break down dextrins in the mash to glucose, which is converted to ethanol and carbon dioxide (CO_2) by the yeast. The fermented mixture is called “beer” which contains approximately 18% ethanol. After the fermentation process is complete, the entire contents of the fermentation tank are pumped to the beer well.

The CO_2, which is saturated with ethanol, is vented from the fermentation tanks to a single pass wet scrubber. The ethanol is adsorbed in the water. The fermentation process also produces small amounts of methanol and acetaldehyde. These compounds, when emitted to the atmosphere are defined by the United States Environmental Protection Agency (USEPA) as hazardous air pollutants (HAPs). The scrubber water also adsorbs these compounds.

The distillation and dehydration process separates the ethanol from the beer resulting in 200 proof (100%) anhydrous ethanol. Beer is pumped continuously from the beer well to the distillation process through a series of columns that separates the ethanol contained in the beer from the solids/water mixture. The beer stream first enters the top of the stripper column. Steam is injected at the bottom of the stripper column to vaporize

and separate the ethanol from the water and remaining corn solids. The ethanol vapor rises through the column into a rectifier column, where it is concentrated to approximately 190 proof (95%) ethanol. Following the rectifier, the ethanol vapor is pumped through a vaporizer/superheater, then to molecular sieve to remove water contained in the vapor. Below is a brief description of a molecular sieve.

> *"A molecular sieve is a material containing tiny pores of a precise and uniform size that is used as an adsorbent for gases and liquids. Molecules small enough to pass through the pores are absorbed while larger molecules are not"* (Source: Molecularsieve.org, 2006)

As stated above, the packing material in the molecular sieve adsorbs any remaining water from the ethanol vapor. The ethanol vapor is then condensed to a liquid, resulting in 200 proof (100%) ethanol. The condensed ethanol is pumped into storage tanks.

As the molecular sieves will eventually become saturated with water, the beds must be regenerated. This regeneration step uses a vacuum to extract the water from the pores of the molecular sieve. The water and any remaining ethanol are extracted from the bed, condensed, and returned to the rectifier for recovery. This returned condensate stream is approximately 110 proof (55%) ethanol.

The water from the stripper and rectifier column (also called stillage), along with any remaining solids are pumped to four centrifuges to be separated into a thin stillage fraction and a solids fraction. The thin stillage is pumped to an evaporator, where water is removed with steam heat, to produce a syrup that contains approximately 30% solids. The syrup is pumped to a mixer where it is mixed back into the solids fraction.

Following distillation and dehydration, the ethanol is pumped into above ground storage tanks (ASTs). The ethanol is blended with approximately 5% gasoline or natural gas liquids as a denaturant. Denatured ethanol is shipped from the facility by both rail and truck.

The solids fraction from the distillation system and syrup mixture is conveyed into two natural gas fired ring flash dryers constructed in series. The dried product, called dried distillers grains with solubles (DDGS), is removed from the dryers through drop boxes into a pneumatic fluid bed cooler. From the cooler the DDGS is pneumatically conveyed to the storage silo.

The combustion products and water vapor from the dryers are vented to product recovery cyclones to remove the remaining entrained DDGS. This DDGS is pneumatically conveyed into a storage silo, prior to shipment via rail cars and trucks from the grain receiving building.

Facility support systems include:

- Two 100 million British Thermal Unit per hour (MMBtu/hour) natural gas fired boilers. The boilers provide process steam for the facility.
- One 1000 Kilowatt (Kw) diesel fired electric generator for emergency power. The primary purpose of the generator is to provide electricity in the event of an emergency condition at the plant. In the event of an emergency, the generator is of sufficient size to operate emergency shutdown systems, lighting systems, cooling tower water pumps, and limited ancillary equipment. The DDGS dryers, Regenerative Thermal Oxidizer (RTO), centrifuges, boilers, and other process systems will not be powered by the emergency generator.
- One cooling tower. The cooling tower removes heat from the fermentation tanks, as well as other equipment associated with the facility boilers.
- Two groundwater production wells (PW) for process (not potable) water.

The Existing Plant has installed pollution control equipment on their emission sources. Grain receiving and handling systems are equipped with fabric filters (also known as baghouses) to control the emissions of particulate matter (PM). Similarly, the DDGS handling and storage systems have fabric filters to control particulate matter. The fermentation and distillation systems are equipped with wet scrubbers and RTOs to control emissions of PM, volatile organic compounds (VOCs), HAPs, and carbon monoxide (CO). The ethanol

loadout system is equipped with a flare to control emissions of VOCs and HAPs. To minimize emissions of nitrogen oxides (NO_X) the facility boilers are equipped with low NO_X burners.

2.1.1.3 Startup, Shutdown, Maintenance, and Emergency Conditions

The Existing Plant normally operates 24 hours per day, seven days per week. On an annual basis, the facility operates approximately 350 days per year. Minor maintenance activities are regularly scheduled throughout the operating year. Total plant shutdowns are scheduled each year for major maintenance activities that require the entire plant to be off-line. This limits the number of times the facility goes through complete start up and shut down cycles.

Standard operating procedures (SOPs) have been developed for each operating system and the associated pollution control systems. The SOPs describe the actions that will be taken by facility personnel for each of the following operating conditions:

- Cold start up;
- Normal operations;
- Normal shutdown;
- Standby operations;
- Warm startup from standby operations;
- Emergency shutdown; and
- Startup from an emergency shutdown.

The pollution control systems (fabric filters) associated with grain receiving, handling, storage, and milling are interconnected with the motor controls on the process equipment. Shutdown of the pollution control device automatically shuts down the associated process. The fabric filters on the DDGS handling and loading operations are similarly interlocked. The RTO on the DDGS dryers is interlocked with the dryers, however, in the event of an RTO shutdown, the dryers are set up to allow the product remaining in the dryers to be removed before the dryers are shutdown. This is both a safety and operational requirement.

The fermentation and distillation systems have two pollution control systems in series, a wet scrubber and the RTO. If the RTO goes down, the wet scrubber remains in service. The air permit, issued by the Iowa Department of Natural Resources (IDNR), allows operation of the fermentation and distillation system for up to 500 hours per year with the RTO out of service.

2.1.1.4 Project Design Features to Minimize Threat from Intentional Destructive Activities

The Existing Plant design includes security lighting, cameras in critical areas that are monitored 24 hours per day in the control room, and communication procedures are in place with the local 911 emergency response system. In addition, the facility is manned 24 hours per day and equipped with automation that allows remote emergency shutdown and cutoff of process units and loading racks.

2.1.2 Starch Expansion

The proposed Starch Expansion will utilize some existing equipment, modify some existing equipment, and add new production equipment. Figure 3 – Emmetsburg Process Flow Diagram with Starch Expansion shows the systems that will be added as part of the Starch Expansion.

- The existing corn receiving system has the capacity to unload the grain necessary for the expansion without modification. After the expansion, the Existing Plant, plus the Starch Expansion, will process approximately 40 MMBu of corn per year.
- One new 652,000 bushel corn receiving bin will be added;

- From the corn cleaning system, the corn will be separated into either the existing ethanol production system or a new parallel system. The corn will be separated into a new parallel system for transfer of corn to the Starch Expansion. This will consist of a new transfer leg, scalper, horizontal conveyors, four hammermills, and a pneumatic conveyor.
- The existing pre-blend tank will be converted to a common slurry tank. New slurry pumps will be added and the common slurry tank will send flow to both the existing and new fermenters. One existing enzyme tank will be converted to a common pre-blend tank. Six additional fermenters will be installed for the new production line. A new wet scrubber will be installed to control VOC emissions from the fermentation system.
- A new distillation system, molecular sieves, centrifuges, and evaporators will be installed for the new production line.
- The existing denaturant tank, TK001, and the existing 190 proof (95%) ethanol AST, TK002 will not be modified or change service as a result of this project. The existing 200 proof (100%) ethanol AST, TK003 will be converted for service as a denaturant storage tank. Existing denatured ethanol ASTs, TK004 and TK005 will not be modified or change service as a result of this project.
- POET D&C will install an in-line blending system for adding denaturant to the fuel ethanol. This system will allow the facility to blend 85% ethanol fuel (E-85) on-site at the ethanol loading rack. The facility proposes to blend and load up to 10.7 MMgal/year of E-85 at this location.
- The truck and rail loading systems will not be modified as a result of this project.
- The existing flare will be replaced with a larger flare.
- Two new DDGS dryers will be installed to dry the spent grain from the new production line. A new pneumatic DDGS cooler will also be installed.
- A new RTO will be installed on the new production line. Under normal operating conditions, the new RTO will receive:
    - CO_2 from the new fermentation tanks;
    - Non-condensable gases from the new distillation column, beer well, centrifuges, evaporator, rectifier, and molecular sieves; and
    - Exhaust gases from the new DDGS dryers.
- POET D&C will install a new DDGS storage silo as part of this project. The existing flat storage building and DDGS loadout system will not be modified.
- POET D&C will install new support systems including:
    - One 99-MMBtu/hour natural gas fired boiler.
    - One cooling tower for the new production line.

The Starch Expansion will require additional electricity, water and natural gas supplies for operation. POET D&C will construct a new substation on-site to supply electricity to the Starch Expansion. No new transmission lines leading to the site will be required. POET D&C will also install a third production well (PW#3) to provide a redundant water supply for the Starch Expansion in the event one of the existing production wells is out of service for maintenance or repair. POET D&C will contract with Northern Natural Gas Company (NNG) to provide the additional natural gas service. NNG is proposing to construct approximately 2 miles of 16 inch pipeline near Welcome, Minnesota and approximately 13.3 miles of 6 inch pipeline near Emmetsburg, Iowa to support the Starch Expansion. The proposed pipelines will be constructed next to the existing NNG natural gas lines in their existing right of way. NNG does not anticipate requiring any new right of way or easements for these lines. The location of the proposed lines is shown on Figure 4.

2.1.2.1 Start up, Shutdown, Maintenance, and Emergency Conditions

The Starch Expansion will operate in a similar manner to the Existing Plant. The SOPs for the facility will be modified for the new equipment, but will include the same elements. Start up, shutdown, maintenance, and emergency conditions are anticipated to be consistent with current operations.

2.1.2.2 Material Balance and Logistics

Table 2-1 shows the resource requirements and products for the Existing Plant before and after the Starch Expansion. The numbers are cumulative and represent the maximum resource requirements and production rates.

Table 2-1 Existing and Starch Expansion Material Balance

Input Description	**Existing Plant Requirements**	**Starch Expansion Requirements**	**Supply Method**
Corn	18 MMBu/year	40 MMBu/year	Truck
Process Water	0.5 MMgal/day	1.0 MMgal/day	On-site production wells
Potable Water	1,600 gallons per day (gpd)	1,840 gpd	From the City of Emmetsburg
Fermentation Enzyme	1.3 tons/day	2.6 tons/day	Truck
Yeast	3,700 pounds (lbs)/week	3,700 lbs/week	Truck
Denaturant (gasoline or natural gas liquids)	2.6 MMgal/year	7.8MMgal/year	Truck
Process Chemicals (Acids, bases, detergents, etc.)	28,000 gallons/week	56,000 gallons/week	Truck
Natural gas usage	4,900 MMBtu/day	9,800 MMBtu/day	Existing pipeline
Electricity	8.5 Megawatt hour (MWh)/hour	17 MWh/hour	Existing substation
Output Description	**Facility Products**		**Transport Method**
Denatured Fuel Ethanol @ 5% Denaturant	55.0 MMgal/year	99.3 MMgal/year	Truck and Rail
E-85	0 gallons/year	10.7 MMgal/year	Truck
DDGS	0.15 million tons/year	0.34 million tons/year	Truck and Rail
Wet Cake/Syrup	275 tons/week	275 tons/week	
Waste Material Description	**Annual Production**		**Disposal Method**
Non-contact cooling water	0.12 MMgal/day	0.24 MMgal/day	Discharged via permitted outfall to the Des Moines River
Non-hazardous solid waste	25 tons/week	25 tons/week	Off-site disposal at Palo Alto County landfill
Air Potential Emissions			Emitted in accordance with the air permits issued by the IDNR Air Quality Bureau
PM	51.3 tons/year	133.7 tons/year	
Particulate Matter less than 10 micron (PM_{10})	51.3 tons/year	107 tons/year	
NO_X	94.9 tons/year	164.7 tons/year	
CO	79.9 tons/year	149.4 tons/year	
VOCs	60.7 tons/year	179.7 tons/year	

Sulfur Dioxide (SO_2)	2.3 tons/year	2.9 tons/year	
Greenhouse Gases (GHG)			
CO_2 Biogenic CO_2 Anthropogenic CO_2	 0.16 million tons/year 0.17 million tons/year	 0.33 million tons/year 0.31 million tons/year	
Methane (Anthropogenic)	19.9 tons/year	34.1 tons/year	
Nitrous Oxide (Anthropogenic)	0.3 tons/year	0.6 tons/year	

2.1.2.3 Environmental Permits, Approvals, and Plans

The Existing Plant requires a number of environmental permits, approvals, and plans for their operation. In addition, the Starch Expansion will require environmental permits and approvals specifically for the construction activities. Table 2-2 summarizes the existing and required permits.

Table 2-2 Summary of Existing and Required Permits

Environmental Media	Existing Permits, Approvals or Plans	Starch Expansion Required Permits, Approvals or Plans	Comments
Air Construction Permits	04a219-S4 Grain Bin Loading 04A220 Corn Scalper, Conveyor, and Surge Bin 04a221-S1 Hammermill #1 04a222 Hammermill #2 04a223 Hammermill #3 04a224 Pneumatic Flour Conveyor Receiver 04a225-S2 Mash Fermentation and Beer Wells	<u>Revised Permits</u> 04a219-S4 Grain Bin Loading 04a234 Tank 003 04a237-S1 Ethanol Truck/Rail Loadout 05a863 VOC Emissions from Equipment Leaks 05a864-S1 Haul Road Emissions	A permit application for the Starch Expansion was submitted in June 2008. Permits are expected to be issued in approximately October 2008.
Air Construction Permits	04a226 Distillation 04a227-S2 RTO 04a228-S1 DDGS Fluid bed Cooler 04a229 DDGS Storage Silo 04a230-S1 DDGS Silo Bypass 04a231-S1 Boiler #1 04a232-S1 Tank 001 04a233 Tank 002	<u>New Permits</u> Four New Hammermills New Fermentation and Distillation system New DDGS dryers and RTO New Fluid Bed Cooler New DDGS Silo New Boiler New Cooling Towers	

Air Construction Permits	04a234 Tank 003 04a235 Tank 004 04a236 Tank 005 04a237-S1 Ethanol Truck/Rail Loadout 04a1067 Boiler #2 04a1068 Hammermill #4 04a1069 Emergency Generator 05a862 Cooling Tower Drift 05a863 VOC Emissions from Equipment Leaks 05a864-S1 Haul Road Emissions		
Air Operating Permit	Not Required	Title V Air Operating Permit	The Title V Permit Application will be submitted within 12 months after startup of the Starch Expansion.
Surface Water	National Pollutant Discharge Elimination System (NPDES) Permit for Non-Contact Water Discharge (IA0078492)	The existing NPDES permit will be modified for the additional discharge volume. No change in discharge point is anticipated.	The permit must be revised before the expansion to the facility begins operation in 2009. NPDES revisions typically take between six and nine months to be issued after application submittal.
Surface Water	NPDES Permit General Permit #1 for Storm Water Discharge Associated with Industrial Activities	A revised application for coverage under General Permit #1 is not required.	
Surface Water	Storm Water Pollution Prevention Plan (SWPPP) required by General Permit #1	The SWPPP will be revised to include the Starch Expansion.	The SWPPP must be revised prior to start of operation.
Surface Water	NPDES General Permit #2 for Storm Water Discharge Associated with Construction	An authorization specific to Starch Expansion will be issued for construction activities.	The authorization for the General Permit #2 must be issued before the start of construction. Authorization typically takes less than one month to be issued after application submittal.
Surface Water	SWPPP for Construction required by General Permit #2	A SWPPP specific to Starch Expansion will be issued for construction activities	The construction SWPPP must be prepared prior to start of construction.
Surface Water	Spill Prevention, Control, and Countermeasure Plan (SPCC) required under 40 CFR 112	The existing SPCC plan will be revised to include the Starch Expansion.	The existing SPCC plan must be revised within six months after the start of operation the Starch Expansion.

Groundwater	Iowa Water Use Permit (Permit #8790)	The existing Water Use permit will be revised for water use associated with the Starch Expansion.	The existing Water Use permit must be revised before the water use from a new source can occur. Water use permits typically take between four and six months to be issued after application submittal.
Hazardous Waste	Hazardous waste, USEPA Identification (ID) Number IAR000504217 Conditionally Exempt Small Quantity Generator	No change will be required.	

2.1.2.4 Workforce Requirements

The construction workforce for the Starch Expansion is expected to be up to 200 people over a period of 12 to 14 months beginning in 4th calendar quarter 2008. This workforce will be derived from a combination of existing local and regional resources. The regional ethanol facility construction building activities of the last five years for POET D&C and other companies have developed a significant available workforce with experience in ethanol production facility construction.

The permanent workforce for the facility, following Starch Expansion, will be approximately 46 people. The facility employment prior to the Starch Expansion is 40 employees. The additional six employees are expected to be hired from existing local resources.

2.1.2.5 Project Design Features to Minimize Threat from Intentional Destructive Activities

The Starch Expansion will be constructed within the footprint of the Existing Plant. Therefore, the equipment and operations will have the same design features as the Existing Plant.

2.2 Proposed Action

As discussed in Section 1.1, the Proposed Action is DOE's proposal to provide financial assistance to POET for the construction and operation of an integrated biorefinery including a 25 MMgal/yr lignocellulosic ethanol production facility, a solid fuel boiler system that will use spent solids from the lignocellulose based ethanol system, and an anaerobic digestion system that will produce biogas from the treatment of wastewater for use on-site. Project LIBERTY would be located near the City of Emmetsburg, Iowa. The financial assistance would cover up to 40% of project costs and would not exceed $80 million.

This section will describe the different unit operations required to operate Project LIBERTY, the waste streams generated, and the estimated workforce requirements. Each portion of the project described below would be integrated into one working biorefinery with the Existing Plant and Starch Expansion. The basic components of the project would be:

- Lignocellulose Collection, Receiving, and Handling
- Lignocellulose Pretreatment
- Lignocellulose Fermentation
- Ethanol Distillation
- Ethanol Storage and Loading
- Anaerobic Digestion System

- Solid Fuel Boiler
- Supporting Infrastructure

Figure 5 – Project LIBERTY Process Flow Diagram, shows a process flow diagram for Project LIBERTY.

2.2.1 Project Overview and Purpose

The objectives of Project LIBERTY would be as follows:

- Transform an existing conventional dry mill corn-to-ethanol plant into a commercial scale biorefinery that integrates advanced corn-to-ethanol dry milling and lignocellulose-to-ethanol conversion technologies; the lignocellulosic feedstock would be corn cobs and could include corn fiber.
- Implement a sustainable corn cob collection, storage, and delivery system to provide feedstock to the biorefinery.
- Maximize alternative energy production and minimize traditional energy usage.
- Operate the cob collection and biorefinery systems to:
  - Validate the technology at commercial scale.
  - Validate the economics at commercial scale.
  - Enable replication of the technology at other existing corn-to-ethanol dry mills or new greenfield lignocellulosic-to-ethanol facilities.

2.2.2 Project Location and Site Plan

Project LIBERTY would be constructed immediately adjacent to the Existing Plant. Topographically, the project site is at approximately 1,200 feet AMSL. The site is relatively flat with a total elevation change of approximately 10 feet in the form of slightly rolling hills. The slope is generally downhill from northeast to southwest. Figure 6 – Plot Plan for Project LIBERTY shows the site location and proposed site layout.

The proposed site location is situated in an area that is generally rural agricultural crop land. Farmsteads and row crops, mostly corn and soybeans, are predominant in the area. The nearest school, hospital, and residential area are in the City of Emmetsburg, approximately one mile to the northeast of the proposed project location. AGP, a soybean processing facility, is located immediately to the north of the project site.

2.2.3 Proposed Plant Process Description

2.2.3.1 Lignocellulose Supply

Lignocellulose for Project LIBERTY would be derived from corn cobs and potentially corn fiber separated from the corn kernel. However, the facility may use corn cobs exclusively. Using corn cobs only would result in the greatest potential environmental impacts and is therefore the default condition used in this EA. The primary reason that using corn cobs only presents the greatest potential for environmental impacts is that additional truck transportation would be needed to move cobs to the facility compared to using fiber from the conventional plant.

If used, the corn fiber would be produced on-site thru a new BFrac™ corn fractionation process that would be built at the conventional ethanol production facility. The BFrac™ process is a proprietary system for separating the corn fiber and germ from the corn starch. The starch from the BFrac™ system would be used in the conventional ethanol production process at the Existing Plant and Starch Expansion. The fiber would be stored on-site in a silo, then conveyed to the lignocellulosic ethanol plant to be processed into ethanol. The BFrac™ facility would be capable of producing 190 bone dry tons (BDT)/day of corn fiber.

Corn cobs would be purchased from local farmers and brought to Project LIBERTY for processing.

2.2.3.2 Corn Cob Harvesting and Field Storage

Corn cobs would be harvested by farmers using multiple methods depending upon individual farmer selection:

- Corn cob mix (CCM) collection (grain and cobs collected simultaneously in combine hopper and unloaded to grain carts and/or wagons);
- Conventional harvesting practices with the incorporation of cob separation equipment, and/or
- Picking of whole ear corn.

In the cases of CCM collection and conventional grain harvesting practices with the incorporation of cob separation equipment, the cobs would be collected and then transferred to pile(s) at field edge using feedstock and cob handling equipment. CCM may be separated at field edge, using a screening process, whereby the cobs would be separated from the grain and piled at field edge. The grain would follow conventional harvesting practices. The pile(s) would remain at field edges for up to 10 months. The corn cobs would be loaded onto a semi-truck/trailer for delivery to Project LIBERTY.

In the case of whole corn, corn pickers would be utilized as the harvesting method. The ear corn would be delivered to the ethanol plant via live-bottom semi trailers during harvest (2 month timeframe).

2.2.3.3 Cob Delivery, On-site Storage, and Handling

Short-term storage for cobs at Project LIBERTY would be a silo structure, where the reduced matter can be conveyed to the ethanol production process. Long-term storage for cobs at Project LIBERTY may include multiple storage options, ranging from a covered, semi-enclosed structure (e.g. hoop building) to large, open-air cob piles.

The cobs would be delivered to the plant at a maximum receiving rate of 1,540 tons per day, which is double the maximum use rate. Upon receipt at the plant, the trucks/trailers would be unloaded into a receiving bay and conveyed to long-term storage. The cobs would be reclaimed from long-term storage using front end loaders and trucks, and deposited into a hopper. The cobs would be conveyed to milling equipment, which would reduce the cobs to the final size required for the ethanol production process. Post milling, the ground cobs would be conveyed to short-term storage for immediate processing.

CCM could be harvested by the farmer and delivered to the plant during harvest (2 month timeframe) using conventional grain handling equipment. Upon receipt at the plant, the trucks/trailers would be unloaded into a conventional grain handling system, where the CCM would then be conveyed to a stationary separator. Post-separator, grain would be weighed and sent to corn storage and the cobs would be conveyed to cob milling and short-term storage for immediate processing.

Upon receipt at the plant, ear corn would be dumped into hoppers feeding husking beds (if required) where it would be cleaned. The ear corn would then be conveyed to aerated on-site structures and aerated until appropriate moisture levels were reached (estimated to be 30-60 days aeration time). Aeration air would be low velocity and expected to contain minimal PM. Ear corn would be reclaimed from storage using front end loaders and trucks, then unloaded into hoppers feeding a corn sheller. The shelling process would produce PM. Pollution controls such as fabric filters (baghouses) would be used to control the dust emissions. After the shelling process, cobs would be returned back to storage using the ear corn conveying system referenced above. Cob handling processes would follow as discussed above. The shelled corn would be hauled via truck/trailer to the existing grain handling system.

The cob receiving and handling systems would produce PM. Pollution controls, such as fabric filters (baghouses), would be used to control the dust emissions where applicable.

2.2.3.4 Lignocellulose Pretreatment

Lignocellulose pretreatment is required prior to the fermentation process. Project LIBERTY would require a minimum of 770 BDT/day of lignocellulose. This may consist of all cobs or a mixture of cobs and up to approximately 190 BDT/day of corn fiber. The purpose of the pretreatment is to enhance the conversion of cellulose and hemicellulose to sugars for fermentation. The pretreatment process utilizes temperature and acidity to begin the lignocellulose conversion to these sugars. The pretreatment process would be completed inside the pretreatment building.

The ground cobs and fiber from the BFrac™ process would be mixed together with water in a blending vessel. The resulting slurry would be pumped through a series of agitated tanks which would allow chemicals to react with the cellulose and hemicellulose. The pretreated cellulose and hemicellulose would be pumped into the fermentation tanks.

Air emissions from the pretreatment process would include acid gases from the pretreatment vessels. The pretreatment emissions would be controlled using a wet scrubber.

The pretreatment process would require water to make the slurry. Water from the wet scrubber may be used for the mixing process. Scrubber water would be obtained from on-site water wells.

The pretreatment process requires the use of evaporative cooling towers for temperature control. Makeup water for the cooling towers would be obtained from on-site water wells. PM emissions from the cooling towers would be minimized through the use of high efficiency mist eliminators. The cooling tower blowdown would be discharged off-site through a permitted outfall to the West Fork Des Moines River

2.2.3.5 Lignocellulose Fermentation

The pretreated lignocellulose would be pumped to either a single fermentation system or several fermentation systems operating in parallel. The decision on the design of the fermentation system will be based on information gathered from continuing research and development activities. The potential environmental impacts and associated pollution control systems are expected to be the same regardless of fermentation system configuration. The fermentation process generates heat and requires the use of evaporative cooling towers for temperature control.

Project LIBERTY would use one or more yeast strains that are highly effective at fermenting sugars released from the pretreated cob and fiber. The yeasts would consume the available sugars and convert them into ethanol and CO_2. Project LIBERTY would also use one or more enzymes to promote fermentation and improve efficiency of the fermentation process. Multiple yeast strains and enzymes may be required if multiple parallel fermentation systems are used.

The yeast would be a mix of common brewers yeast (*Saccharomyces cerevisiae*) and a genetically modified form (GMO) derived from a common commercial brewers yeast. The genetic modification would be to enhance the ability of the yeast to preferentially metabolize sugars from the lignocellulose feedstock into ethanol before metabolizing sugars from a starch feedstock. Project LIBERTY would use commercially available yeasts purchased from outside vendors. Current commercially available GMO brewers yeasts have been approved as food additives by the US Food and Drug Administration (FDA) and are classified as Substances Generally Recognized as Safe (GRAS) per 21 CFR 170.36 (GRAS NOTICE No. GRN 000120). Strains of yeast are ubiquitous in the environment. The potential environmental impacts associated with the use of the GMO yeast strain designed for preferential metabolism of lignocellulosic sugars is expected to be the same as currently present from the use of common brewers yeast in the starch ethanol process.

The liquid from the fermenters, called beer, would be pumped to the distillation system. The gas stream from the fermenters would contain CO_2, some ethanol and fermentation byproducts, such as aldehydes and ketones, and would be vented to a wet scrubber. The water from the scrubber adsorbs the ethanol and other VOCs. The scrubber water would be reused in the fermentation process. This allows recovery of the ethanol and reduces water usage. After the scrubber, the gas stream would be routed to a RTO for further reduction in VOC concentration.

After fermentation, beer would be pumped to a storage tank (the beerwell) for the start of the distillation process.

2.2.3.6 Ethanol Distillation

Beer would be continuously pumped from the beerwell to the beer stripping column, where ethanol would be removed from the beer stream by vapor injection. The vapor introduced into the beer stripper would be either boiler steam or compressed process vapors. Vaporized ethanol and water from the beer stripper would be sent to the rectifying column. The stream leaving the bottom of the beer stripper would be whole stillage.

The rectifying column would provide additional distillation to yield a stream of approximately 190 proof (95%) ethanol. The ethanol, not vaporized in the rectifying column, would be sent to the side stripping column, where the remaining ethanol would be vaporized using steam, and introduced back into the rectifying column.

The 190 proof (95%) ethanol vapor from the rectifying column would be condensed and pumped to a surge tank. From this surge tank, ethanol would be pumped back to the distillation area where it would be again vaporized using steam. Under vacuum, the 190 proof (95%) ethanol vapor would be pulled through a molecular sieve where the remaining water vapor would be removed. The now anhydrous ethanol or 200 proof (100%) ethanol vapor would be condensed to a liquid and sent to the final product storage tanks.

The whole stillage from the bottom of the beer stripper would be pumped to a series of centrifuges. The centrifuges would separate the beer solids from the fermentation liquor. The liquid fraction, called thin stillage, would be reused in the process or pumped to an anaerobic digestion system. The solids cake would be conveyed to a solid fuel boiler for use as a fuel for steam production.

Water from the bottom of the side stripper would be recycled to the beginning of the pre-treatment process. Water from the molecular sieves would be released during a regeneration cycle and recycled back to the process.

Non-condensable gases from the distillation system and associated processes contain some ethanol and other VOCs. These gases would be vented to a wet scrubber or other pollution control device such as a thermal oxidizer. The control device would remove most of the ethanol and other VOCs from the gases, which would be vented to atmosphere.

2.2.3.7 Ethanol Storage and Distribution

The 200 proof (100%) ethanol from the distillation process would be pumped to a storage tank. Denaturant, usually unleaded gasoline, would be blended in-line with the ethanol as it is pumped to either the truck or rail load out rack.

The 200 proof (100%) ethanol and denaturant storage tanks would be located in a lined secondary containment structure for spill control. VOC emissions from the storage tanks would be minimized using floating roofs. Ethanol vapors expelled from the load out process would be vented to a flare system for pollution control.

2.2.3.8 Anaerobic Digestion

The thin stillage from the centrifuge process would contain small amounts of suspended and dissolved solids. These thin stillage solids from the lignocellulose plant are prime feed sources for an anaerobic digestion system. The biological organisms contained in the anaerobic digestion system would convert the organics in the mixed stream to biogas and clean waste water. This process is commonly used to treat waste streams because it reduces the overall volume of the waste product and creates a renewable form of methane-rich biogas.

The biogas stream would be mostly methane and CO_2, with small amounts of hydrogen and hydrogen sulfide. This gas would be collected in a gas surge tank. The biogas must be cleaned of impurities prior to its use in any process. A scrubbing system would be used to convert the hydrogen sulfide entrained in the biogas into elemental sulfur and water. The clean biogas (methane/ CO_2) from the scrubber would be compressed and

used as a replacement for natural gas in the plant's boilers and dryers. The elemental sulfur cake would be stored and sold as soil conditioner or fertilizer or disposed at a licensed landfill.

The digestate (solids) and process water remaining after the anaerobic digester would be further processed in several aerobic sequencing batch reactors (SBR). This final process step would further purify the digestate and process water. The effluent water would be pumped through a reverse osmosis (RO) system which concentrates the impurities in the water stream. The clean water would be transferred to a permeate tank for recycling back into the process. The concentrated waste water would be pumped to a brine tank.

The solids discharged from the SBR tanks would be conveyed to a sludge tank. The sludge would be processed through a series of presses. The solids would be mixed with brine from the RO stream in a mixer and stored until it can be transported off-site for beneficial reuse as a soil nutrient, used as fuel in the solid fuel boiler, or disposed at a licensed landfill. The liquid stream created in the press would be pumped back to the anaerobic digester tank for further use.

2.2.3.9 Solid Fuel Boiler

The solid fuel boiler system may utilize corn fiber, cobs, biomass (wood), solids cake from the lignocellulose centrifuges, and digestate sludge from the anaerobic digestion system in combination to generate steam. The steam would be used in the lignocellulose plant for distillation and other processes requirements.

Each of the solid fuel feed constituents are stored in tanks or silos near the boiler building. The various fuels would be combined in a mixing conveyor and transported onto a water-cooled, vibratory grate conveyor in the boiler. The solid fuel would be burned using combustion air to produce steam.

The exhaust from the boiler would be vented to an electrostatic precipitator (ESP) to remove PM. The solid fuel boiler would also be a source of NO_X, SO_X, CO, and VOCs. The SO_X would be controlled by the addition of soda ash (Trona) into the exhaust gases for adsorption of sulfur prior to the ESP unit. A brief description of soda ash and its properties is provided below.

> *"The commodity called "soda ash" is anhydrous sodium carbonate (that is, sodium carbonate without water, (Na_2CO_3). It is made both by the processing of the minerals trona ($Na_3H(CO_3)_2.2H_2O$) and nahcolite ($NaHCO_3$)." (*Source: Mineral Information Institute)

The ash from the boiler and the ESP would be conveyed into a storage silo, until it can be transported off-site for either beneficial reuse as a soil nutrient or to a licensed landfill.

2.2.3.10 Supporting Infrastructure

Project LIBERTY would require supporting infrastructure including process water, potable water, electricity, natural gas, non-contact cooling water discharge systems and sanitary wastewater treatment systems.

POET D&C would install a new production well (PW#4) to supply process water. Potable water would be provided by the District via the existing pipeline to the Existing Plant. POET D&C would construct a new substation on-site to provide electricity. No new transmission lines are expected to be required.

As a backup to the solid fuel boiler and the anaerobic digester system, Project LIBERTY would require a supplemental natural gas system. POET would contract with NNG to provide this backup natural gas supply. NNG is proposing to construct approximately 2 miles of 16 inch pipeline near Welcome, Minnesota and approximately 8.8 miles of 6 inch pipeline near Emmetsburg, Iowa to support Project LIBERTY. This pipeline would be in addition to the pipeline added for the Starch Expansion. The proposed pipelines would be constructed next to the existing NNG natural gas lines in their existing right of way. NNG does not anticipate requiring any new right of way or easements for these lines. The location of the proposed lines is shown on Figure 4.

Non-contact cooling water would be discharged through the existing discharge line. No new non-contact cooling water discharge infrastructure is expected to be required. POET D&C would construct a new mound type septic system for sanitary wastewater generated by Project LIBERTY.

2.2.3.11 Start up, Shutdown, Maintenance, and Emergency Conditions

Project LIBERTY would normally operate 24 hours per day, seven days per week. On an annual basis, it is expected that the facility would operate approximately 350 days per year. Minor maintenance activities would be regularly scheduled throughout the operating year with an additional plant-wide shutdown scheduled each year for major maintenance activities that require the entire plant to be off-line. This would limit the number of times the facility goes through a complete start up and shut down cycle.

Similar to the Existing Plant, SOPs would be developed for each operating system and the associated pollution control systems. The SOPs for the cob and fiber receiving, handling, and processing system would be similar to those for corn receiving, handling, and processing operations. New SOPs would need to be developed for:

- The pretreatment, fermentation, and distillation systems;
- The solid fuel boiler and ash handling systems; and
- The anaerobic digester.

The pollution control systems (fabric filters) associated with cob and corn fiber receiving, handling, storage, and milling would be interconnected with the motor controls on the process equipment. Shutdown of the pollution control device would automatically shut down the associated process.

Similar to the conventional plant, the Project LIBERTY fermentation and distillation systems would have two pollution control systems in series; a wet scrubber and an RTO. Project LIBERTY anticipates that an RTO shutdown would occasionally be required for maintenance, while the fermentation and distillation systems are still in operation. The wet scrubber would continue to be operated to minimize air emissions during times of RTO shutdown. The anaerobic digester would normally provide gas for facility operations. In the event that the boiler or other combustion sources are not in operation, the gas from the digester would be vented to a flare.

The spent lignocellulose from Project LIBERTY would normally be combusted in the solid fuel boiler. Operation of the solid fuel boiler would require the use of pollution control systems for PM control and sulfur removal. In the event that the solid fuel boiler is not operational, the spent lignocellulose would be beneficially reused as a soil amendment on farm fields or disposed in a licensed landfill. Long-term, on-site storage of the lignocellulose is not anticipated to minimize the potential for odor impacts.

2.2.4 Construction

2.2.4.1 Preconstruction Surveying and Geotechnical Analysis

The site where Project LIBERTY would be constructed is well documented. Information regarding the topography, geotechnical conditions, and underground utilities were developed during the construction of the Existing Plant. This information would be used to guide the preconstruction activities for Project LIBERTY.

POET D&C would complete pre-construction surveys and geotechnical analysis for the site including soil borings and compression testing. A topographical survey of all new construction areas would be completed prior to preparation of a grading plan. A wetland survey of the entire project site has been completed with only one small area of wetlands being identified on the Project LIBERTY portion of the project site. POET D&C does not anticipate the need for any access roads or other site disturbances to complete the topographical survey and geotechnical evaluations. POET D&C does not anticipate impacting the identified wetlands during the construction of Project LIBERTY.

2.2.4.2 Grading and Earthworks

The site grading design would be completed to minimize the impact to the surrounding environment. Much of the area being used has already been developed with the original ethanol plant construction, although there are areas which would be converted to other uses as part of Project LIBERTY. The amount of additional land

that would be cleared, graded, or otherwise disturbed for the construction of Project Liberty is approximately 60 acres. This includes construction laydown areas, new roads, and process areas. After completion of construction, the disturbed areas that will not be used for Project LIBERTY operations (approximately 5 acres) will either be seeded with native grasses or leased to local farmers for row crop agriculture. Post-construction, the developed portion of the site would grow from approximately 120 acres to 175 acres.

POET D&C would obtain authorization from the IDNR for a NPDES General Permit #2 for Storm Water Discharge Associated with Construction before initiating any construction. An Erosion and Sedimentation Control Plan, and SWPPP would be developed prior to starting construction as required by the General Permit #2. POET D&C would utilize engineering and construction Best Management Practices (BMPs) to control the amount of sedimentation and erosion created by the construction process. The BMPs would include, but not be limited to:

- minimizing traffic and activity outside the construction area;
- using silt fencing, hay bales, rip rap; and/or
- sedimentation ponds.

In accordance with Iowa stormwater regulations and the SWPPP, POET D&C would routinely inspect the BMPs to ensure implementation and to evaluate whether additional measures would be required to prevent unnecessary impacts.

2.2.4.3 Roads and Facility Access

The Existing Plant currently has entrances on Palo Alto County 380th Street and Palo Alto County 470th Avenue. The primary entrance for trucks is off of 380th Street. These two property entrances would be used in the construction and operations of Project LIBERTY. Currently, there are approximately 13,000 feet of 30 foot wide gravel roads on the Existing Plant site. POET D&C anticipates construction of approximately 7,500 feet of 30 foot wide new roads for Project LIBERTY. POET D&C plans to pave the existing roads and all new roads during Project LIBERTY with bituminous asphalt. This would reduce the amount of fugitive dust generated from truck traffic on-site. It would also help reduce the potential for sediment entrainment in stormwater.

Independent of the Proposed Action and Project LIBERTY, Palo Alto County has plans to address road improvement needs associated with the facility. A copy of the road improvement map is included in Appendix F. These include reconstruction and paving of 480th Avenue north of Highway 18 to the Clay County line. The current T located at 340th St will be eliminated, to allow traffic a direct route from the north to the facility. In addition, the mile of 390th Street just east of Highway 4 and the mile of 470th Avenue that borders the facility on the west (between 380th and 390th streets) will be paved. The intersection of 390th Street and 470th Avenue will be a curved intersection to efficiently handle truck traffic.

The Chicago, Rock Island, and Pacific Railroad enters the property in the southeast corner. It runs through the property to the northwest until it exits the site at the Palo Alto County 380th street boundary. Currently, there are approximately 16,000 track feet on the existing plant siding. Project LIBERTY would add approximately 13,000 track feet of new rail siding on the plant site.

2.2.4.4 Major Buildings and Structures

Project LIBERTY would include the construction of new buildings and exterior tanks, similar in size and configuration to those in the existing ethanol plant. The table below outlines the major buildings and equipment that would be added to the site as a result of Project LIBERTY.

Table 2-3 Summary of Project LIBERTY Structures

Structure	Description	Structure Size
Cob Unloading Building	Equipment for unloading cobs, moving cobs to and from storage, and pollution control equipment	17,000 square feet ($ft^{2)}$
Cob Storage	Structures for long-term cob storage	25 acres
Corn Fractionation Building	Processing equipment to separate corn into its fractions, control room, lab	15,000 ft^2
Corn Fiber and Germ Tanks	Silos housing corn fiber, wet and dried corn germ	Germ Silo = 55' diameter x 112 ' tall, Fiber Silos = 15' diameter x 25' tall (qty =4)
Corn Germ Drying Equipment	Processing equipment which dries corn germ	Germ dryer, etc = 4,000 ft^2
Wet Fiber Pad	Concrete pad for off spec product	3,500 ft^2
Lignocellulose Ethanol Process Building	Processing equipment for lignocellulose conversion, control room, lab	55,000 ft^2
Lignocellulose Ethanol Distillation Building	Processing equipment for extracting ethanol	12,600 ft^2
Process Tanks	Pretreatment Tanks 10 Fermentation Tanks, Yeast Tanks	Beerwell tank = 46' diameter x 55' tall, Fermentation tanks = 46' diameter x 46' tall each Thin Stillage tank = 40' diameter X 48' tall
Ethanol Storage Tanks	Denaturant Tank, 200 Proof (100%) Ethanol Product Tank	95' diameter x 40' tall (2 MMgal)
Cooling Tower	Structure to cool water by evaporation	5,000 ft^2
Solid Fuel Boiler Unit Operation	Equipment for processing solid fuels into steam, contains boiler, pollution control equipment, conveyors, and stacks	9,000 ft^2
Anaerobic Digestion Process Building	Equipment for processing lignocellulose waste streams, lab	30,000 ft^2
Anaerobic Reactor tanks	Tanks for processing lignocellulose waste stream	30,000 ft^2
Biogas Surge Tank	Surge tank for biogas generated in the anaerobic digester	20' diameter x 20' tall
Dewatering Building	Equipment for dewatering lignocellulose sludge	2,800 ft^2
Biogas Process Building	Equipment for cleaning biogas	15,200 ft^2
Sulfur Storage Building/Pad	Storage for elemental sulfur	3,750 ft^2
Thermal Oxidizer	Pollution control equipment	Starch: 3,840 ft^2 Cellulose: 5,000 ft^2

Pending final design and configuration requirements, small concrete pads, steel structures, or tanks may be installed in conjunction with the major buildings and equipment listed above.

2.2.4.5 Construction Schedule

The engineering and construction schedule is broken into five different areas of unit operation, corn fiber feedstock, lignocellulose ethanol, cob feedstock collection, solid fuel boiler, and biogas production and process water recycle. Each of these processes is interdependent, so they must be completed and ready for commissioning at the same time. However, each unit operation division may have a different start date.

Once the appropriate environmental permits have been obtained, the civil contractor would prepare the site for the required infrastructure. Topsoil would be stripped, ditches and ponds established, and erosion control devices installed. Underground utilities would then be installed in preparation for concrete foundations. The construction would then follow the proceeding order:

Table 2-4 Proposed Construction Schedule

Unit Operations	Start Date	Finish Date
Corn Fiber Feedstock	Third Quarter 2010	Third Quarter 2011
Cob Feedstock Collection	Third Quarter 2010	Third Quarter 2011
Solid Fuel Boiler	Second Quarter 2010	Third Quarter 2011
Biogas Production & Process Water Recycle	Second Quarter 2010	Third Quarter 2011
Lignocellulosic Ethanol	First Quarter 2010	Third Quarter 2011

This timeline is based on the engineering and procurement schedule established by POET D&C.

2.2.4.6 Construction Staffing

POET D&C would have full time construction management on-site throughout the entire duration of the project. POET D&C would construct a "contractor" lay down area near the west facility entrance from 470th Street where temporary job trailers and warehouses would be erected and construction materials and equipment would be pre-positioned for use on the project. POET D&C would establish a temporary office on the site where all personnel entering the construction work zones must report. It is POET D&C policy for all construction labor to park their vehicles in the established contactor area. Only construction equipment and supervisor vehicles are allowed in the construction zones.

At the peak of construction, POET D&C would employ six people on-site full time. The sub-contractor labor force would average around 200 employees, with a peak of nearly 325. This workforce would be derived from a combination of existing local and regional resources. The regional ethanol facility construction activities of the last five years for POET D&C and other companies have developed a significant available workforce with experience in ethanol production facility construction.

2.2.5 Operations

2.2.5.1 Material Balance and Logistics

Table 2-5 summarizes resources and products that Project LIBERTY would require for the production of 25 MMgal/year of denatured lignocellulosic ethanol. Additional details are presented in the following paragraphs.

Table 2-5 - Summary of Project LIBERTY Material Balance

Input Description	**Conventional Plant With Starch Expansion**	**LIBERTY**	**Cumulative**
Corn	40 MMBu/year	0 tons/year	40 MMBu/year
Corn Cobs and Corn Fiber	0 tons/year	0.34 million tons/year	0.34 million tons/year
Process Water	1.0 MMgal/day	0.44 MMgal/day	1.4 MMgal/day
Potable Water	1,840 gpd	1,200 gpd	3,040 gpd
Fermentation Enzyme	2.6 tons/day	46 tons/day	48.6 tons/day
Ethanologen (yeast)	3,700 lbs/week	12,000 lbs/week	15,700 lbs/week
Lignocellulose Pretreatment Chemicals	0 tons/day	46 tons acid/day 106 tons base/day	46 tons acid/day 106 tons base/day
Denaturant (gasoline or natural gas liquids)	7.8 MMgal/year	1.2 MMgal/year	9.0 MMgal/year
Process Chemicals (Acids, bases, detergents, etc.)	56,000 gallons/week	16,000 gallons/week	72,000 gallons/week
Natural gas usage	9,800 MMBtu/Day	Backup Supply Only	9,800 MMBtu/day
Fuel for Solid fuel boiler	0 tons/day	500 tons/day lignocellulose cake 80 tons/day cobs 50 tons/day digester sludge	500 tons/day lignocellulose cake 80 tons/day cobs 50 tons/day digester sludge
Electricity	17 MWh/hour	4.9 MWh/hour	22 MWh/hour
Output Description	**Conventional Plant With Starch Expansion**	**Facility Products**	**Cumulative**
Ethanol @ 5% Denaturant	99.3 MMgal/year	25 MMgal/year	124.3 MMgal/year
E-85	10.7 MMgal/year	0 MMgal/year	10.7 MMgal/year
Corn Germ	0 tons/year	113,750 tons/year	113,750 tons/year
DDGS	0.34 million tons/year	-0.11 million tons/year	0.23 million tons/year
Waste Material Description	**Conventional Plant With Starch Expansion**	**Annual Production**	**Cumulative**
Non-contact cooling water discharge	0.24 MMgal/day	0.13 MMgal/day	0.37 MMgal/day
Non-hazardous solid waste	25 tons/week	25 tons/week	50 tons/week

Non-hazardous liquid waste from pre-treatment	0 tons/day	82 tons/day	82 tons/day
Boiler Ash	0 tons/week	16 tons/day	16 tons/day
Sulfur	0 tons/week	8 tons/day	8 tons/day
Air Potential Emissions			
PM	133.7 tons/year	182.7 tons/year	316.4 tons/year
PM_{10}	107 tons/year	181.6 tons/year	288.6 tons/year
NO_x	164.7 tons/year	167 tons/year	331.7 tons/year
CO	149.4 tons/year	210 tons/year	359.4 tons/year
VOCs	179.7 tons/year	51.3 tons/year	231 tons/year
SO_2	2.9 tons/year	107.5 tons/year	110.4 tons/year
GHGs			
CO_2 Biogenic CO_2 Anthropogenic CO_2	 328,700 tons/year 305,300 tons/year	 279,500 tons/year 0 tons/year	 608,200 tons/year 305,300 tons/year
Methane	34.1 tons/year	0 tons/year	34.1 tons/year
Nitrous Oxide	0.6 tons/year	0 tons/year	0.6 tons/year

Project LIBERTY is an integrated biorefinery, thus each of the unit operations feed each other and are interdependent.

Corn fiber would be produced at the Existing Plant following the construction of a BFrac™ separation system. The BFrac™ system separates the corn fiber and germ from the kernel leaving the starch portion for use in conventional corn-to-ethanol production. The lignocellulosic ethanol plant would require a maximum of 190 bone dry tons of fiber per day. The starch would be used at the Existing Plant for fuel ethanol production. The corn fiber would be conveyed directly to Project LIBERTY for use.

Cobs would be delivered by truck and unloaded in a new unloading building. The lignocellulosic ethanol plant would require a maximum of approximately 770 BDT of cobs per day. Partially ground cobs would be delivered approximately six month per year at a rate of up to 90 trucks per day. Cobs sized for long-term storage would be delivered only during harvest at a rate of up to 90 trucks per day. Because there may be overlap of these two cob feedstocks, as many as 170 trucks may be unloaded on any one day for a short time of the year. Most of the daily cob requirements would be met by the long-term storage piles on-site and conveyed to their required destination.

The lignocellulose plant would utilize a maximum of 0.44 MMgal/day of groundwater withdrawn from production wells located on the plant site. POET D&C would install a new production well (PW#4) to meet this need. The groundwater would be pre-treated with a RO system and used as make-up water for the plant's cooling tower and solid fuel boiler.

Chemicals and other processing aids would be required for the process. Lignocellulose pretreatment chemicals would be used at a rate of approximately 72,000 gpd. The acid used for pretreatment would be neutralized in-situ using a base (potassium hydroxide or sodium hydroxide) prior to separating the solids from

the liquor. The resulting KSO_4 or $Na(SO_4)$ remains in solution and ultimately ends up in the anaerobic digester. Project LIBERTY would design an acid recycle system to minimize acid and base use to the degree possible.

Fermentation enzymes, used to free sugars from the fiber, would be added at a rate of approximately 46 tons per day. Approximately 1.5 tons of the ethanologen (yeast) would be required for start up of the fermentation system in 2011, with an additional 12,000 lbs of ethanologen (yeast) required per week thereafter. Finally, acid and caustic would be utilized for processing and cleaning. Acid and caustic would be used at approximately 2,300 gpd in total. The chemicals and yeast would be brought to the site via trucks and would be stored in above ground tanks.

The anaerobic digestion plant would receive all of its inputs from other systems on-site. The mixed lignocellulose, thin stillage, and solids, plus other process streams from the starch ethanol plant and lignocellulose plant would be pumped to the anaerobic digestion system at a rate of approximately 1.6 MMgal per day. The stillage liquids and solids are processed in the anaerobic system using the approximately 1,600 tons of bacteria sludge. The sludge would be loaded into the digesters prior to facility start up. This process would not require fresh or process water.

The solid fuel boiler would be dependent on other operations at the facility. The inputs to the system would be generated by the cob handling system, lignocellulose ethanol, and anaerobic digestion plants. The cake, generated in the lignocellulose plant, would be conveyed to the solid fuel boiler at a rate of approximately 500 tons per day (~45% solids). It would be mixed in the fuel spreader with approximately 80 tons of cobs and 65 tons of anaerobic digestate sludge per day. The boiler would require a maximum of 0.14 MMgal per day of boiler make up water per day. This water would be drawn from on-site water wells. Boiler treatment chemicals would be added into the feed water in minimal amounts. These chemicals would be utilized from 55 gallon drums and shipped to the site on trucks. Start up gas requirements would normally be drawn from the anaerobic digestion biogas. Project LIBERTY would have a backup supply of natural gas available to operate the facility in the event that both the solid fuel boiler and the anaerobic digester system were off-line and for startup conditions. POET D&C would contract with NNG to provide this natural gas. NNG is proposing to construct approximately 2 miles of 16 inch pipeline near Welcome, Minnesota and approximately 8.8 miles of 6 inch pipeline near Emmetsburg, Iowa to support Project LIBERTY. These pipelines would be in addition to those installed for the Starch Expansion.

The lignocellulose ethanol plant would generate approximately 72,000 gallons of 200 proof (100%) ethanol per day. The product would be pumped to an existing storage tank before being denatured with gasoline. Denaturant, usually unleaded gasoline, would be blended in-line with the ethanol as it is pumped to either a truck or rail load out rack at a rate of approximately 5% (volume/volume).

Biogenic CO_2 gas would be released to the atmosphere at a rate of approximately 240 tons per day after the wet scrubber and thermal oxidizer. Project LIBERTY would not capture this gas.

The lignocellulose cooling tower would release approximately 0.025 MMgal per day of water cooling (blowdown) to control mineral content buildup in the circulating cooling water. This non-contact cooling water would be discharged with the other non-contact water streams from the plant to a permitted outfall which would ultimately discharge to the West Fork of the Des Moines River.

Following the anaerobic digestion system a RO system would filter and clean the liquid phase. The system would produce approximately 1.5 MMgal per day of process water, which would be recycled back into the lignocellulose ethanol plant. The reject water from the RO system would be further concentrated and the resulting waste stream would be disposed off-site or beneficially reused. Additionally, approximately 320 tons (25% solids) of digestate sludge would be created per day and sent to the solid fuel boiler or a collection tank. In the event the sludge cannot be used in the boiler, it would be trucked off-site for beneficial reuse or for disposal in a licensed landfill. Beneficial reuse means a specific utilization of a solid byproduct as a resource that would otherwise be considered to be a waste in a manner that constitutes reuse rather than disposal and does not adversely affect human health or the environment. Byproducts from Project Liberty, such as

digester sludge, sulfur, boiler ash, etc, may be able to be used as a soil amendment or in an industrial application such as cement product manufacture.

The digester would produce a methane/carbon monoxide biogas at a rate of approximately 440 tons per day. This gas would be cleaned, compressed, and piped to dryers and boilers located in the plant. Elemental sulfur would be a byproduct of the biogas cleaning process and would be shipped offsite for sale or beneficial reuse for purposes such as a soil amendment. Elemental sulfur would be produced at a rate of approximately 8 tons per day.

The solid fuel boiler would create limited products. Steam would be generated at a rate of approximately 130,000 pounds per hour. The generated steam would be piped throughout the plant and used where needed. Condensate would be captured and returned to the de-aeration tank or absorbed in the process.

Boiler ash would be a byproduct of the combustion process. Ash would be collected at a rate of approximately 16 tons per day and shipped off-site by truck. An average of four trucks per week would be required to transport the ash. The ash would be disposed in a licensed landfill if not appropriate for beneficial reuse.

Additionally, the boiler would have a water blow down at a rate of approximately 3,600 gpd. This non-contact water stream would be reused in the ethanol distillation process.

2.2.5.2 Permits, Approvals, and Plans

Similar to the Starch Expansion discussed in Section 2.2.3, Project LIBERTY would require a number of environmental permits, approvals, and plan revisions for construction and operation. The permits, plans, and approvals include:

- Air emission unit construction permits
    - o Lignocellulose receiving, processing, and handling;
    - o Lignocellulose pretreatment systems;
    - o Fermentation and distillation systems;
    - o Solid fuel boiler; and
    - o Anaerobic digester
- Revised Title V Operating permit
- Revised NPDES Permit for Non-Contact Water Discharge
- Revised SWPPP for the entire Emmetsburg biorefinery complex
- Authorization under the NPDES General Permit #2 for Storm Water Discharge Associated with Construction
- Project specific SWPPP for Construction required by General Permit #2
- Revised SPCC plan for the entire Emmetsburg biorefinery complex
- Revised Iowa Water Use Permit (Permit #8790)

The above permits and revisions would be completed in approximately the same timeframes as discussed in Table 2-2.

No impacts to the identified wetlands would be anticipated for Project LIBERTY. Therefore, a permit would not be required from the United States Corps of Engineers (USACE) or the IDNR for wetland impacts.

2.2.5.3 Operational Workforce

The permanent workforce for Project LIBERTY would be approximately 30 additional employees. The surrounding area has sufficient population and skilled personnel to hire the necessary people from existing local resources.

2.2.5.4 Project Design Features to Minimize Threat from Intentional Destructive Activities

The Proposed Project would be designed to include measures to minimize potential threats or damages from intentional destructive acts (i.e. acts of sabotage or terrorism). The facility design would include security fences, security lighting, and communication procedures with the local 911 emergency response system. In addition, the facility would be manned 24 hours per day and equipped with automation that allows remote emergency shutdown and cutoff of process units and loading racks.

2.3 Alternatives Considered but Eliminated

2.3.1 Cob Delivery and Storage Alternatives

Multiple cob delivery scenarios have been evaluated and rejected. These scenarios have included:

- Using contractors exclusively to haul all cobs to the facility. This option was too restrictive for local farmers who have the capability to handle and haul their own products. The option may have resulted in the haul trucks traveling greater distances.

- Cob storage in one-time use tarp covered piles. Once the tarp has been opened the entire contents of the pile must be recovered. This option was rejected because it limited flexibility and would generate excess solid waste in the form of the used tarps.

2.3.2 Alternative Project Location

Successful development of the Combined Biorefinery would require an available workforce, sufficient constructible land for the facility, sources of lignocellulose compatible with the proposed process, and infrastructure including rail service, surface roads, water for process and cooling requirements, and electric power.

The area population is sufficient to provide the necessary workforce for the proposed action. As noted in section 2.2.5.3 approximately 30 additional permanent jobs would be added for Project LIBERTY. POET has confirmed that the available population and required skilled workers in the vicinity of Emmetsburg are sufficient to meet these needs.

POET has secured options on 330 acres of property adjacent to the Existing Plant which is large enough for Project LIBERTY. Geotechnical evaluations completed for the Existing Plant confirm that the land is suitable for construction. The property does not have any noteworthy cultural resources, wetlands, threatened and endangered species, or other environmental constraints.

Sufficient, appropriate lignocellulose for the project is available from the surrounding farms and from the Existing Plant. Finally, POET D&C has ascertained that the Emmetsburg site has the necessary infrastructure, including roadways, rail, and water to support this project.

Since the Emmetsburg site would meet the needs of Project LIBERTY and the viability of other sites is unknown with regard to personnel resources, lignocellulose availability, land availability, constructability, and infrastructure, other sites were not evaluated for the Project LIBERTY.

3.0 Affected Environment and Environmental Consequences of the Alternatives

3.1 Safety and Occupational Health

3.1.1 Affected Environment

The Existing Plant is located approximately 1 mile southeast of the City of Emmetsburg. Emergency services are provided by the Emmetsburg Fire and Police Departments. The Emmetsburg Fire Department is a volunteer service operated entirely by 21 active and certified volunteers. The department is housed at the Fire Station at 10th & Grand. The Existing Plant has met with local emergency responders and established communication protocols and responsibility matrices.

Occupational health services are provided by the Palo Alto County Hospital located in Emmetsburg. Emergency medical services are also provided by the Palo Alto County Hospital. The Palo Alto County Hospital has:

- County-wide Pre-hospital Emergency Medical Services
- Five Advanced Care Ambulances throughout Palo Alto County
- Additional Ambulances located in Emmetsburg, Graettinger, Ruthven, and West Bend
- First-Responder/ automated external defibrillator (AED) services, Cylinder, and Mallard
- Two Advanced Cardiac Life Support (ACLS) Certified/Conditional Paramedic Ambulances located in Emmetsburg

The City of Emmetsburg has an Emergency Management Director. The Emergency Management Director's job is to coordinate county disaster services and emergency planning for such events as floods, fire, earthquakes, tornadoes, hurricanes, drought, epidemics, electrical or computer outages, and terrorist attacks. The Director also provides emergency preparedness plans and coordinates the 911 rural addressing system. The Director's primary goal is to prevent injuries, save lives, and reduce property damage in the community during emergency situations.

The Existing Plant has a health and safety coordinator. In addition, POET PM has a health and safety program manager located in Sioux Falls, South Dakota to provide technical support to the facility. The Existing Plant has developed an Integrated Contingency Plan (ICP) and Emergency Response Plan (ERP) for the facility that describes planning and procedures to be followed in the event of an emergency including:

- Spills or releases of hazardous materials,
- Fire/Explosion,
- Tornadoes,
- Severe Weather,
- Medical Emergency, and
- Bomb Threat.

The emergency response coordinator and alternates are identified, responsibilities are described, and appropriate emergency service contact information is provided.

The Existing Plant also has established safety and emergency response procedures for construction activities, excavation and trenching, electrical, hazardous chemicals, hot work permits, fall prevention, proper

equipment usage, confined space entry, fire protection and prevention, and hearing and respiratory protection for employees, contractors, and visitors.

3.1.2 Environmental Consequences of the No Action Alternative

The chemicals and chemical processes used to produce ethanol create a potential for health and safety hazards. The hazards related to hazardous material storage and handling are further discussed in Section 3.7. However, in summary, the hazardous materials generally fall into two categories, flammable or reactive. The ethanol, denaturant, gasoline, and diesel fuel are flammable. Many of the process chemicals are reactive, i.e. acids or bases.

POET PM will revise the existing ICP and ERP to address the medical and environmental hazards associated with the Starch Expansion. The revisions will be completed in accordance with federal and Iowa Occupational Safety and Health Administration (OSHA) and USEPA regulations and guidance. POET PM will also review and revise the safety and emergency response procedures for construction activities, excavation and trenching, electrical, hazardous chemicals, hot work permits, fall prevention, proper equipment usage, confined space entry, fire protection and prevention, and hearing and respiratory protection for employees, contractors and visitors.

The existing emergency response capabilities of the City of Emmetsburg and Palo Alto County are expected to remain in place and available to the Existing Plant, if needed.

3.1.3 Environmental Consequences of the Proposed Action Alternative

Similar to the Starch Expansion, the chemicals and chemical processes used to produce ethanol for Project LIBERTY create a potential for health and safety hazards. For Project LIBERTY, the hazards related to hazardous material storage and handling are further discussed in Section 3.7. However, in summary, the hazardous materials generally fall into the same two categories as the Starch Expansion, flammable or reactive. The ethanol, denaturant, gasoline, and diesel fuel are flammable. Many of the process chemicals are reactive, i.e. acids or bases.

POET PM would review and revise the existing ICP and ERP to address the medical and environmental hazards associated with Project LIBERTY. The revisions would be completed in accordance with federal and Iowa OSHA and USEPA regulations and guidance. POET PM would also review and revise the safety and emergency response procedures for construction activities, excavation and trenching, electrical, hazardous chemicals, hot work permits, fall prevention, proper equipment usage, confined space entry, fire protection and prevention, and hearing and respiratory protection for employees, contractors and visitors.

The existing emergency response capabilities of the City of Emmetsburg and Palo Alto County are expected to remain in place and available to Project LIBERTY, if needed.

3.2 Meteorology

3.2.1 Affected Environment

Meteorology for the Emmetsburg area features typical mid-continent weather patterns with large ranges of temperatures between summer and winter. Severe weather events, such as thunder storms, are common in summer and Palo Alto County historical area-adjusted tornado activity is slightly above the Iowa state average. It is 3.0 times above the overall U.S. average (City Data.com 2007).

Climate data for Emmetsburg and surrounding area shows that average monthly mean temperature ranges from 13 degrees Fahrenheit (°F) to 72°F. Winter months (December through February) are the coldest with average monthly low temperatures ranging from 4°F to 10°F and high temperatures ranging from 23°F to 30°F. The warmest months are the summer months of June through August. During those months, the average monthly temperature ranges from 58°F to 62°F and high temperatures range from 80°F to 83°F. Average annual precipitation is approximately 31 inches. December through February have the lowest

precipitation rate with an average of 0.84, 0.83, and 0.69 inches, respectively, most of which is in the form of snowfall of 7.3, 8.2, and 5.5 inches (Midwestern Regional Climate Center, 2007).

Wind data shows that the prevailing winds are from the south in summer and the northwest in winter. (Figure 7 – Wind Rose for Mason City, Iowa, IDNR, Unspecified Date c).

3.2.2 Environmental Consequences of the No Action Alternative

No aspect of the No Action Alternative would affect the climate or weather of the region. No impacts to meteorology would be expected to occur under the Proposed Action.

Severe weather, such as thunderstorms or blizzards, may temporarily impact operations by limiting delivery of supplies, impeding shipments of either ethanol or DDGS, or causing disruption of electrical or natural gas service. These types of impacts would be expected to last for less than 24 hours but could extend for up to several days. Although these impacts may occur in any given year, operational planning allows normal operations to resume with minimal impacts. In the event of severe weather, the Existing Plant has prepared an ERP to protect their employees and the public. The Existing Plant has not experienced severe impacts due to inclement weather since becoming operational in 2005.

In the event of a tornado, the Existing Plant has prepared an ERP to protect their employees and the public. Due to the extremely unpredictable and localized nature of tornados, the potential for severe impacts to the facility are considered to be minor.

3.2.3 Environmental Consequences of the Proposed Action

No aspect of the Proposed Action would affect the climate or weather of the region. No impacts to meteorology would be expected to occur under the Proposed Action due to the Proposed Project.

Similar to the No Action Alternative, severe weather, such as thunderstorms or blizzards, may temporarily impact operations by limiting delivery of supplies, impeding shipments of either ethanol or DDGS, or causing disruption of electrical or natural gas service. These types of impacts would be expected to last for less than 24 hours but could extend for up to several days. Although these impacts may occur in any given year, operational planning would allow for normal operations to resume with minimal impacts. POET PM would modify its ERP, as necessary, to protect their employees and the public in the event of severe weather.

3.3 Air Quality

3.3.1 Affected Environment

3.3.1.1 Ambient Air Quality

The Clean Air Act required the USEPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. NAAQS include two types of air quality standards. Primary standards protect public, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (USEPA, 2008a). USEPA has established and Iowa has adopted NAAQS for seven principal pollutants, which are called “criteria pollutants”.

Table 3-1- National Ambient Air Quality Standards

Pollutant	Primary Stds.	Averaging Times	Secondary Standards
CO	9 part per million (ppm) (10 milligram per cubic meter mg/m^3)	8-hour[(1)]	None
	35 ppm (40 mg/m^3)	1-hour[(1)]	None
Lead	1.5 microgram per cubic meter (µg/m^3)	Quarterly Average	Same as Primary
NO_X	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean [Arith.]))	Same as Primary
PM_{10}	Revoked[(2)]	Annual[(2)] (Arith. Mean)	Revoked[(2)]
	150 µg/m^3	24-hour[(3)]	Same as Primary
Particulate matter less than 2.5 micron ($PM_{2.5}$)	15.0 µg/m^3	Annual[(4)] (Arith. Mean)	Same as Primary
	35 µg/m^3	24-hour[(5)]	Same as Primary
Ozone	0.08 ppm	8-hour[(6)]	Same as Primary
	0.12 ppm	1-hour[(7)] (Applies only in limited areas)	Same as Primary
SO_X	0.03 ppm	Annual (Arith. Mean)	-------
	0.14 ppm	24-hour[(1)]	-------
	-------	3-hour[(1)]	0.5 ppm (1300 µg/m^3)

(1) Not to be exceeded more than once per year.

(2) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

(3) Not to be exceeded more than once per year on average over 3 years.

(4) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

(5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

(6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(7) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1, as determined by appendix H.

(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

Areas that meet the air quality standards for the criteria pollutants are designated as being in attainment. Areas that do not meet the air quality standard for one or more of the criteria pollutants may be subject to the formal rule-making process and designated as being in nonattainment for that standard. Palo Alto County is in attainment for all criteria air pollutants. The USEPA maintains a database of selected ambient air quality data. According to the USEPA Airdata County Air Quality Report for Palo Alto County, Iowa, the air quality data for selected pollutants was:

Table 3-2 - Palo Alto Ambient Air Quality Data

Pollutant	Averaging Period	Palo Alto Ambient Air Quality Data			
		2005	2006	2007	
Ozone	1-hour	0.072 ppm	0.066 ppm	0.075 ppm	Below U.S. average
	8-hour	0.064 ppm	0.06 ppm	0.063 ppm	Below U.S. average
PM_{10}	24-hour	59 µg/m^3	47 µg/m^3	53 µg/m^3	Near U.S. average
	Annual	19 µg/m^3	20 µg/m^3	21 µg/m^3	Near U.S. average
$PM_{2.5}$	24-hour	28 µg/m^3	25 µg/m^3	25 µg/m^3	Near U.S. average
	Annual	10.2 µg/m^3	9.1 µg/m^3	9.7 µg/m^3	Near U.S. average

3.3.1.2 Odor

The DDGS dryer emissions are the primary odor sources at an ethanol facility. Secondary sources include the fermentation system and distillation system. The odors are associated with the VOCs emitted by these sources. The Existing Plant controls VOC emissions from the DDGS dryers with a RTO. The RTO destroys greater than 98% of the VOCs generated by the dryers. The RTO on the DDGS dryers is interlocked with the dryers. However, in the event of an RTO shutdown, the system allows the product remaining in the dryers to be removed before shutdown.

The odors from the fermentation and distillation systems are controlled with a wet scrubber and the RTO. The wet scrubber and RTO destroys greater than 98% of the VOCs generated by these systems. In the event that the RTO is shut down, the scrubber continues to operate. This assures that VOCs and the associated odors are not released into the atmosphere.

The Existing Plant routinely produces small quantities of wetcake when the DDGS dryers are not in service. Wetcake storage areas can be a source of odors. The odors from wetcake develop over a few days time. In order to minimize these odors, the Existing Plant removes the wetcake within approximately 72 hours of its generation.

3.3.1.3 Greenhouse Gases

Direct (Point Source) GHG Emissions

The Existing Plant generates GHG primarily from two sources, the fuel combustion equipment (anthropogenic sources) and the fermentation process (biogenic sources). The facility boilers, DDGS dryers, and RTOs use natural gas for combustion which generates CO_2, methane, and nitrous oxide (NO). Table 3-3 summarizes the potential emissions of GHGs from the Existing Plant. It should be noted that fermentation CO_2 emissions are included for completeness and are a biogenic source of CO_2 emissions. Biogenic sources are natural sources of CO_2 where emissions are produced by living organisms or biological processes and are typically considered part of the natural carbon cycle and, therefore, not an increase in global GHG emissions.

Table 3-3 Summary of Current Potential to Emit for Greenhouse Gases

Greenhouse Gases	Natural Gas Combustion (Anthropogenic)	Fermentation (Biogenic)	Total
CO_2	178,500 tons/year	164,300 tons/year	342,800 tons/year
Methane	19.9 tons/year	0 tons/year	19.9 tons/year
NO	0.3 tons/year	0 tons/year	0.3 tons/year

Emissions of combustion GHGs are a function of the amount of fuel combusted. The emissions of process related GHGs are a function of the amount of ethanol produced. Therefore, emissions of GHGs are not expected to be higher than normal operations during start up or shutdown conditions.

Life Cycle GHG Analysis:

Currently, the latest consensus data of a "well-to-wheels" life-cycle analysis performed by Michael Wang of the Argonne National Laboratory (Argonne 2007) indicates that dry-mill ethanol production using natural gas yields a 28% reduction in GHG when compared to gasoline use. This life-cycle analysis takes into account refining of gasoline, farming activities (including fertilization), transportation of both crude oil and corn and then gasoline and ethanol, and the tailpipe emissions from the use of these fuels.

Production of 55 MMgal/year of 200 proof (100%) ethanol from the Existing Plant currently displaces approximately 39,285,714 gallons of gasoline based on a simple energy balance of ethanol and gasoline which uses the accepted standard gasoline displacement ratio of 1.4. Based on an emission factor of 19.4 pounds of CO_2/gallon of gasoline (USEPA Emission Factor, EPA420-F-05-001), 39,285,714 gallons of gasoline results in 381,071 tons/year of CO_2 emissions.

Therefore, the current net reduction in global CO_2 emissions as a result of the production of ethanol from the existing plant is 106,700 tons/year (28% x 381,071 tons/year) compared to gasoline use.

3.3.2 Environmental Consequences of the No Action Alternative

3.3.2.1 Ambient Air Quality

The No Action Alternative is the continued operation of the Existing Plant with the construction and operation of the Starch Expansion. The potential to emit for the No Action Alternative is summarized in Table 3-4.

Table 3-4 - Summary of Potential to Emit for the Existing Plant plus the Starch Expansion

Pollutant	Potential to Emit Tons/year
PM	133.7
PM_{10}	107
NO_X	164.7
SO_X	2.9
CO	149.4
VOC	179.7
Lead	0

POET D&C completed the required ambient air quality modeling analysis for their Existing Plant including the Starch Expansion in June 2008, using the USEPA AERMOD ambient air quality model (USEPA 2007a). The model was set up in accordance with the IDNR's *Dispersion Modeling Guideline* (IDNR 2004) and *Air Dispersion Modeling Checklist* (IDNR 2007). Table 3-5 summarizes the results from the modeling analysis.

Table 3-5 - Summary of Starch Expansion 2008 Ambient Air Quality Modeling Analysis Results

Pollutant	Averaging Period	Existing Plant and Starch Expansion Sources µg/m^3	Default Background Concentration µg/m^3	Total Concentration µg/m^3	NAAQS µg/m^3
NO_X	Annual	17.2	11	28.2	100
PM_{10}	24-hour	100.7	45	145.7	150
PM_{10}	Annual	11.7	22	33.7	50
CO	1-hour	142	0	142	40,000
	8-hour	68.9	0	68.9	10,000
SO_X	3-hour	73.7	20	93.7	1,300
	24-hour	20.5	20	40.5	365
	Annual	1.8	20	21.8	80

As shown in Table 3-5, the ambient air quality impacts from the Existing Plant plus the Starch Expansion will be below the NAAQS for PM_{10}, NO_X, SO_X, and CO. A modeling analysis was not completed for $PM_{2.5}$ for two reasons,

1. A modeling protocol has not been developed for $PM_{2.5}$. The USEPA has established guidance (USEPA Memo, Unspecified Date) that compliance with the PM_{10} standard will demonstrate compliance with $PM_{2.5}$ until the modeling protocol has been established, and
2. The IDNR has not established background concentrations of PM2.5 for use in the analysis.

Since the modeling analysis completed for PM_{10} shows compliance with the NAAQS, compliance with the $PM_{2.5}$ standard is assumed.

3.3.2.2 Odor

The Starch Expansion will have the same potential odor sources and control systems, including wet scrubbers and an RTO, as the Existing Plant. This assures that VOCs and the associated odors will not be released into the atmosphere.

3.3.2.3 Greenhouse Gases

Point Source GHG Analysis

The Starch Expansion will generate GHGs from the same sources as the Existing Plant, the boilers, dryers, RTOs, and fermentation system. Table 3-6 summarizes the potential emissions of both anthropogenic and biogenic GHGs from the Starch Expansion. It should be noted that fermentation CO_2 emissions are included for completeness and are a biogenic source of CO_2 emissions. Biogenic sources are natural sources of CO_2 and are typically considered part of the natural carbon cycle and therefore not an increase in global GHG emissions.

Table 3-6 Summary of Potential to Emit for Greenhouse Gases Including the Starch Expansion

Greenhouse Gases	Natural Gas Combustion (Anthropogenic)	Fermentation (Biogenic)	Total
CO_2	305,300 tons/year	328,700 tons/year	634,000 tons/year
Methane	34.1 tons/year	0 tons/year	34.1 tons/year
NO	0.6 tons/year	0 tons/year	0.6 tons/year

As noted in Section 3.2.1.3, emissions of combustion GHGs are a function of the amount of fuel combusted. The emissions of process related GHGs are a function of the amount of ethanol produced. Therefore, emissions of GHGs are not expected to be higher than normal operations during start up or shutdown conditions.

Life Cycle GHG Analysis

Currently, the latest consensus data of a "well-to-wheels" life-cycle analysis performed by Michael Wang of the Argonne National Laboratory (Argonne 2007) indicates that dry-mill ethanol production using natural gas yields a 28% reduction in GHG when compared to gasoline use. This life-cycle analysis takes into account refining of gasoline, farming activities (including fertilization), transportation of both crude oil and corn and then gasoline and ethanol, and the tailpipe emissions from the use of these fuels.

Production of 55 MMgal/year of 200 proof (100%) ethanol from the Starch Expansion will displace approximately 39,285,714 gallons of gasoline based on a simple energy balance of ethanol and gasoline which uses the accepted standard gasoline displacement ratio of 1.4. Based on an emission factor of 19.4 pounds of CO_2/gallon of gasoline (USEPA Emission Factor, EPA420-F-05-001), 39,285,714 gallons of gasoline results in 381,071 tons/year of CO_2 emissions.

Therefore, the net reduction in global CO_2 emissions that will occur as a result of the production of ethanol from the Starch Expansion plant is 106,700 tons/year (28% x 381,071 tons/year) compared to gasoline use.

3.3.3 Environmental Consequences of the Proposed Action

The environmental impacts as a result of the Proposed Action due to the construction and operation of Project LIBERTY would result in an increase in the amount of air pollutants emitted from the Emmetsburg biorefinery complex.

Emissions during construction would consist primarily of fugitive dust generated by site grading and vehicles moving on the site and exhaust emissions from construction equipment and trucks. The primary risks from blowing dust particles relate to human health and human nuisance values. Fugitive dust can contribute to respiratory health problems and create an inhospitable working environment. Deposition on surfaces can be a nuisance to those living or working downwind. Dust emissions would be minimized by appropriate fugitive dust control measures as needed. Therefore, impacts to air quality during the construction phase of the project would be minor and temporary.

Potential emissions during operations would come from several sources.

Fugitive dust would be generated by vehicle traffic hauling raw materials and finished products to and from the site. These emissions would be minimized by paving, enforcing a 10 mile per hour speed limit, and by maintaining the roads as needed. Fugitive dust would also be generated from the cob receiving, storage, reclamation, and handling operations and would be reduced by best operating practices.

The lignocellulose pretreatment, fermentation, and ethanol distillation systems would generate emissions of VOC and HAPs, including acetaldehyde, formaldehyde, and methanol. These pollutants would be controlled

by venting the exhaust gases from these processes through a wet scrubber that would remove approximately 95% of the VOC and 50% of the HAPs. During normal operation, the exhaust gases would also be routed through an RTO to further control VOCs and HAPs.

The solid fuel boiler would generate PM, PM_{10}, NO_X, SO_X, CO, and VOC from combustion of the spent lignocellulose and anaerobic digester solids. Table 3-7 summarizes the potential to emit from the Project LIBERTY sources.

Table 3-7 Summary of Project LIBERTY Potential to Emit

Input Description	Conventional Plant With Starch Expansion	LIBERTY	Cumulative
PM	133.7 tons/year	182.7 tons/year	316.4 tons/year
PM_{10}	107 tons/year	181.6 tons/year	288.6 tons/year
NO_x	164.7 tons/year	167 tons/year	331.7 tons/year
CO	149.4 tons/year	210 tons/year	359.4 tons/year
VOCs	179.7 tons/year	51.3 tons/year	231 tons/year
SO_2	2.9 tons/year	107.5 tons/year	110.4 tons/year

As noted in Section 3.3.1.1, the USEPA has established and the IDNR has adopted the NAAQS for criteria air pollutants. The NAAQS include two types of air quality standards. Primary standards protect public, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (USEPA, 2006A). The IDNR requires new facilities that would have significant air emissions to acquire an air construction permit prior to beginning construction. As part of the permitting process, the IDNR requires that an ambient air quality modeling analysis be completed. The modeling analysis must demonstrate that the proposed facility emissions would not cause or contribute to an exceedance of the NAAQS or the facility cannot be constructed. However, because the proposed plant would not be built in a criteria air pollutant nonattainment or maintenance area, a full Clean Air Act conformity determination is not required.

Project LIBERTY would evaluate the emissions from the Combined Biorefinery and complete the required ambient air analysis. In the event that the modeling analysis shows that the facility would cause or contribute to an exceedance of the NAAQS, Project LIBERTY would revise the design to reduce the potential concentrations of pollutants in the ambient air. Design of the biorefinery complex so that it will comply with the NAAQS would ensure that the entire biorefinery, including Project LIBERTY would not adversely impact ambient air quality, the health of the public or the environment.

3.3.3.1 Odor

Project LIBERTY would have potential odor sources including the lignocellulose pretreatment system, the fermentation system, the anaerobic digester, and storage for digester biosolids. The potential odors from the pretreatment system are from the acids used during processing. Project LIBERTY would control the acid emissions using a wet scrubber, which would reduce emission by approximately 80%. Project LIBERTY would operate the scrubber at all times when the pretreatment system is in operation.

The potential odors from the anaerobic digester are from the generation of hydrogen sulfide and other reduced sulfur compounds contained in the biogas produced in the digester. Project LIBERTY would treat the gas from the digester with a scrubber specifically designed to remove these sulfur compounds. The scrubber would remove 90% of the sulfur compounds. After scrubbing, the gas would be combusted in the boilers, RTO or other combustion equipment on-site, further removing the odorous sulfur compounds. Project LIBERTY would operate the scrubber at all times when the digester system is in operation.

The potential odors from the fermentation system are VOCs. These compounds would be controlled using a wet scrubber and RTO similar to the conventional ethanol facility. This redundant system design assures that VOCs and the associated odors would not be released into the atmosphere during normal operations, startup, shutdown, or maintenance activities.

The potential odors from the digester biosolids are from the generation of hydrogen sulfide and other reduced sulfur compounds contained in the biosolids. The biosolids remaining after the anaerobic digester would be further processed in several SBR tanks. The aeration of the biosolids that would occur in the SBRs would oxidize the hydrogen sulfide and other reduced sulfur compounds contained in the biosolids reducing the potential for odor from the biosolids. The solids discharged from the SBR tanks would be conveyed to a sludge tank. The biosolids would then be de-watered through a series of presses and mixed with brine from the RO stream in a mixer. The de-watered biosolids would be stored on a concrete pad until it can be transported off-site for beneficial reuse as a soil nutrient or used as fuel in the solid fuel boiler. Project LIBERTY expects the treated and dewatered biosolids would have an odor similar to soil.

The overall odor generated by Project LIBERTY would be similar to that of the Existing Plant. The combination of pollution control equipment operation, operating procedures, and the distance to the nearest residence (approximately 1/3 mile) would effectively manage odors from the facility.

3.3.3.2 Greenhouse Gases

Point Source GHG Analysis

Project LIBERTY would generate GHGs from the solid fuel boiler, the fermentation system, and the RTO. Table 3-8 summarizes the potential emissions of GHGs from the Project LIBERTY. It should be noted that CO_2 emissions from the lignocellulose fermentation, the solid fuel boiler, and use of the biogas from the anaerobic digester are included for completeness and are a biogenic source of CO_2 emissions. Biogenic sources are natural sources of CO_2 and are typically considered part of the natural carbon cycle and, therefore, not an increase in global GHG emissions.

Table 3-8 Summary of Current Potential to Emit for Greenhouse Gases for Project LIBERTY

Greenhouse Gases	Solid Fuel Boiler	Fermentation (Biogenic)	Total
CO_2	204,750 tons/year	74,700 tons/year	279,500 tons/year
Methane	0 tons/year	0 tons/year	0 tons/year
NO	0 tons/year	0 tons/year	0 tons/year

As noted in Section 3.2.2.3, emissions of combustion GHGs are a function of the amount of fuel combusted. The emissions of process related GHGs are a function of the amount of ethanol produced. Therefore, emissions of GHGs are not expected to be higher than normal operations during start up or shutdown conditions.

Life Cycle GHG Analysis:

All of the fuel inputs for Project LIBERTY, except minimal amounts of natural gas for building heat and cold startup use, would come from the lignocellulose used to produce ethanol. The solid fuel boiler would use the spent biomass from the cellulosic ethanol production process, the anaerobic digester sludge, and cobs as fuel. As such, the GHG emissions from the boiler are considered to be “carbon neutral”. A plant is said to be carbon neutral if the carbon dioxide (CO_2) that it absorbs while alive is the same as the CO_2 it emits when burned as a fuel. The use of the solid fuel boiler would off-set up to 127,460 tons per year of anthropogenic CO_2 and 14 tons per year of anthropogenic methane that would be produced if a natural gas fired boiler was used for

steam production. The solid fuel boiler would be used for both Project LIBERTY and the existing grain-based ethanol production.

Currently, the latest consensus data of a "well-to-wheels" life-cycle analysis performed by Michael Wang of the Argonne National Laboratory (Argonne 2007) indicates that cellulosic ethanol yields an 86% reduction in GHG when compared to gasoline use. This life-cycle analysis takes into account refining of gasoline, growing and harvesting of the cellulose feedstock, transportation of both crude oil and cellulose and then gasoline and ethanol, and the tailpipe emissions from the use of these fuels.

Production of 25 MMgal/year of lignocellulose ethanol would displace approximately 18 MMgal/yr of gasoline based on a simple energy balance of ethanol and gasoline which uses the accepted standard gasoline displacement ratio of 1.4. Based on an emission factor of 19.4 pounds of CO_2/gallon of gasoline (EPA420-F-05-001), 18 MMGal/yr of gasoline results in 173,214 tons/year of CO_2 emissions. Therefore, the reduction in CO_2 emissions from Project LIBERTY would be 148,964 tons/year (86% x 173,214 tons/year).

3.4 Geology and Soils

3.4.1 Affected Environment

Palo Alto County is located within the Central Lowland Physiographic Province, Western Lake Section in the Des Moines Lobe Ecological Region (USGS 2003; IDNR, undated a). Elevations in the ecoregion range from about 1,000 to 1,700 feet AMSL. The topography at the site ranges from 1,200 to 1,230 feet AMSL. This ecoregion is characterized by level to gently rolling land, interspersed with irregular ponds and wetlands, and marked by areas of broadly curved bands of ridges and knobby hills (IDNR, undated a). A distinguishing feature of the Des Moines Lobe is the lack of loess over glacial drift. The stream network is poorly developed and widely spaced. Most of the region, formerly wet prairie, has been converted to agricultural use with substantial surface water drainage (IDNR, undated b).

The Des Moines Lobe (DML) consists of glacial and glaciofluvial deposits ranging in thickness from less than 10 feet to 170 feet. The surficial deposits of the DML are grouped into four formations: the Dows, Noah Creek, Peoria, and DeForest formations. The Dows Formation consists of upland glacial deposits. The Noah Creek Formation is composed predominantly of coarse-grained glaciofluvial and fluvial deposits in stream valleys and on outwash plains. The Peoria Formation consists of wind-transported sediments. The DeForest Formation includes post-glacial sediments that are primarily fine-grained alluvial, colluvial, and paludal deposits (IDNR, 2002).

Underlying the surficial sediments is the Dakota Formation with a maximum thickness of 500 feet (IDNR, 1997b). The Dakota Formation is a Cretaceous sequence consisting of a lower sandstone-dominated Nishnabotna Member and an upper mudstone-dominated Woodbury Member (IDNR, 1997a). The primary lithologies of the Formation consist of gray noncalcareous shale/mudstones, variably silty-sandy and very fine to medium grained sandstone. Secondary lithologies consist of medium to very course, pebbly sandstone; siltstone; red, pink, yellow-brown, black (carbonaceous) shale/mudstone; and quartzose, chert-rich gravel (IDNR, 1997b).

Below the Dakota Formation are undifferentiated sedimentary rocks of Paleozoic age (USGS, 1992), underlain by Precambrian Gneiss (IGS, 2006). Discontinuous sandstone beds within the Dakota Formation comprise the Cretaceous Aquifer, which is the primary source of potable water in the area. The Cretaceous Aquifer in this area ranges in thickness from 90 to 170 feet (USGS, 1992).

Earthquake hazard is defined with respect to two ground motion parameters specified by the USGS based on a probability of exceedances of 2% in 50 years (USGS, 2007a). Typically, these two parameters are combined and expressed as a single value, expressed as peak ground acceleration (PGA) expressed in units of gravity (g) (USGS, 2007a). In Palo Alto County, there is only a 0.01 probability of a magnitude 4.75 or greater earthquake over a 100-year period (USGS, 2007b). The peak ground acceleration (PGA) for Palo Alto County is 0.03 g (USGS, 2007c). Based on the information that the site has a low potential for seismic activity, there is no need for special consideration of earthquakes as a source of potential accidents.

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Palo Alto County, Iowa (NRCS, 1977), Canisteo, Okoboji, Clarion, Nicollet, and Harps soil series are found within the site boundaries. Figure 8 – Natural Resources Conservation Service Palo Alto County Soil Map, shows the project location overlain on the soil map contained in the Soil Survey (NRCS, 1977).

The Canisteo silty clay loam (Canisteo series; 507) makes up approximately 40% of the site. The Canisteo series has slopes of 0% to 2%, is poorly or very poorly drained, and is found in shallow swales, flats, and on rims of depressions. The Canisteo series have moderate permeability and runoff is negligible to low. The seasonal high water table on the poorly drained phase is at depths of 0.5 to 1.5 feet from November to July in most years. The very poorly drained phase is at depths of +1 to 0.5 feet from November to July in most years. This series is mostly under cultivation, with corn and soybeans being the principal crops. Native vegetation is wet-site community of tall grass prairie. The Canisteo silty clay loam is considered to be a hydric soil, according to the NRCS National Hydric Soils List (NRCS, 2005).

The Okoboji silty clay loam (Okoboji series; 6) makes up approximately 25% of the site. The Okoboji series has slopes of 0 to 1%, is very poorly drained, and is found in depressions on till plains and moraines. Seasonal high saturation for the undrained phase is at the surface during the months of October to June in normal years. In an undrained condition, ponding is common during snow melt and heavy rainfall periods. Where drained, the Okoboji soils are cultivated to corn, soybeans, and small grain. Native vegetation is water tolerant grasses and sedges. The Okoboji silty clay loam is considered to be a hydric soil, according to the NRCS National Hydric Soils List (NRCS, 2005).

The Clarion loams (Clarion series; 138B and 138C2) make up approximately 20% of the site. These Clarion series soils have slopes of 1 to 9% and are moderately well drained upland soils. The Clarion series have a frequently saturated zone that occurs within depths of 4 to 6 feet during March to June in normal years. Most of these soils are cultivated, with corn, soybeans, small grains, and legume hay as principal crops. Native vegetation is big bluestem, little bluestem, switchgrass, and other tall grass prairie grasses. Inclusions within the Clarion loam (138B) may be considered to be hydric soil, according to the USDA NRCS National Hydric Soils List (NRCS, 2005); Clarion loam (138C2) is not considered to be hydric.

The Nicollet loam (Nicollet series; 55) makes up approximately 10% of the site. The Nicollet series has slopes of 0 to 5%, is somewhat poorly drained, and is found on till plains and moraines. The Nicollet series has slow runoff and a seasonal high saturation that occurs at depths as high as 1.5 feet, typically during the months of March through June in normal years. This series is mostly cultivated to corn and soybeans. Native vegetation is tall grass prairie. Inclusions within the Nicollet loam may be considered to be hydric soil, according to the NRCS National Hydric Soils List (NRCS, 2005).

The Harps loam (Harps series; 95) makes up approximately 5% of the site. The Harps series has slopes of 0 to 3%, is poorly drained in an undrained condition, and is found on narrow rims or shorelines of depressions on till plains and moraines. The Harps series has a frequently saturated zone that occurs at the surface to a depth of 0.3 meters during the wettest periods of years when precipitation is within one standard deviation of the 30 year mean of annual precipitation. Most of these soils are artificially drained and cultivated. Principal crops are corn, soybeans, small grains, and legume hay. The native vegetation is big bluestem, western wheatgrass, sedges, blue grama, and other species of the tall grass prairie tolerant of excessive wetness. The Harps loam is considered to be a hydric soil, according to the NRCS National Hydric Soils List (NRCS, 2005).

3.4.2 Environmental Consequences of the No Action Alternative

The No Action Alternative includes development of the Starch Expansion. This will require grading and site development activities around the Existing Plant. However, only areas previously developed will be affected. In addition, the areas disturbed during construction, such as equipment laydown areas, that are not part of the active facility, will be seeded with appropriate grasses and vegetation as part of the erosion control plan and SWPPP for the facility.

3.4.3 Environmental Consequences of the Proposed Action

The Proposed Action would include development of approximately 55 acres of land that is currently used for row crop production. This would require grading, excavation, and site development activities. These activities would be essentially identical to the grading, excavation, and site development activities associated with the No Action Alternative. POET D&C would develop an Erosion Control Plan and a SWPPP to prevent excess erosion or degradation of the site. The areas disturbed during construction, such as equipment laydown areas that are not part of the active facility, would be seeded with appropriate grasses and vegetation as part of the erosion control plans and SWPPP for the facility.

3.5 Biological Resources

3.5.1 Affected Environment

The Emmetsburg site consists of approximately 534 acres of land that contains the Existing Plant, and where the Starch Expansion and Project LIBERTY would be constructed. The Existing Plant and the Starch Expansion are zoned Industrial. Project LIBERTY would be located on agricultural land that is currently used for row crop cultivation including corn and soybeans. No native grassland areas are located on the Emmetsburg site.

A wetland delineation of the 534 acres Emmetsburg site has been completed. The wetland delineation methodology was completed in accordance with the USACE Wetland Delineation Manual (1987) which requires investigation of three wetland parameters:

- hydrophytic vegetation,
- hydric soils, and
- hydrological characteristics at selected sampling points within a study area.

These points are positioned to ascertain upland/wetland boundaries and to record significant spatial changes in wetland plant communities. For an area to be classified as a wetland, positive indicators of each of the three parameters must be present.

The wetland delineation identified five wetland areas. The total size of the wetlands within the site property boundaries is approximately 2.71 acres. Of the identified wetlands, only wetland 1 was present prior to the construction of the Existing Plant. Wetlands 2 through 5 are associated with anthropogenic activities such as road, rail spur, and stormwater pond construction. A total of 2.61 acres of new wetlands have developed since 2004 as a result of the construction of the Existing Plant. Figure 9 – Wetland Location Map, shows the location and configuration of the wetland areas within the property boundary.

3.5.1.1 Wetland 1 – Project LIBERTY Site

Wetland 1 (approximately 0.10 acres in size) is located on the southwestern perimeter of the proposed LIBERTY site boundary, at the northeast intersection of 470th Street and 390th Street. This wetland is associated with a tributary to Cylinder Creek that extends off-site to the west and south.

Wetland 1 was primarily vegetated by *Leersia oryzoides* (rice cut grass)*, Impatiens capensis* (spotted touch-me-not)*,* and *Phalaris arundinacea* (Reed Canary Grass). The mapped soil series is Canisteo silty clay loam, a hydric soil. An aquatic moisture regime, reducing conditions, and gleyed or low-chroma colors provided evidence of hydric soil. Saturation in the upper 12 inches of soil, local soil survey data, and the Fac-Neutral test provided evidence of persistent hydrology.

Species are classified as Obligate Wetland (OBL) if they almost always occur in wetlands (>99% of the time), Facultative Wetland (FACW) if they usually occur in wetlands (67-99% of the time), Facultative (FAC) if they are equally likely to occur in wetlands or non-wetlands (34-66% of the time), Facultative Upland (FACU) if they usually occur in non-wetlands (67-99% of the time), and Obligate Upland (UPL) if they almost always occur in

non-wetlands (>99% of the time). A positive (+) or negative (-) sign may accompany the regional indicator designation for a particular species. The positive sign indicates a tendency towards the wetter end of the spectrum (more frequently found in wetlands); a negative sign indicates a tendency towards the drier end of the spectrum (less frequently found in wetlands). A NI (no indicator) status is recorded for those species for which insufficient information is available to determine an indicator status. Hydrophytic (wetland) vegetation is considered prevalent where more than 50 percent of the dominant species in a plant community have an indicator status of OBL, FACW, or FAC (excluding FAC-).

Table 3-9 - Species List for Wetland 1

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
Anemone canadensis	MEADOW ANEMONE	FACW	Forb
*CIRSIUM VULGARE**	BULL THISTLE	FACU-	Forb
Cyperus esculentus	FIELD NUT SEDGE	FAC+	Sedge
Elymus canadensis	CANADA WILD RYE	FAC-	Grass
Fragaria virginiana	WILD STRAWBERRY	FAC-	Forb
Helianthus grosseserratus	SAWTOOTH SUNFLOWER	FACW-	Forb
SETARIA FABERI	GIANT FOXTAIL	FACU+	Grass
SETARIA GLAUCA	YELLOW FOXTAIL	FAC	Grass
Spartina pectinata	PRAIRIE CORD GRASS	FACW+	Grass

*All capital letters in the scientific name column indicates non-native species

3.5.1.2 Wetland 2 – Existing Plant Site

Wetland 2 (approximately 0.74 acres in size) is located on the western perimeter of the Existing Plant site boundary, along 470th Street. Wetland 2 is an emergent wetland and is contained within a roadside ditch. Wetland 2 appears to be connected by overland sheet flow and a culvert to a tributary of Cylinder Creek. Wetland 2 was primarily vegetated by *Spartina pectinata* (prairie cordgrass) and *Equisetum hyemale* (tall scouring rush). The mapped soil series is Canisteo silty clay loam, a hydric soil. Reducing conditions, low chroma color, and listing on the national hydric soils list provided evidence of hydric soil. Saturation in the upper 12 inches of soil, local soil survey data, drainage patterns, and the Fac-Neutral test provided evidence of persistent hydrology.

Table 3-10 - Species List for Wetland 2

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
*ABUTILON THEOPHRASTI**	BUTTONWEED	FACU-	Ad A-Forb
Ambrosia artemisiifolia	COMMON RAGWEED	FACU	Nt A-Forb
Ambrosia trifida	GIANT RAGWEED	FAC+	Nt A-Forb
Andropogon gerardii	BIG BLUESTEM	FAC-	Nt P-Grass
Asclepias incarnata	SWAMP MILKWEED	OBL	Nt P-Forb
Asclepias syriaca	COMMON MILKWEED	UPL	Nt P-Forb
BROMUS INERMIS	HUNGARIAN BROME	UPL	Ad P-Grass
CIRSIUM ARVENSE	FIELD THISTLE	FACU	Ad P-Forb
ECHINOCHLOA CRUSGALLI	BARNYARD GRASS	FACW	Ad A-Grass
Equisetum arvense	COMMON HORSETAIL	FAC	Nt Fern
Equisetum hyemale affine	TALL SCOURING RUSH	FACW-	Nt Fern
MORUS ALBA	WHITE MULBERRY	FAC	Ad Tree
Polygonum pensylvanicum	PINKWEED	FACW+	Nt A-Forb
Prunella vulgaris v. elongata	SELF-HEAL	FAC	Nt P-Forb
RUMEX CRISPUS	CURLY DOCK	FAC+	Ad P-Forb
Schizachyrium scoparium	LITTLE BLUESTEM	FACU-	Nt P-Grass

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
Scirpus acutus	HEARD-STEMMED BULRUSH	OBL	Nt P-Sedge
SETARIA FABERI	GIANT FOXTAIL	FACU+	Ad A-Grass
Spartina pectinata	PRAIRIE CORD GRASS	FACW+	Nt P-Grass

3.5.1.3 Wetland 3 - Existing Plant Site

Wetland 3 (approximately 0.35 acres in total size) is located on the east-central portion of the Existing Plant site boundary and is associated with Retention Pond 3. Wetland 3 is an emergent wetland that is an isolated wetland.

Wetland 3 was primarily vegetated by *Typha angustifolia* (narrow-leaved cattail) and *Salix exigua* (sandbar willow). The mapped soil series is Canisteo silty clay loam, a hydric soil. An aquatic moisture regime, reducing conditions, low chroma color, and listing on the national hydric soils list provided evidence of hydric soil. Saturation in the upper 12 inches of soil, drainage patterns, local soil survey data, and the Fac-Neutral test provided evidence of persistent hydrology.

Table 3-11 -Species List for Wetland 3

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
Ambrosia artemisiifolia	COMMON RAGWEED	FACU	Nt A-Forb
Cyperus strigosus	LONG-SCALED NUT SEDGE	FACW	Nt P-Sedge
*ECHINOCHLOA CRUSGALLI**	BARNYARD GRASS	FACW	Ad A-Grass
Eleocharis obtusa	BLUNT SPIKE RUSH	OBL	Nt A-Sedge
FESTUCA ARUNDINACEA	TALL FESCUE	FACU+	Ad P-Grass
HORDEUM JUBATUM	SQUIRREL-TAIL GRASS	FAC+	Ad P-Grass
Juncus torreyi	TORREY'S RUSH	FACW	Nt P-Forb
MEDICAGO SATIVA	ALFALFA	UPL	Ad P-Forb
Populus deltoides	EASTERN COTTONWOOD	FAC+	Nt Tree
RUMEX CRISPUS	CURLY DOCK	FAC+	Ad P-Forb
Salix amygdaloides	PEACH-LEAVED WILLOW	FACW	Nt Tree
Salix exigua	SANDBAR WILLOW	OBL	Nt Shrub
SETARIA FABERI	GIANT FOXTAIL	FACU+	Ad A-Grass
TYPHA ANGUSTIFOLIA	NARROW-LEAVED CATTAIL	OBL	Ad P-Forb

*All capital letters in the scientific name column indicates non-native species

3.5.1.4 Wetland 4 - Existing Plant Site

Wetland 4 (approximately 0.39 acres in total size) is located on the northeastern portion of the Existing Plant site boundary. Wetland 4 is an emergent/scrub shrub wetland that that appears to be isolated.

Wetland 4 was primarily vegetated by *Typha angustifolia* (narrow-leaved cattail), *Salix amygdaloides* (peach-leaved willow), and *Juncus torreyi* (Torrey's Rush). The mapped soil series is Canisteo silty clay loam, a hydric soil. Reducing conditions and low chroma color provided evidence of hydric soil. Drainage patterns, local soil survey data, and the FAC-Neutral test provided evidence of persistent hydrology.

Table 3-12 - Species List for Wetland 4

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
Ambrosia artemisiifolia	COMMON RAGWEED	FACU	Nt A-Forb
FESTUCA ARUNDINACEA	TALL FESCUE	FACU+	Ad P-Grass

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
HORDEUM JUBATUM	SQUIRREL-TAIL GRASS	FAC+	Ad P-Grass
Juncus torreyi	TORREY'S RUSH	FACW	Nt P-Forb
Leersia oryzoides	RICE CUT GRASS	OBL	Nt P-Grass
MEDICAGO SATIVA	ALFALFA	UPL	Ad P-Forb
Panicum virgatum	PRAIRIE SWITCH GRASS	FAC+	Nt P-Grass
Phragmites australis	COMMON REED	FACW+	Nt P-Grass
Polygonum amphibium	WATER KNOTWEED	OBL	Nt P-Forb
Populus deltoides	EASTERN COTTONWOOD	FAC+	Nt Tree
Salix amygdaloides	PEACH-LEAVED WILLOW	FACW	Nt Tree
Salix exigua	SANDBAR WILLOW	OBL	Nt Shrub
Spartina pectinata	PRAIRIE CORD GRASS	FACW+	Nt P-Grass
TYPHA ANGUSTIFOLIA	NARROW-LEAVED CATTAIL	OBL	Ad P-Forb
Xanthium strumarium	COCKLEBUR	FAC	Nt A-Forb

*All capital letters in the scientific name column indicates non-native species

3.5.1.5 Wetland 5 - Existing Plant Site

Wetland 5 (approximately 1.13 acres in size) is located on the north-central portion of the Existing Plant site boundary and is associated with Retention Pond 5.. Wetland 5 is an emergent/scrub shrub wetland and appears to be connected by overland sheet flow and a series of ditches and culverts to a tributary of Cylinder Creek.

Wetland 5 was primarily vegetated by *Salix exigua* (sandbar willow), *Cyperus esculentus* (field nut sedge), *Polygonum amphibium* (water knotweed), and *Xanthium strumarium* (cocklebur). The mapped soil series is Canisteo silty clay loam, a hydric soil. An aquatic moisture regime, reducing conditions, and low chroma color provided evidence of hydric soil. Saturation in the upper 12 inches of soil, local soil survey data, drainage patterns, and the Fac-Neutral test provided evidence of persistent hydrology.

Table 3-13 - Species List for Wetland 5

SCIENTIFIC NAME	COMMON NAME	WETNESS	PHYSIOGNOMY
ABUTILON THEOPHRASTI	BUTTONWEED	FACU-	Ad A-Forb
Conyza canadensis	HORSEWEED	FAC-	Nt A-Forb
Cyperus esculentus	FIELD NUT SEDGE	FACW	Nt P-Sedge
ECHINOCHLOA CRUSGALLI	BARNYARD GRASS	FACW	Ad A-Grass
LOTUS CORNICULATUS	BIRDSFOOT TREFOIL	FAC-	Ad P-Forb
Polygonum amphibium	WATER KNOTWEED	OBL	Nt P-Forb
Populus deltoides	EASTERN COTTONWOOD	FAC+	Nt Tree
Potamogeton nodosus	AMERICAN PONDWEED	OBL	Nt P-Forb
RUMEX CRISPUS	CURLY DOCK	FAC+	Ad P-Forb
Salix amygdaloides	PEACH-LEAVED WILLOW	FACW	Nt Tree
Salix exigua	SANDBAR WILLOW	OBL	Nt Shrub
SETARIA VIRIDIS	GREEN FOXTAIL	UPL	Ad A-Grass
TYPHA ANGUSTIFOLIA	NARROW-LEAVED CATTAIL	OBL	Ad P-Forb
Xanthium strumarium	COCKLEBUR	FAC	Nt A-Forb

*All capital letters in the scientific name column indicates non-native species

3.5.1.6 Farmed Wetland Determination

An independent evaluation of the potential presence of farmed wetlands was completed on the farmed portion of the project area using National Food Security Act Manual (NFSAM) methodology. Aerial photographs from 1930, 1939, 1990, 2002, 2004, and 2006 were reviewed in order to identify potential farmed wetland signatures. The identified suspect areas were then field investigated to confirm that the areas are in fact wetlands. After reviewing the aerial photographs and interviewing current tenant farmers, it was determined that only "prior converted" (PC) areas were identified on the site. Extensive tile draining exists throughout the farmed areas. Figure 10 – Natural Resources Conservation Service Prior Converted Land Map, presents a 1990 NRCS map that identifies areas of the property as PC Spell out. No areas on the site are designated as wetland on the NRCS map.

3.5.1.7 Protected Species

In order to comply with Section 7 of the Endangered Species Act, the United States Fish and Wildlife Service (USFWS) was contacted to determine if federally protected species were known or likely to be present in Palo Alto County. The USFWS identified two plant species as potentially present.

- The Prairie Bush Clover (*Lespedeza leptostachya*) is listed as threatened and is considered to potentially occur statewide. The species occupies dry to mesic prairies with gravelly soils. However, the USFWS has no records of any occurrences in Palo Alto County.
- The Western Prairie Fringed Orchid (*Platanthera praeclara*) is listed as threatened and is considered to potentially occur statewide. The species occupies wet to mesic grassland habitats. However, the USFWS has no records of any occurrences in Palo Alto County.

Critical habitat has not been designated for either species. A copy of the USFWS letter in contained in Appendix C.

The IDNR list of threatened and endangered species was also reviewed for the project site and Palo Alto County. No additional threatened or endangered species were identified on the lists.

During the wetland delineation, the site was also surveyed for the presence of the above plant species. No occurrences of either species were observed on the project site. Also, there is no habitat for either species on the site of the proposed action. Based on this analysis, DOE has determined that its proposed action would have "no effect" on listed species, their habitats, or designated critical habitat and thus, further consultation with USFWS is not required.

3.5.2 Environmental Consequences of the No Action Alternative

The construction of the Starch Expansion will impact Wetland #4 due to the construction of a new rail spur. This wetland was created due to the construction of the existing rail spurs in 2004. Flow of surface water was impeded allowing accumulation of water and growth of wetland vegetation, this wetland is considered to be isolated and no mitigation will be required for the proposed impacts. No threatened or endangered species were identified at this location. A total of 0.39 acres of wetlands will be removed.

3.5.3 Environmental Consequences of the Proposed Action

Wetland #1 is located on the northeast side of the intersection of 470th Street and 390th Street. POET has committed to the installation of a turn lane on 470th Street to minimize traffic interruptions on 470th. The proposed west entrance to Project Liberty is approximately 0.5 miles north of the wetland. The turn lane would be designed to avoid impacting the wetland.

The Palo Alto County Board of Supervisors plans to install a curved road at the intersection of 470th Street and 390th Street to improve the efficiency for truck traffic. Construction activities would affect the northwest corner of the intersection. Therefore, Wetland #1 would not be impacted by this construction.

No other wetlands would be impacted as a result of Project LIBERTY. No threatened or endangered species were identified at this location.

3.6 Water Resources

3.6.1 Affected Environment

3.6.1.1 Groundwater

The Dakota aquifer is the most extensive source of large quantities of groundwater in northwestern Iowa. The aquifer is composed of multiple layers of sandstone in the Cretaceous Dakota Formation. Quaternary sand and gravel deposits that are directly in contact with these sandstones are included in the aquifer. Individual sandstone layers are separated by shale, and the thickness of the individual sandstone beds varies from a few inches to more than 150 feet. The composite thickness of sandstone is more than 200 feet throughout much of the western and north-central parts of Northwest Iowa.

The Dakota aquifer is confined by a sequence of overlying Cretaceous shales and limestones and Quaternary till and loess. Beneath the aquifer are shales of the Dakota Formation and Paleozoic shales, carbonate rocks, sandstones and Precambrian crystalline rocks.

The quality of water pumped from Dakota aquifer may be altered by leakage from the underlying Paleozoic aquifers if large withdrawals reverse the natural flow from Dakota into the Paleozoic aquifers. The quality of water from the Dakota is generally suitable for irrigation purposes." (USGS 1984.)

"Shallow drift aquifers are commonly used for small private, domestic, and livestock water supplies in the northwest region. Surface water and associated alluvial aquifers are the most common water sources in the northwest region with alluvial groundwater providing over half of the water used in the region." (IDWAWM 1985.)

The majority of water supplies in Palo Alto County utilize groundwater as their source. Groundwater use in Palo Alto County is shown in Table 3-14, below.

Table 3-14 - Estimated Water Use in Palo Alto County, 1993

USERS AND USE [a]	NUMBER	ANNUAL WATER WITHDRAWAL MMgal/year
Public Water Supplies	12	278
Private and Farm	1,529	92
Livestock Production	162,420	260 [b]
Irrigation Permits	54	674 [b]
Mining Permits	3	7
Industrial Permits	0	18
TOTAL USE		**1,329**

Source: Iowa Plan Survey, 1994.
[a] No permits were issued for power production in Palo Alto County.
[b] Figure for 1992.

Table 3-15 shows the public water supplies located in Palo Alto County.

Table 3-15 - Public Water Supplies in Palo Alto County

SYSTEM NAME	SYSTEM TYPE[a]	TOTAL CONNECTIONS	WATER SOURCE TYPE	TOTAL ANNUAL USE MMgal/yr[b]
City of Ayrshire	M	103	Wells	5.6 [c]
City of Graettinger	M	432	Wells	37.4 [c]
City of Mallard	M	166	Wells	9.4 [c]
City of Rodman	M	24	Wells	1.2 [b]
City of Ruthben	M	400	Wells	30.7 [b]
Emmetsburg Municipal Utilities District[c]	M	1,657	Wells	213.9 [c]
West Bend Municipal Utilities	M	421	Wells	36.3 [c]
Electric Park Campgrounds	REC	0	Wells	0.5 [b]
Lost Island Corner Store and Cafe	RET	0	Wells	0.2 [b]
The Chuck Wagon Cafe	RET	0	Wells	0.1 [b]
Clay County Rural Water District	RW	4	Wells	0.8 [b]
Lakeland Area Education Agency	S	0	Wells	0.1 [b]
TOTAL USE				**278.3**

Source for System Type, Total Connections, Water Source Type - Iowa Plan Survey, 1994

[a] No permits were issued for power production in Palo Alto County.

[b] Source: Iowa Plan Survey, 1994.

[c] Source: IDNR Water Use Database, accessed 8/13/2008, http://www.iowadnr.com/online_db.html.

The IDNR Private Well Tracking System shows a total of six private water wells within approximately 1 mile of the Existing Plant. The wells are shown on Figure 11 and listed on table 3-16.

Table 3-16 Private Groundwater Wells Within 1-Mile of Project LIBERTY Site.

Well ID Number	Reported Owner	Well Depth (feet)
212476	Dennis Hanson	47
212475	Robert J. Darrah	215
212477	Chad Anderson	130
212435	Mike Mundus	200
2006950	Lance Bruch	275
2127434	Jeff Elbert	250
212470	Jesse Wolfe	80

Since publication of the Plan Survey in 1994, the Existing Plant site has been constructed near the City of Emmetsburg. Also, the Emmetsburg Municipal Utilities District (District) has received a new Water Use permit (#5009-R3). The nearby AGP facility gets all of its potable and process water from the Emmetsburg Municipal Water District.

The District uses four alluvial wells and one bedrock well. The alluvial wells are approximately 40 feet deep. The bedrock well is completed in the Dakota Sandstone formation. The District is allowed to use a maximum of 500 MMgal of groundwater per year. The Existing Plant utilizes potable water obtained from the District.

The Existing Plant currently utilizes groundwater for process water. The process water is used for five primary purposes, the fermentation process, process cooling water, pollution control systems (wet scrubbers), boiler feed water, and facility cleaning. The Existing Plant has identified and implemented a number of water reuse and reduction strategies. For example:

- Water discharged from the fermentation wet scrubber is used in the mash tank to make the corn slurry before fermentation;
- Water condensed in the syrup evaporators is also used in the mash tank to make the corn slurry before fermentation;
- Water from the boiler blowdown is pumped back to the ethanol production process; and
- Clean up water will be recycled within the facility for process use.

POET D&C constructed two production wells and two monitoring wells on-site for the Existing Plant. Monitoring well west was completed at 240 feet below grade, monitoring well east was completed at 230 feet below grade, production well (PW) #1 was completed at 273 feet below grade, and PW #2 was completed at 282 feet below grade. All wells were completed in the Dakota Sandstone Formation.

POET D&C completed 24 hour pump tests on each production well. The static water level in PW#1 was 29 feet below grade. The pump test was conducted at 500 gpm resulting in a total drawdown of 32 feet which was achieved within 10 minutes of test start. Recovery to original water levels in PW#1 was achieved within 13 minutes after the completion of the pump test. Drawdown was also measured in monitor well east during the PW#1 pump test. No drawdown was observed.

The static water level in PW#2 was 25 feet below grade. The pump test was conducted at 610 gpm resulting in a total drawdown of 33 feet which was achieved within 45 minutes of test start. Recovery to original water levels in PW#2 was achieved within 60 minutes after the completion of the pump test.

A copy of the boring logs and pump test information is included in Appendix D.

The Existing Plant applied for and received a Water Use Permit (Permit #8790) from the IDNR. The permit allows water withdrawal of 240 MMgal/year and a maximum instantaneous withdrawal rate of 1000 gpm. A copy of the Existing Plant Water Use Permit is included in Appendix D.

Water use for and water elevation data for the District and the Existing Plant have been reported to the IDNR as required by their respective water use permits. Table 3-17 summarizes that data.

Table 3-17 Water Use data for 2004 through 2007

Date	**Emmetsburg Municipal Utilities District**		**Existing Plant**	
	Actual Water Use MGY	Water Level Feet Below Grade	Actual Water Use MGY	Water Level Feet Below Grade
2004	236.4	25	0	36
2005	223.1	14	149	29
2006	238.7	13.9	178.2	29
2007	213.9	13.9	167	29

3.6.1.2 Surface Water

The 534 acre Emmetsburg site is in the Upper Des Moines River watershed. Site drainage is generally to the south to Dry Ditch, an intermittent tributary of Cylinder Creek. Dry Ditch starts north of the site, flows northwest to southeast for approximately 200 linear feet on-site, then continues off-site to the southeast until its confluence with Cylinder Creek. Cylinder Creek is a tributary to the West Fork Des Moines River which ultimately drains to the Des Moines River.

Dry Ditch is an intermittent stream, having flow only during and immediately after rainfall events and after snow melt. Cylinder Creek has a very small flow rate under normal conditions with occasional periods of no flow during dry weather. No threatened or endangered species are known to be present in these water ways near the Existing Plant.

The West Fork Des Moines River is a normally flowing river that feeds the Des Moines River. The USGS has operated a continuous gauging station (ID 05466750) near Humboldt, IA (approximately 35 miles southeast of the Existing Plant) to monitor flow on the Des West Fork Des Moines River within the Upper Des Moines Watershed (07100002) since 1965. The monitoring station has collected daily maximum, minimum, and mean flow data for the West Fork Des Moines River watershed since October 1, 1986. The available minimum flow data from the gauging station located near Humboldt, IA for the period of October 1, 1986 through June 15, 2008 indicates that the daily minimum flow at this station was 10 cubic feet per second (cfs) and the calculated minimum 7-day average flow is 14 cfs (USEPA 2008b and USGS 2008).

The Existing Plant currently discharges a maximum of 0.18 cfs (118,000 gpd) of non-contact utility water which consists of non-contact cooling water, RO system blowdown, water softener blowdown, and green sand filter backwash through a dedicated pipeline to the West Fork Des Moines River. Figure 12 – NPDES Discharge Pipeline Route shows the discharge route. Approximately 50% of the Upper Des Moines Watershed is located upstream of the Existing Plant's discharge location to the West Fork Des Moines River. Therefore, minimum daily and minimum 7-day average flows of the West Fork Des Moines River near Emmetsburg, IA are conservatively estimated to be 5 cfs and 7 cfs respectively.

The primary pollutant of concern contained in the non-contact utility water discharged by the Existing Plant is total dissolved solids (TDS). The TDS in the non-contact utility water results from naturally occurring inorganic compounds in the make-up water being concentrated during plant operation.

The IDNR has been monitoring TDS in the West Fork Des Moines River at a location near Humboldt, IA on a monthly basis since in October 1999. The Existing Plant began operation in March 2005. Prior to March 2005, the measured maximum TDS was 710 milligrams per liter (mg/L), minimum was 270 mg/L, and the average was 506 mg/L. TDS data collected by IDNR between April 2005 and June 2008 indicated that the measured maximum TDS was 660 mg/L, minimum was 290 mg/L, and the average was 494 mg/L. The TDS data indicates that the Existing Plant's non-contact utility water discharge had no measured impact on the TDS concentration in the West Des Moines River at the Humboldt, IA monitoring site.

3.6.1.2 Stormwater

Stormwater from the cultivated sections of the Emmetsburg site predominantly infiltrates the soil. Excess stormwater flows generally to the south or southwest into Dry Ditch. The majority of the cultivated land does not have man-made erosion control features other than good tillage practices. As shown on Figure 9, for the cultivated land north of the existing Retention ponds #1 and #2, POET D&C constructed a drainage pathway that directs excess stormwater to the retention pond #5.

Stormwater from the active portions of the Existing Plant drains to stormwater retention ponds installed on-site. The stormwater ponds were designed to control stormwater run-off, allow sediments to settle out, and to eliminate soil erosion. The stormwater ponds are equipped with manual overflow valves that are normally closed. This allows inspection of the stormwater before allowing discharge to occur. It also allows the ponds to function as a final spill control measure in the event of a catastrophic release or ethanol or other hazardous material on-site. The Existing Plant manually opens the valves during overflow conditions, discharge from the stormwater ponds flows west to Dry Ditch.

3.6.2 Environmental Consequences of the No Action Alternative

3.6.2.1 Groundwater

The Existing Plant uses approximately 1,600 gpd of potable water obtained from the District system. The operation of the Starch Expansion will require additional potable water. Potable water use will increase to a maximum of approximately 1,840 gpd. The IDNR indicates that the District appropriated 213.9 MMgal of groundwater during 2007. It is not anticipated that the increased potable water use of 0.09 MMgal/year associated with the Starch Expansion will adversely affect the District system or the existing groundwater uses in the area.

The Existing Plant uses a maximum of approximately 178 MMgal/year of process water. The operation of the Starch Expansion will require additional water for process operations. Groundwater use will increase to a maximum of approximately 390 MMgal/year. The estimated increase in water use includes startup, shutdown, and maintenance (cleanup) conditions. Most of the additional water will come from the existing production wells which have a demonstrated capacity of approximately 583 MMgal/year (1,110 gpm). POET D&C plans to install a third production well to have redundancy in the event that maintenance is required on one of the existing production wells. The existing water use permit will be modified to allow the additional use of groundwater.

Groundwater elevation data from 2004 through 2007 for the District shows that the water levels have increased by approximately 11 feet while the water levels at the Existing Plant have decreased by approximately 7 feet. This indicates that local decreases at the Existing Plant are not indicative of a general reduction in regional water levels.

Additional decreases in the local groundwater levels may occur as a result of the Starch Expansion. All of the private wells in the area, except Well #212476 registered to Dennis Hanson, have a depth of at least 80 feet below grade. If additional decreases in the local groundwater levels occur at the Existing Plant site, this well may be affected. This is unlikely because the well is completed in a shallow water bearing zone that is not hydraulically connected to the Dakota Sandstone.

The Existing Plant maintains two monitoring wells on site. These wells provide information on the aquifer drawdown and allow evaluation and prediction of potential well interference from the additional groundwater withdrawal. In the unlikely event that well interference is observed, the facility will proactively participate to determine the reason for the interference and implement actions to resolve the interference as outlined in Iowa Administrative Code 567-54. Actions that may occur include lowering the pump of the affected well or drilling of a replacement well to greater depth to restore capacity. A second alternative is available via the District. The existing District water line could be extended east to supply potable water. According to Mr. Jeff Moury, District Water Treatment Plant Operator, the District has sufficient capacity to supply water for domestic purposes. Therefore, no unmitigatable impacts are expected to occur as a result of the Starch Expansion.

3.6.2.2 Wastewater

The Existing Plant discharges sanitary wastewater to an on-site septic system. The septic system was designed in accordance with the IDNR requirements. The IDNR standards specify siting and construction requirements relative to the primary and secondary treatment portions of the sewage disposal systems as well as minimum depth to groundwater, minimum separation distances to potable water sources, and maximum percolation rates for soils. The IDNR standards are primarily a prescriptive code giving design criteria for each alternative type of secondary treatment system permitted. The operation of the Starch Expansion will increase discharge of sanitary wastewater to the septic system by approximately 240 gpd. The existing septic system has the capacity to handle the additional load without modification.

The Existing Plant discharges a maximum of 0.18 cfs (118,000 gpd) of non-contact utility water which consists of non-contact cooling water, RO system blowdown, water softener blowdown, and green sand filter backwash through a dedicated pipeline to the West Fork Des Moines River. This discharge is regulated by the terms and conditions of the facility's National Pollutant Discharge Elimination System (NPDES) permit #74-00-1-02. The

Existing Plant has completed the required testing, monitoring, recordkeeping, and reporting; and demonstrated compliance with the terms and conditions of their NPDES discharge permit. In accordance with the terms of the NPDES permit, the Existing Plant has completed whole effluent toxicity (WET) testing of the non-contact wastewater discharge and demonstrated that their effluent is not toxic to the aquatic flora and fauna in the river.

The operation of the Starch Expansion will double the discharge of non-contact utility water to approximately 0.37 cfs (236,000 gpd). This volume includes water generated during startup and shutdown conditions. Water generated during cleanup and maintenance activities will be reused in the process. The dedicated pipeline to the West Fork Des Moines River has the capacity to handle the additional discharge without modification. The maximum outside mixing zone concentration of TDS in the river was calculated using a mass balance approach and the projected discharge rate of a maximum of 0.37 cfs, the low flow in the West Fork Des Moines River of 5 cfs, the actual discharge concentration from the Starch Expansion of approximately 2500 mg/l TDS, and the maximum TDS monitored in the river by the IDNR of 710 mg/L. The resulting calculation indicates that in river maximum TDS concentration would be 833 mg/L. Based on WET testing completed by the Existing Plant, the projected discharge from the No Action Alternative of 0.37 cfs of non-contact utility water is not expected to alter the aquatic habit of the West Fork Des Moines River.

3.6.2.3 Stormwater

The Starch Expansion will be constructed within the footprint of the Existing Plant and will have operations that are essentially the same as the Existing Plant. The existing stormwater ponds will be retained and operated to minimize potential impacts to stormwater. Therefore, the impacts of the No Action Alternative are expected to be negligible.

3.6.3 Environmental Consequences of the Proposed Action

3.6.3.1 Groundwater

The Existing Plant plus the Starch Expansion will use approximately 1,840 gpd of potable water obtained from the District. Project LIBERTY would require a maximum of approximately 1,200 gpd for a total biorefinery complex requirement of 3,040 gpd. The IDNR indicates that the District appropriated 213.9 MMgal of groundwater during 2007. It is not anticipated that the increased potable water use of 0.44 MMgal/year associated with Project LIBERTY would adversely affect the District or the existing groundwater uses in the area.

The Existing Plant plus the Starch Expansion will use a maximum of approximately 390 MMgal/year. Project LIBERTY would require a maximum of approximately 157 MMgal/yr for a total biorefinery complex requirement of 547 MMgal/year. The estimated increase in water use includes startup, shutdown, and maintenance (cleanup) conditions. The additional water would come from groundwater resources. The existing production wells have a demonstrated capacity of approximately 583 MMgal/year (1,110 gpm). POET D&C would install an additional production well to supply Project LIBERTY.

As noted in Section 3.6.2.1, regional groundwater levels appear to have been steadily increasing in the last three years. Local decreases in water levels may occur as a result of Project LIBERTY. One private well may be impacted if water levels decrease sufficiently, however, this is unlikely because that well is completed in a shallow water bearing zone that is not hydraulically connected to the Dakota Sandstone. The Existing Plant maintains two monitoring wells on site. In the unlikely event that well interference at that private well is observed, the facility will proactively participate to determine the reason for the interference and implement action to resolve the interference as outlined in Iowa Administrative Code 567-54. Actions that may occur include lowering the pump in the affected well or drilling replacement wells to greater depth to restore capacity. A second alternate response would be to connect the residence to the District water system. Therefore, no unmitigatable impacts are expected to occur as a result of Project LIBERTY.

3.6.3.2 Wastewater

Project LIBERTY would construct buildings in a location where connection to the existing septic system would be impractical. Also, the discharge of sanitary waste water would increase by approximately 1,200 gpd. The existing septic system does not have the capacity to handle the additional load without modification. Therefore, POET D&C would construct a new septic system to serve the sanitary discharge of Project LIBERTY. The new septic system would be a mound type system designed in accordance with the IDNR requirements. Since it would be a mound system, percolation rates of the natural site soils are not a design concern. The Existing Plant installation and operation of the existing septic system indicates that the site soil and depth to groundwater are suitable for installation and operation of the new septic system.

The operation of Project LIBERTY would increase the discharge of non-contact utility water consisting of non-contact cooling water, RO system blowdown, water softener blowdown, and green sand filter backwash from the entire biorefinery to approximately 0.57 cfs (367,000 gpd). This volume includes water generated during startup and shutdown conditions. Water generated during cleanup and maintenance activities would be reused in the process. The dedicated pipeline to the West Fork Des Moines River has the capacity to handle the additional discharge without modification. The maximum outside mixing zone concentration of TDS in the river was calculated using a mass balance approach and the projected discharge rate of a maximum of 0.57 cfs, the low flow in the West Fork Des Moines River of 5 cfs, (See Section 3.6.1.2) the actual discharge concentration from the Combined Biorefinery of approximately 2500 mg/L TDS, and the maximum TDS monitored in the river by the IDNR of 710 mg/L. The resulting calculation indicates that the in river maximum TDS concentration would be 893 mg/L. Based on WET testing completed by the Existing Plant, the projected discharge from the Proposed Action of 0.57 cfs of non-contact utility water is not expected to alter the aquatic habit of the West Fork Des Moines River.

3.6.3.3 Stormwater

Construction activities would require grading and excavation on approximately 55 acres of land currently used for row crop production. These construction activities would expose the soil to stormwater and have the potential to cause sedimentation in Dry Ditch, which runs across the southwestern most tip of the project site. An erosion control plan and SWPPP for construction would detail the BMPs necessary to prevent impacts to the Dry Ditch. These BMPs may include:

- Installation of silt fencing;
- Installation of hay bales for sediment control;
- Construction of temporary stormwater retention ponds;
- Retention of vegetative cover where practical.

During operation, lignocellulose/cob storage, haul roads, and spent lignocellulose handling are potential sources of contaminants to the surface and stormwater. POET D&C is planning to cover the lignocellulose/cob piles to minimize stormwater contact. The cover may consist of large tarp covered structures or permanent buildings. Haul roads on the site would be maintained to minimize potential for sediment generation. Road cleaning would be completed a necessary. Finally, stormwater retention ponds would be designed to control stormwater run-off, allow sediments to settle out, and to eliminate soil erosion. The stormwater ponds would be equipped with manual overflow valves that are normally closed. This would allow inspection of the stormwater before allowing discharge to occur. It would also allow the ponds to function as a final spill control measure in the event of a catastrophic release of ethanol or other hazardous material on-site. Project LIBERTY would manually open the valves during overflow conditions and discharge from the stormwater ponds would flow to Dry Ditch.

3.7 Waste Management and Hazardous Materials

3.7.1 Affected Environment

3.7.1.1 Solid and Hazardous Waste

The Existing Plant generates paper waste from office operations and non-hazardous solid wastes including scrap metal, wood, plastic products, paper from plant operations, and empty containers (i.e., drums, totes, and boxes). The Existing Plant recycles their non-hazardous waste products to the extent practical. The remaining non-hazardous solid waste, approximately 25 tons per week is disposed at the Northern Plains Regional Landfill through a licensed waste transportation company.

The Existing Plant is a conditionally exempt generator of hazardous waste, USEPA ID Number IAR000504217. The hazardous waste consists primarily of flammable liquids and laboratory chemicals. The hazardous wastes are transported off-site by a licensed hazardous waste transportation company to a licensed hazardous waste treatment, storage, and disposal facility.

The facility also infrequently generates universal wastes including used oil, fluorescent and high intensity discharge (HID) light bulbs, and batteries. The universal wastes are transported off-site by a licensed universal waste transportation company to a licensed disposal facility.

3.7.1.2 Hazardous Materials

The Existing Plant stores and uses various hazardous materials at the Existing Plant. Table 3-18 summarizes the major hazardous materials stored and used on-site.

Table 3-18 - Summary of Hazardous Materials Storage Tanks

Contents	Location	Storage Capacity (gallons)	Hazardous Characteristics	Spill Control Measure
190 proof (95%) ethanol tank	Outside	180,000	Flammable	Secondary containment that is equipped with an impermeable, synthetic liner
200 proof (100%) ethanol tank	Outside	180,000	Flammable	Secondary containment that is equipped with an impermeable, synthetic liner
Denatured ethanol tank	Outside	2,000,000	Flammable	Secondary containment that is equipped with an impermeable, synthetic liner
Denaturant (unleaded or natural gasoline)	Outside	127,000	Flammable	Secondary containment that is equipped with an impermeable, synthetic liner
Enzyme	Inside	25,000	None	Inside a building
Enzyme	Inside	25,000	None	Inside a building

Contents	Location	Storage Capacity (gallons)	Hazardous Characteristics	Spill Control Measure
Alkaline Cleaner	Inside	300	Reactive with acids, Acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Acid Cleaner	Inside	300	Reactive with caustics, Acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	300	Reactive with strong acids, Acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	300	Reactive with strong acids, Acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	300	Reactive with strong oxidizing agents, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	300	Reactive with strong acids, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Diesel Fuel	Outside	1,700	Flammable	Double wall AST
Diesel Fuel		500	Flammable	Double wall AST
Gasoline	Outside	500	Flammable	Double wall AST
Clean in place (CIP) Makeup	Inside	24,000	Reactive with strong acids, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Waste CIP	Inside	24,000	Reactive with strong acids, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility

Contents	Location	Storage Capacity (gallons)	Hazardous Characteristics	Spill Control Measure
50% Caustic	Inside	5,800	Reactive with strong acids, acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Bulk Urea	Inside	12,000	Reactive with strong oxidizers, acids, bases, and nitrates, acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Sulfuric Acid	Outside	6,500	Reactive with caustics, Acute and chronic health hazard from chemical exposure	Secondary containment that is equipped with an impermeable, synthetic liner

The Existing Plant also uses small quantities of hazardous materials in the quality assurance laboratory.

As noted above, all chemical storage areas are either inside buildings or located within impermeable secondary containment structures to prevent a release of the tank contents to the environment. The Existing Plant has a SPCC Plan to address spills or releases of the denaturant and oil. The Existing Plant also has an ERP to address spill or releases from the other (non-petroleum) storage tanks. The facility is manned 24-hours per day, 365 days per year and all operating personnel have been provided with spill response training. As noted in Section 3.1, the City of Emmetsburg has an Emergency Response Director who has direct responsibility to coordinate county disaster services and emergency planning for such events as floods, fire, earthquakes, tornadoes, hurricanes, drought, epidemics, electrical or computer outages, and terrorist attacks.

3.7.2 Environmental Consequences of No Action Alternative

3.7.2.1 Solid and Hazardous Waste

During construction the Starch Expansion will generate paper waste from office operations and construction debris. Construction debris will include, scrap metal, wood, paper, plastic products, and empty containers for construction supplies. Some waste concrete may also be generated. POET D&C and their contractors will recycle their waste products to the extent practical. The Northern Plains Regional Landfill and/or other local landfills will be capable of handling the construction debris generated by the Starch Expansion.

During operation, the Starch Expansion is not predicted to increase the amount of solid or hazardous waste generated by the Existing Plant.

3.7.2.2 Hazardous Materials

The Starch Expansion will not change the storage capacities for bulk denaturant, ethanol, diesel fuel or gasoline. The Starch Expansion is expected to add a second set of hazardous material ASTs that are otherwise similar to those listed in Table 3-16. Similar secondary containment and spill control procedures will be implemented. All storage tanks for hazardous materials will be located inside buildings or within impermeable secondary containment structures. The spill response training provided to employees will be applicable to the hazardous materials stored on-site for the starch expansion. No new hazard will established as a result of the starch expansion. These measures would prevent impacts from spills of hazardous materials. Therefore, no impacts are expected as a result of the No Action Alternative.

3.7.3 Environmental Consequences of Proposed Action

3.7.3.1 Solid and Hazardous Waste

During construction of Project LIBERTY, the facility would generate paper waste from office operations and construction debris. Construction debris would include, scrap metal, wood, paper, plastic products, and empty containers for construction supplies. Some waste concrete may also be generated. POET D&C and their contractors would recycle their waste products to the extent practical. The Northern Plains Regional Landfill and/or other local landfills would be capable of handling the construction debris generated by Project LIBERTY.

During operation, Project LIBERTY would generate approximately 320 tons per day of spent biosolids from the anaerobic digester and another 22 tons per day of ash and sulfur from the solid fuel boiler and digester gas scrubber.

Options for disposal of the digester solids are

1. Use as fuel for the solid fuel boiler;
2. Land application as a soil amendment; and
3. Disposal as a solid waste in a local landfill.

The boiler ash and sulfur may be beneficially reused or disposed in a local landfill. Iowa has established regulations under the Iowa Administrative Code 567, Chapter 108 for completing beneficial use determinations. The IDNR encourages the beneficial use of solid byproducts in order to preserve resources, conserve energy, and reduce or eliminate the need to dispose of solid byproducts in sanitary landfills Beneficial reuse would require completing a permit application, along with supporting documentation, for submittal to the IDNR. The supporting documentation would need to include:

- A thorough analysis of the material for chemical characteristics. The material could not be a hazardous waste;
- A thorough analysis the potential for impacts to the human health or the environment;
- A management plan for the material;
- A description of how the material would be reused, with the locations, businesses, and/or industries that would use the material; and
- For use as a soil amendment, the locations of farms and use rates of the material would need to be identified.

The IDNR would review the application and if the material meets the requirements for beneficial reuse, the IDNR would issue a beneficial reuse determination. The determination would allow beneficial reuse of solid byproducts as detailed in the application.

Two landfills are located within a reasonable haul radius from the facility, Northern Plains Regional Landfill, Graettinger, IA and Dickinson County Landfill, Spirit Lake, IA. Both landfills are licensed to accept Industrial Waste and could accept the biosolids, boiler ash, and sulfur. The Superintendent of the Northern Plains Regional Landfill, Mr. Chuck Duhn, indicated that the landfill currently has the potential to receive approximately 250-300 tons/day. However, based on information from the IDNR the landfill is currently receiving at an average of 150 tons/day. The Superintendent further indicated that at the potential receiving rate of 250-300 tons/day, the remaining lifetime capacity of the landfill is estimated to be 50 years. The Engineer for the Dickinson County Landfill indicated that it currently receives 165 to 240 tons/day and 60,000 tons/year. The Engineer further indicated that if Project LIBERTY's waste was transported to the landfill, the estimated current remaining lifetime capacity of 75 years would be reduced to approximately 35 years. Therefore, under worst case conditions where all of the biosolids, boiler ash, and sulfur have to be landfilled,

local landfills have the capacity to accept the additional waste generated by Project LIBERTY for at least 35 years.

3.7.3.2 Hazardous Materials

Project LIBERTY would store and use various hazardous materials. The storage tanks located outside would be designed and constructed with secondary containment structures sufficient to hold the contents of the largest tanks plus sufficient additional volume for rain or snow fall. Tanks located inside the buildings may also be located in secondary containment if determined to be necessary for employee safety or protection of the environment. Each storage tank would be constructed using materials compatible with the chemical being stored. The spill response plan would be updated to include the storage areas associated with Project LIBERTY. Additional spill kits would be acquired as needed. Spill response training would be provided to employees working with the hazardous materials stored and used on-site. These measures would prevent impacts from spills of hazardous materials. Therefore, no impacts are expected as a result of the Proposed Action.

Table 3-19 summarizes the hazardous chemicals that would be present on-site in significant quantities.

Table 3-19 - Summary of Hazardous Materials Storage Tanks

Contents	Location	Storage Capacity	Hazardous Characteristics	Spill Control Measure
Fermentation Enzyme	Inside	25,000 gallon AST	None	Inside a building, spill kit available, 24 hour manned facility
Pretreatment Chemicals • Acid • Base	Inside	30,000 gallon AST 30,000 gallon AST	Reactive, Acute and chronic health affect	Inside a building, spill kit available, 24 hour manned facility
Alkaline Cleaner	Inside	1,000 gallon AST	Reactive with strong acids, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Acid Cleaner	Inside	1,000 gallon AST	Reactive with strong bases, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	1,000 gallon AST	Reactive with strong oxidizing agents, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	1,000 gallon AST	Reactive with strong oxidizing agents, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility

Contents	Location	Storage Capacity	Hazardous Characteristics	Spill Control Measure
Cooling Water Treatment	Inside	1,000 gallon AST	Reactive with strong oxidizing agents, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Cooling Water Treatment	Inside	1,000 gallon AST	Reactive with strong oxidizing agents, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
CIP Makeup	Inside	25,000 gallon AST	Reactive with strong acids, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
Waste CIP	Inside	25,000 gallon AST	Reactive with strong acids, slight acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility
50% Caustic	Inside	6,000 gallon AST	Reactive with strong acids, acute and chronic health hazard from chemical exposure	Inside a building, spill kit available, 24 hour manned facility

Project Liberty will use and store an ethanologen (yeast). The yeast will be dry, stored in boxes on pallets. Project LIBERTY would have a maximum of 27 pallets of yeast on site. As noted in Section 2.2.3.5, the yeast would be a mix of common brewers yeast (*Saccharomyces cerevisiae*) and a genetically modified form derived from a common commercial brewers yeast. Current commercially available GMO brewers yeasts have been approved as food additives by the FDA and are classified as Substances Generally Recognized as Safe (GRAS) per 21 CFR 170.36 (GRAS NOTICE No. GRN 000120). The USEPA has completed a risk assessment on *Saccharomyces cerevisiae* which noted that the National Institute of Health in its 1986 Guidelines for Research Involving Recombinant DNS Molecules considers *Saccharomyces cerevisiae* a safe organism (USEPA 1997). The USEPA risk assessment concluded that *Saccharomyces cerevisiae is an organism which has a history of safe use, is nonpathogenic and has not been shown to produce toxins to humans (USEPA 1997).* Project LIBERTY would use a yeast mixture that is also classified as GRAS.

3.8 Hazard Review and Accident and Risk Analysis

3.8.1 Affected Environment

As described in Section 3.7.1.3, the Existing Plant has a number of hazardous materials stored on-site. the Existing Plant has not had a release of any of these hazardous substances that has adversely impacted the site since starting operations in 2005.

The Existing Plant has developed an ICP for the facility that:

- Analyzes the potential for spills or releases of ethanol, petroleum products, and other hazardous materials. This analysis includes spills or releases from equipment failures, human error, natural disasters, and intentional destructive acts;
- Outlines steps to prevent releases or spills from occurring;
- Evaluates the potential impacts of releases should they occur; and

- Describes response actions that should be taken in the event of a release.

The ICP includes information to meet the following programs requirements:

- USEPA SPCC Plan (40 CFR 112)
- USEPA RMP (40 CFR 68),
- USEPA NPDES SWPPP (40 CFR 122); and
- OSHA Process Safety Management (PSM) Plan (29 CFR 1910.122).

The Existing Plant provides training to their personnel on the site specific spill prevention and response measures detailed in the ICP. POET PM also reviews the ICP annually and updates the information as needed. The most recent update was completed in March 2008.

The Existing Plant has also met with the local fire and emergency response providers to discuss potential emergencies, determine capabilities, and establish communication protocols and responsibilities.

In addition to the ICP, POET PM has developed a PSM program for the ethanol production, storage, and loadout operations. The PSM program is an intensive program that is specifically intended to:

- Identify potentially catastrophic incidents associated with the ethanol production process through a rigorous Process Hazard Analysis (PHA) that includes facility siting considerations, process design, maintenance requirements, and human factors.
- Identify process improvements that should be made to reduce the risk of a catastrophic release;
- Identify maintenance activities and monitoring procedures that need to be completed to maintain the mechanical integrity of the process;
- Provide a procedure for identification and evaluation of changes to the process and the potential impact of those changes on process safety;
- Provide a procedure for ensuring that the process and any changes are constructed in accordance with appropriate building codes and process designs;
- Provide a method for ensuring employee participation in the continuing improvement of the PSM program;
- Establish a procedure to provide safety information to contractors that will be working on-site; and
- Provide an emergency response plan for the facility.

The PSM program is reviewed annually and updated as needed.

3.8.2 Environmental Consequences of No Action Alternative

As described in Section 3.7.2.3, the Starch Expansion will not change the storage capacities for bulk denaturant, ethanol, diesel fuel or gasoline. The Starch Expansion is expected to add a second set of hazardous material ASTs that are otherwise similar to those listed in Table 3-16.

POET PM will update both the ICP and the PSM program to account for the additional storage and use of hazardous materials. These updates will be completed prior to bringing the additional hazardous materials on site. The PHA will be updated prior to start up of the Starch Expansion to mitigate or abate hazardous conditions where possible.

3.8.3 Environmental Consequences of Proposed Action

As described in Section 3.7.3.3, Project LIBERTY would increase the amount of hazardous materials stored and used on-site. As shown on Table 3-19, no new types of hazardous materials would be needed for the

lignocellulosic conversion process. Project LIBERTY would analyze the potential release scenarios for the hazardous materials and amend the ICP, ERP, and incorporate changes into the PSM program to account for the additional storage and use of hazardous materials. These updates would be completed prior to bringing the additional hazardous materials on site. The PHA would be updated prior to start up of Project LIBERTY to mitigate or abate hazardous conditions where possible. These measures would prevent impacts from spills of hazardous materials.

3.9 Infrastructure

3.9.1 Affected Environment

The Existing Plant uses natural gas for fuel in the facility boilers, dryers, and for space heating equipment. Natural gas is supplied by NNG via a 6 inch line (from the onsite meter station to the production facility). The natural gas pipeline enters at the southwest edge of the property along 470th Avenue and travels to the northwest to the meter station. The meter station is located in the northwest corner of the facility south of the facility's entrance road.

The Existing Plant purchases electric power from MidAmerican Energy. The power line right of way is along 380th Street. The power line enters the property in the northeast and travels to the southwest to the substation. The substation is located in the northwest corner of the facility, north of the facility's entrance road.

As discussed in Section 2.6, The Existing Plant has on-site water wells for process requirements. The Existing Plant also has an on-site septic system for sanitary waste disposal.

3.9.2 Environmental Consequences of No Action Alternative

The existing infrastructure for waste water discharge is sufficient to support the Starch Expansion.

POET D&C will install a third production well (PW#3) to supplement the existing groundwater supply. PW#3 will be drilled on-site. The drilling of a third well is not anticipated to have any adverse environmental impact. The potential consequences of additional withdrawal of ground water are discussed in Section 3.6.2.1.

The Starch Expansion will require additional natural gas supplies for operation. POET D&C will contract with NNG for this additional service. NNG is proposing to construct approximately 2 miles of 16 inch pipeline near Welcome, Minnesota and approximately 13.3 miles of 6 inch pipeline near Emmetsburg, Iowa to support the Starch Expansion. The proposed pipelines will be constructed next to the existing NNG natural gas lines in their existing right of way. NNG does not anticipate requiring any new right of way or easements for these lines. The location of the proposed lines is shown on Figure 4. Most of the pipeline will cross agricultural fields. Some Prime Farmland will be disturbed by the construction, but the disturbance is expected to be for one growing season only.

Based on the proposed pipeline route, the 16 inch pipeline will cross one stream, an unnamed tributary to Lilo Creek, in Minnesota. The 6 inch pipeline will cross a total of five streams in Iowa. The streams are:

- Big Muddy Creek
- Ditch No. 61
- An Unnamed Tributary to Ditch No. 61
- Pickeral Run (or tributary)
- An Unnamed Tributary to the Des Moines River

NNG's general practice is to horizontally bore under streams to avoid disturbing the stream bed.

The National Wetland Inventory (NWI) maps (USFWS, 2008) for the pipeline routes show that no wetlands are present on the 16 inch pipeline route. Four wetland areas are present on the 6 inch pipeline route. The total amount of wetland impacts that will occur during construction will be approximately 1,330 linear feet by 40 feet wide (1.2 acres). The wetlands are located as follows:

- Wetland 1 - 320 linear feet T98N, R35W, Section 24
- Wetland 2 – 250 linear feet T96N, R33W, Section 23
- Wetland 3 – 160 linear feet T96N, R33W, Section 35
- Wetland 4 – 600 linear feet T95N, R32W, Section 6

NNG will apply for any required wetland permits from the USACE and the IDNR and will mitigate the impacts to all wetlands that are under the jurisdiction of the USACE..

NNG will prepare a Prior Notice for construction of the proposed pipelines as required by Section 157.205 of the Federal Energy Regulatory Commission's (FERC) regulations under the Natural Gas Act (NGA). As part of the Prior Notice, NNG will prepare thirteen resource reports. The resource reports will address the following topics:

- General Description;
- Water Use and Quality;
- Fish, Wildlife, and Vegetation;
- Cultural Resources;
- Socioeconomics;
- Geological Resources
- Soils;
- Land Use, Recreation, and Aesthetics;
- Air Quality and Noise;
- Alternatives;
- Safety and Reliability;
- Polychlorinated biphenyl (PCB) Contamination; and
- Engineering and Design Material

NNG will acquire the required environmental permits such as; a NPDES stormwater permit for construction and wetland and or stream crossing permits from the USACE.

A new electric substation will be constructed on-site for the Starch Expansion. The substation will be constructed and owned by Mid-American Energy. No new transmission lines will be constructed off-site.

3.9.3 Environmental Consequences of Proposed Action

Project LIBERTY would require approximately 43,800,000 Kw-hours of electric power for process operation. Start up, shutdown, and maintenance conditions are expected to have lower power use requirements than normal operations. A new substation would be constructed on-site to supply the necessary power. However, no new transmission lines would be required. The construction would take place on-site.

The majority of the gas used for Project LIBERTY process operations would come from the anaerobic digester system. As a backup to the solid fuel boiler and the anaerobic digester system, Project LIBERTY would require a supplemental natural gas system. POET would contract with NNG to provide this backup natural gas

supply. NNG is proposing to construct approximately 2 miles of 16 inch pipeline near Welcome, Minnesota and approximately 8.8 miles of 6 inch pipeline near Emmetsburg, Iowa to support Project LIBERTY. These pipelines would be in addition to those installed for the Starch Expansion. The proposed pipelines would be constructed next to the existing NNG natural gas lines in their existing right of way. NNG does not anticipate requiring any new right of way or easements for these lines. NNG would complete the Prior Notice and associated Resource Reports for the pipeline project.

Based on the proposed pipeline route, the 16 inch pipeline will cross one stream, Center Creek (County Ditch No. 2), in Minnesota. The 6 inch pipeline will cross a total of five streams in Iowa. The streams are:

- Pickeral Run (or tributary)
- Tributary to Ditch No. 2
- Unnamed Tributary to the Des Moines River
- Unnamed Tributary to Ditch No. 132
- Unnamed Tributary to Ditch No. 132

NNG's general practice is to horizontally bore under streams to avoid disturbing the stream bed.

The NWI maps (USFWS, 2008) for the pipeline routes show that no wetlands are present on the 16 inch pipeline route in Minnesota. Four wetland areas are present on the 6 inch pipeline route. The total amount of wetland impacts that will occur during construction will be approximately 1,190 linear feet by 40 feet wide (1.1 acres). The wetlands are located as follows:

- Wetland 1 – 100 linear feet T98N, R34W, Section 33
- Wetland 2 – 290 linear feet T97N, R34W, Section 14
- Wetland 3 – 200 linear feet T97N, R33W, Section 30
- Wetland 4 – 600 linear feet T97N, R33W, Section 31

NNG will apply for any required wetland permits from the USACE and the IDNR and will mitigate the impacts to any wetlands under the jurisdiction of the USACE

POET D&C will install a fourth production well (PW#4) to supplement the existing groundwater supply. PW#4 would be drilled on-site. The drilling of a fourth well is not anticipated to have any adverse environmental impact. The potential consequences of additional withdrawal of ground water are discussed in Section 3.6.3.1

3.10 Cultural Resources

3.10.1 Affected Environment

Cultural resources include sites, buildings, structures, or areas that are of historic, cultural, archeological, and/or architectural significance. Since the DOE is providing funding for a portion of proposed project, the proposed project will be subject to the provisions of Section 106 of the Historic Preservation Act. The purpose of the "Section 106 Process" is to assure that no unnecessary harm comes to historic properties as a result of federal actions. Under Section 106 of the National Historic Preservation Act of 1966 (as amended), federal agencies are required to take into account the effect of their proposed undertakings on properties listed in or eligible for inclusion in the National Register of Historic Places.

The National Register of Historic Places has been reviewed for Palo Alto County. Three buildings are listed on the Register:

1. Emmetsburg Public Library, Emmetsburg, IA - Approximately 1.5 mile northwest of the project site

2. Ormsby-Kelly House, Emmetsburg, IA - Approximately 1.5 mile northwest of the project site
3. Grotto of Redemption, West Bend Iowa - Approximately 15 mile southeast of the project site

A Phase I archeological and historic structure survey has been completed for the site. A total of three scatters from presumed historic farmsteads were identified. None of the scatters were considered to be significant because they were not large, did not have temporal or spatial consistency, and no historic event could be connected to the objects. No archeological artifacts were identified. Similarly, no significant historic structures were identified. A copy of the Phase I report is included in Appendix E.

The Iowa State Historic Preservation Office (SHPO) has reviewed the Phase I report at the request of DOE. The SHPO has concurred with the conclusion that the Emmetsburg site does not contain historic or archeological resources of significance. A copy of the SHPO concurrence letter is included in Appendix E.

3.10.2 Environmental Consequences of the No Action Alternative

The Phase I archeological and historic structure survey above indicated that no significant cultural resources were identified on-site. The SHPO has concurred with the conclusion in the Phase I report.

3.10.3 Environmental Consequences of the Proposed Action

The Phase I archeological and historic structure survey above indicated that no significant cultural resources were identified on-site. The SHPO has concurred with the conclusion in the Phase I report.

3.11 Land Use

3.11.1 Affected Land Use

The Existing Plant is located in Palo Alto County, Iowa. The County is 564 square miles (360,960 acres) in size with 91.4% (~330,000 acres) in farm acreage. The remaining land is divided fairly evenly between water bodies, pasture or grazing use, wooded areas, and rural communities (CityData.com). The agricultural land in Palo Alto County is used predominantly for row crop cultivation, mostly corn and soybeans. This holds true of adjacent counties, Dickinson, Emmet, Kossuth, Humboldt, Pocahontas, Buena Vista, and Clay. There are approximately 1,600,000 acres in corn production within 35 miles of the Project LIBERTY site. The Existing Plant currently purchases approximately 8 MMBu/year of corn grain to produce over 50 MMgal of ethanol per year.

The proposed project site consists of the Existing Plant and the agricultural land immediately adjacent to the south. The Existing Plant is zoned Industrial. The agricultural land is currently used for row crop cultivation including corn and soybeans. The agricultural land is zoned as conservation agricultural property. The undeveloped land south of the existing plant is a mixture of land classified by the NRCS as Prime Farmland, Prime Farmland when drained, and Farmland of statewide importance. (NRCS, 2008)

The properties surrounding the project site, except immediately to the north are farmsteads with active row crop cultivation including corn and soybeans. Immediately to the north of the Existing Plant is the AGP – Emmetsburg soybean processing plant.

The AGP plant receives soybeans from local farmers by truck, stores the soybeans in grain silos, then dries and processes the soybeans to extract soybean oil. The soy bean oil extraction process uses n-hexane as the solvent. The facility also produces soy bean meal as a co-product with the oil. Meal and oil is shipped by rail and truck to off-site customers.

Predominant existing agricultural practices are to harvest the corn with in-field separation of the kernel from the crop residue (stover and cobs). The crop residue is rough chopped by combine equipment and dropped back onto the field. The crop residue acts as a soil amendment and helps prevent soil erosion due to wind and rainfall. The stover represents approximately 94% of the crop residue coverage with the cobs making up the

remaining 6%. Single till and no till farming practices are also widely used to reduce soil compaction and erosion.

3.11.2 Environmental Consequences of No Action Alternative

As noted above, Palo Alto and the surrounding Counties are predominantly agricultural with row crops, corn and soybeans being the dominant crops. After the Starch Expansion, the facility will consume 115,000 bushels/day of corn grain, roughly 40 MMBu/yr, or about 200,000 corn acres. POET completed an evaluation of the corn supply in the Emmetsburg area that determined that there are approximately 357 MMBu of corn available for purchase within a 35-mile radius of the biorefinery. The corn needs of all existing and proposed ethanol biorefineries in the area would account for 57.7% of the corn in the area. POET concluded that there is an adequate supply of corn for the Existing Plant and Starch Expansion. The existing corn supply is sufficient to meet the needs of the expanded facility. No change in regional land use are predicted to occur as a result of the No Action Alternative.

Since the existing land use is currently predominantly row crops, farming and tillage practices are not predicted to change as a result of the No Action Alternative.

The Starch Expansion is a direct addition to the existing ethanol production facility. The buildings and equipment will be similar in size and configuration. No change in on-site land use will occur as a result of the No Action Alternative. No additional Prime Farmland, Prime Farmland when drained, or Farmland of statewide importance will be impacted as a result of the No Action Alternative.

3.11.3 Environmental Consequences of Proposed Action

The two major lignocellulose feedstocks for Project LIBERTY would be corn fiber and corn cobs. Total biomass feedstock consumed for the lignocellulose-to-ethanol process will be 770 BDT/day. The local farming communities could meet the feedstock demands of Project LIBERTY without changing cropping patterns and acreages.

The supply of corn grain, discussed in section 3.11.2, is relevant because it is the source of corn fiber. POET D&C and a commercial partner have developed and operated a proprietary corn kernel dry fractionation process called BFrac™. This process uses advanced milling techniques to separate corn kernels into an endosperm stream rich in starch, a germ stream rich in oil, and bran a stream rich in lignocellulosic fiber. Based on experience with the BFrac™ process, 115,000 bushels/day of corn grain would produce approximately 191 BDT/day of corn fiber.

Project LIBERTY would contract with local farmers to supply cobs. Research has shown that 0.70 BDT of cobs per acre can be expected in Iowa. Using cobs only (no fiber), Project LIBERTY would require approximately 361,000 acres of cobs harvested per year to meet the needs of the biorefinery. If corn fiber is from the BFrac™ system is used, approximately 270,000 acres of cobs would be required per year. Therefore, there is an ample supply of corn cobs in the Emmetsburg area to meet the needs of the lignocellulosic process. Since Project LIBERTY would be using more of the corn plant already being grown, no change in regional land use would occur as a result of the Proposed Action.

As discussed in Section 3.11.1, current practice is to leave the cobs on the field as a soil amendment and cover for erosion control. Removal of the cobs could reduce the amount of nutrients and the amount of cover material returned to the soil. Table 3-20 shows the relative soil nutrient contributions of stover and cobs.

Table 3-20 Elemental Composition of Corn Stover vs. Corn Cobs

Nutrient	Stover Pound per acre	Cobs Pound per acre
Nitrogen	63.6	6.5
Phosphorus	13.8	1.1
Potassium	104.4	13.3
Calcium	34.2	1.5
Magnesium	24.0	0.9
Sulfur	10.2	6.0

Source: Sawyer and Mallarino, 2007, Iowa State University

As shown, the cobs represent approximately 10% of the total soil nutrient composition of the crop residue. Therefore, the short-term impact of cob removal is expected to be negligible. POET is working, with Dr. Stuart Birrell of Iowa State University on an evaluation of corn cob and stover removal levels on crop production, soil quality, and nutrient levels. The purpose of the study is to determine the long-term impacts of cob removal on soil nutrient conditions and to determine what mitigation measures, if any, would be necessary. As discussed in Section 3.11.1, cobs represent approximately 6% of the crop residue cover. Therefore, removal of cobs is expected to have a negligible impact on soil erosion control.

Project LIBERTY would construct buildings and structures similar to the existing conventional ethanol plant. The major difference in the facilities would be the cob storage structures which may be used instead of grain silos. However, these structures would be consistent in shape and size with structures used for outdoor storage of grain at grain elevators common in rural areas. The construction of Project Liberty would disturb approximately 60 acres of land designated as Prime Farmland, Prime Farmland when drained, or Farmland of statewide importance.

3.12 Noise

3.12.1 Affected Environment

Noise sources in rural areas are predominantly natural, including insects, birds, wind, and weather. Background noise levels in wilderness and rural areas typically range between 35 and 45 decibels adjusted (dBA). The primary sources of noise in the rural residential and agricultural areas are roadway traffic and farm machinery on a seasonal basis. Background noise levels are approximately 40 dBA in rural residential areas and 45 dBA in agricultural cropland with equipment operating (FERC 2002, EPA 1978).

The Existing Plant is an agricultural/industrial facility. Noise is generated continuously during normal operations related primarily to mechanical equipment operations. Much of the mechanical equipment at the site is related to the raw material and product-handling operations, including grain conveyors, elevators, and mills; production activities, including dryers, cooling equipment, and other equipment. Noise is also generated by trucks and rail operations for the transport of raw materials and final product, as well as some industrial equipment (front-end loader, etc.) for on-site product movement. The location and operation of the above equipment and therefore, the noise volume does not increase during start up operations.

Noise studies at ethanol plants in Minnesota have indicated that the equipment with the highest noise levels are the cooling towers (~80 dBA), the hammermills (~86 dBA), and the conveyor systems (~78 dBA). (APEC 2007). The readings were taken at 11 feet from each of the above sources.

Noise levels from adjacent sources are added using a logarithmic addition. Table 3-21 shows a simple way to add noise levels.

Table 3-21 - Addition of Decibels

Numerical difference between two noise levels [dBA]	Amount to be added to the higher of the two noise levels [dB or dBA]
0	3.0
1	2.5
2	2.0
3	1.8
4	1.5
5	1.2
6	1.0
7	0.8
8	0.6
9	0.5
10	0.4
11	0.3
12	0.3
13	0.2
14	0.1
15	0.1
Step 1: Determine the difference between the two levels and find the corresponding row in the left hand column. **Step 2**: Find the number [dB or dBA] corresponding to this difference in the right hand column of the table. **Step 3**: Add this number to the higher of the two decibel levels.	

Source: Casella Undated

Using the above table, the logarithmic addition of the potential noise sources that will be present at the facility gives a total predicted noise contribution of 87.5 dBA at 11 feet from the existing equipment at the Existing Plant.

Noise loss from the noise source to the nearest sensitive area (NSA) is calculated using the equation (Beranek et. al. 1992):

$SPL\ 2 = SPL\ 1 + 20\ Log_{10}\ (d_1/d_2)$.

Where:

SPL 2 is the sound pressure level at the NSA,
SPL 1 is the sound pressure level contribution from the noise source,
d_1 is the distance from the noise source that the reading was taken (11 feet), and
d_2 is the distance to the NSA.

The NSA is a farm residence located approximately 2400 feet west of the Existing Plant. Other farm residences are present approximately 2500 feet to the northeast and >3000 feet to the south of the Existing Plant. Therefore, the noise impact from the Existing Plant on the NSA is estimated to be 40.7 dBA. This noise level is within the normal background level for rural agricultural areas.

The AGP facility will have similar noise sources to the Existing Plant facility. However, the AGP facility is not immediately adjacent to the conventional plant. Therefore, the noise levels from the facilities are not additive.

3.12.2 Environmental Consequences of the No Action Alternative

The Starch Expansion is a direct addition to the existing ethanol production facility. The buildings and equipment will be similar in size and configuration and the noise sources will also be similar in size, location, and intensity. The location and operation of the equipment associated with the Starch Expansion is immediately adjacent to the Existing Plant. Therefore, the noise volume addition of a noise source that is within 0 dBA of the original source will add 3.0 dBA to the sound level. Since the distance to the nearest NSA will not change, the total noise level for the Starch Expansion plus the existing plant will be 43.7 dBA. This noise level is within the normal background level for rural agricultural areas.

3.12.3 Environmental Consequences of the Proposed Action

Project LIBERTY would have the same type of noise sources as the Existing Plant. These would include:

- Truck traffic;
- Lignocellulose handling and processing equipment, such as conveyors and milling equipment;
- Cooling towers; and
- Front end loaders.

The noise profile from Project LIBERTY would be similar with the equipment with the highest noise levels being the cooling towers (~80 dBA), the cob milling equipment (~86 dBA), and the conveyor systems (~78 dBA). The location and operation of the equipment associated with the Proposed Action and therefore, the noise volume would not be expected to increase during start up operations.

Based on the layout of Project LIBERTY, the facility would not be immediately adjacent to the conventional plant. Therefore, the noise levels from the facilities are not additive. The NSA to Project LIBERY is approximately 2400 feet to the west. Using the equation from Section 3.9.1, the noise impact from Project Liberty would be 40.7 dBA. This noise level would be within the normal background level for rural agricultural areas. Therefore, no change in noise impacts would be predicted to occur as a result of the Proposed Action.

3.13 Aesthetics

3.13.1 Affected Environment

The local area includes the Existing Plant, the AGP plant to the north; and agricultural land. The Existing Plant has three primary areas that have potential aesthetic affects:

- grain receiving and storage which includes dry distillers grains with solubles (DDGS) storage and loadout;

- ethanol production: and
- ethanol storage tanks.

The grain receiving and storage area includes the corn receiving shed, grains building, DDGS storage silo, one concrete silo, and five steel grain bins. The steel grain bins are the dominant structures at the site with a diameter of 90 feet and a height of 100 feet. The DDGS silo is 55 feet in diameter and 112 feet tall. The grain building is approximately 136 feet long by 100 feet wide by 47 feet tall.

The ethanol production area includes the process building, the mechanical building, and the fermenter area. The total building area is approximately 55,000 square feet with the largest building being Process Building A at 120 feet wide by 246 feet long. Process Building B is the tallest building at 87 feet.

The ethanol storage tanks farm contains two large ethanol ASTs and three smaller ASTs. The large ASTs are 46 feet in diameter and 60 feet tall.

Exhaust is emitted from a 105 foot tall regenerative thermal oxidizer stack. A water vapor plume from this stack is visible from varying distances, depending on weather conditions. Water vapor is also visible from the facility's cooling tower depending on weather conditions. The top of the cooling tower is approximately 35 feet above grade.

The Existing Plant operates 24 hours per day, 7 days per week. Since production will be continuous, lighting is required to support operations and to provide security. Lighting consists of low-level lighting around exit areas and general outside areas, including ground-level operating areas, stairs, platforms, roadways, storage areas, and parking areas. The lighting is provided for purposes of general operator access and safety under regular operating conditions.

Outdoor lights are a combination of pole-mounted and structure-mounted lights. Spot lighting is provided to illuminate operating equipment or access roadways where needed. This lighting is higher in intensity than general outside lighting, but is limited to specific areas and usage is as needed.

The AGP facility has building types that are similar to the Existing Plant, including grain silos, processing buildings, and storage tanks. The AGP facility also has similar exhaust plumes from boilers and cooling towers and lighting for general purpose and process specific needs.

3.13.2 Environmental Consequences of the No Action Alternative

The Starch Expansion is a direct addition to the existing ethanol production facility. The buildings and equipment will be similar in size and configuration. The expansion will be constructed within the footprint of the Existing Plant.

3.13.3 Environmental Consequences of Proposed Action

Project LIBERTY would construct buildings and structures similar to the existing conventional ethanol plant. The major difference in the facilities would be the cob storage structures which may be used instead of grain silos. However, these structures would be consistent in shape and size with structures used for outdoor storage of grain at grain elevators common in rural areas.

Due to the similarity in use, buildings and structures, no significant change in appearance would occur as a result of the Proposed Action.

3.14 Traffic

3.14.1 Affected Environment

3.14.1.1 Roads

The Existing Plant is approximately 1 mile southeast of the town Emmetsburg, Iowa. The main routes serving this area are US Highway 18 going east-west and State Highway 4 going north-south. Currently, the most direct route to the site from State Highway 4 is via 380th Street or via 480th Street from US Highway 18.

During 2003, the annual average traffic count on State Highway 4 between Highway 18 and 420th Street was 2,670 vehicles per day. Likewise, Highway 18 between 525th Avenue and State Highway 4 had the average of 2,870 vehicles per day. (Source: Traffic Flow Map 2004)

The 2003 traffic data shows that the average traffic counts on the roads immediately adjacent to the Existing Plant property 380th Street and 390th Street, have 590 vehicles and 100 vehicles per day respectively.

A 1999 Annual Average Daily Traffic survey shows 100 vehicles on 470th Avenue between 380th Street and 390th Street. (Source: Traffic Flow Map 2004).

The Existing Plant facility receives approximately 100 trucks per day for grain receiving plus DDGS, wet cake, and ethanol shipping. During spring when local farmers are emptying their grain bins and during fall harvest, the maximum number of grain trucks can exceed 280 per day. The Existing Plant also has approximately 40 passenger vehicles arriving per day for employees and visitors.

The AGP facility receives soybeans via truck. Based on the maximum grain receiving system capacity, the AGP facility would be expected to be able to process a maximum of approximately 200 trucks per day over two 8 hour shifts. On average, the facility will need to receive approximately 84 trucks per day to provide the soybeans for normal operation. Similar to the Existing Plant site, peak grain receiving will occur during the fall harvest season and in the spring when farmers are emptying out their grain bins for cleaning and preparation for the growing season.

As shown on Figure 13, there are five commercial grain elevators within 10 miles the City of Emmetsburg. Three of the elevators are inside the city limits. Most of the grain from the local farms that does not go to either AGP or the Existing Plant would be trucked to these elevators during harvest season.

3.14.1.2 Rail Lines

The Iowa, Chicago, & Eastern R.R. Corp line ("ICE") runs through Palo Alto County from eastern border to western border of the county line via Emmetsburg. The Union Pacific Railroad Rail Traffic go through Emmetsburg from northeast to southeast. Both lines are low traffic lines with less than five trains per day each Iowa DOT 2007). The Existing Plant uses approximately 66 rail cars for ethanol and DDGS shipment per week.

3.14.2 Environmental Consequences of the No Action Alternative

3.14.2.1 Roads

Construction for the Starch Expansion will likely commence during the fourth quarter of 2008. The sub-contractor labor force will average around 200 employees, with a peak of nearly 325. POET D&C experience with construction at Emmetsburg and other sites in Iowa indicated that most of the workforce will car pool to some degree. Therefore, a maximum of approximately 150 cars per day and an average of 80 cars per day will be associated with construction staff. Truck traffic for construction is highly variable depending on the phase of construction. POET D&C experience with construction at Emmetsburg and other sites in Iowa indicates that peak truck traffic will occur during delivery of construction steel with up to 6 steel trucks a day for approximately a week plus two small carrier deliveries (United Parcel Service style truck), four mid-size truck deliveries, and five semi-load deliveries for a maximum of approximately 17 trucks per day. The average

number of trucks will be approximately 11 trucks per day. Construction will take approximately 12 to 14 months. Construction traffic for staff and deliveries will use existing plant entrances.

The Starch Expansion will require approximately twice the total grain as the current facility uses. This grain will be brought to the facility by truck from local farms. Therefore, the average number of grain trucks arriving at the facility will double to approximately 160 per day. Some of these trucks will have historically been taking their grain to the local grain elevators in the City of Emmetsburg. However, peak receiving will remain steady at approximately 280 per day because POET D&C is not changing the grain receiving system or the grain storage capacity of the facility.

Shipping of ethanol by truck is expected to increase from approximately 4 per week to approximately 5 per day due to the addition of E-85 blending capacity. E-85 will generally be sold to the local market rather than shipped via rail.

Shipment of DDGS and wet cake by truck will increase from approximately 8 trucks per day to approximately 12 per day. The local market for DDGS and wet cake is not expected to increase sufficiently to utilize more than approximately 12 trucks per day of DDGS and/or wet cake.

Traffic flow patterns will likely change as a result of the road improvements proposed by Palo Alto County. These improvements will take place beginning in the 2008 construction season with all modifications scheduled to be completed by the end of the 2011 construction season. A copy of the road improvement map is included in Appendix F. The purpose of these improvements is to upgrade roads and to facilitate movement for the additional traffic.

Figure 14 – Non-Cellulose Delivery Routes shows the roads that will be used by the Existing Plant for haul truck traffic. The primary route from the south will likely change from the current pattern with trucks turning east onto 390th then north on 470th to get to the entrance on 380th. This route will be more desirable to trucks because it will avoid the existing sharp corner that exists at the junction of Hwy 4 and 380th.

The primary route from the west will likely change from the current pattern, with trucks going south to 390th rather than going through town. This route will be desirable because it will avoid city traffic and several regulated intersections. Farmers may choose to go through town; however, this is expected to be a secondary route. POET PM will monitor traffic patterns and work with local farmers to distribute traffic on the roads.

The additional truck traffic to the facility will result in an average increase of approximately 15% to the existing traffic on 380th street.

The planned improvements to the roads are expected to mitigate all or most adverse impacts to traffic flow around the facility.

3.14.3 Environmental Consequences of the Proposed Action

Construction for Project Liberty would commence during the third quarter 2010, after completion of the Starch Expansion. Therefore, no overlap of construction staff or truck deliveries is expected.

Similar to the Starch Expansion, the sub-contractor labor force for Project LIBERTY would average around 200 employees, with a peak of nearly 325. Truck delivery schedules and numbers are expected to be similar to the Starch Expansion. Therefore, a maximum of approximately 150 cars per day and an average of 80 cars per day would be associated with construction staff. Truck traffic for deliveries would be a maximum of approximately 17 trucks per day with an average of 11 trucks per day. Construction would take approximately 12 to 14 months.

Construction traffic patterns would change for Project Liberty with the majority of staff and deliveries entering the site from 470th Street. Operations staff and corn deliveries at the conventional plant would continue to use 380th Street.

Project LIBERTY would require a maximum of 170 trucks per day to deliver cobs during operations. The maximum delivery periods are expected to be in the fall during harvest and during the spring just prior to planting season. In addition, approximately 11 trucks per day would be used to bring fermentation enzymes and process chemicals to the facility. Shipment of boiler ash and biosolids from the anaerobic digester could reach a maximum of approximately 19 trucks per day. Therefore, the total maximum additional truck traffic from Project LIBERTY could reach 200 trucks per day and the total number of trucks arriving at the Biorefinery could reach 515 per day. Figure 15 – Proposed Internal Traffic Patterns shows the internal traffic patterns at the facility for both corn and cobs. As shown, the traffic patterns are independent of each other.

POET D&C plans to construct a new facility entrance for Project LIBERTY off of 470th Street on the west side of the site. POET has entered into an agreement to deed a 50 foot right of way to Palo Alto County along 470th Street for the construction of a turn lane into the facility. This new access point is expected to reduce the potential for an increase in the truck traffic on 380th Street.

Figure 16 – Cellulose Delivery Routes shows the proposed truck traffic routes to the facility. As shown, the Primary routes to the facility from all directions would avoid the city of Emmetsburg. POET plans to use contractors to haul a significant portion of the lignocellulose for Project LIBERTY. POET would be able to control both the routes and timing of delivery of cobs to the facility to mitigate traffic concerns, since these trucks would be contracted to POET. Farmers, delivering lignocellulose to the facility, may choose to go through town; however, this is expected to be a secondary route. POET would monitor traffic patterns and work with these farmers to distribute traffic on the roads.

POET D&C has met with the Palo Alto County highway department regarding the additional truck traffic. Based on information presented in that meeting, the Palo Alto County staff believes that the additional truck traffic would have a negligible impact on local roads.

In the event that traffic issues occur in the City of Emmetsburg, on Highway 4, Highway 18 or other surrounding roads; POET would implement a traffic control plan to increase the hours when cobs and corn for the conventional plant would be received at the facilities. This would reduce the concentration of trucks arriving at the facility. POET also has sufficient property to construct a truck staging area for Project LIBERTY, if required, to reduce congestion on local roads. These actions plus the planned improvements to the roads are expected to mitigate the impacts to traffic flow around the facility.

3.15 Socioeconomics and Environmental Justice

3.15.1 Affected Environment

Palo Alto County is a rural county and has not been experiencing growth in recent years. The county is not within any defined metropolitan statistical area. The 2006 estimate of the county population was 9,549, which represented a decrease of 598 individuals from the 2000 census. By comparison, the State of Iowa has experienced a population increase of 1.9% in the same time period (US Bureau of Census, 2007). Since 1980, Palo Alto County has experienced a decrease in population of 33% compared to 2.3% increase for Iowa as a whole. Table 3-22 summarizes the population changes for Palo Alto County.

Table 3-22 - Population Changes for Palo Alto County, Iowa and the United States 1980-2006

Political Unit	1980 Population	1990 Population	1980-1990 % Change	2000 Population	1990-2000 % Change	2006 Population	2000-2006 % Change	1980-2000 % Change
Palo Alto County	12,721	10,669	-19.2	10,147	-5.1	9,549	-1.2	-33.2
Emmetsburg	4,621	3,940	-17.3	3,958	0.5	------	-----	-16.8

Political Unit	1980 Population	1990 Population	1980-1990 % Change	2000 Population	1990-2000 % Change	2006 Population	2000-2006 % Change	1980-2000 % Change
Iowa	2,913,808	2,776,755	-4.9	2,926,324	5.1	2,982,085	1.9	2.3
United States	226,545,805	248,709,873	8.9	281,421,906	11.6	299,398,484	6	24.3

Source: U.S. Bureau of Census; 2007

The home ownership rate was slightly below the State average, at 68.5% compared to 72.3% statewide. However, property values were below the State average with the median value of owner-occupied homes at $61,700 compared to a State average of $82,500 (US Bureau of Census, 2007).

Palo Alto County's labor force numbers approximately 5,000 persons. Employment rate has grown from 56.7% in 1990 to 61% in 2000. The median household income increased from $21,223 in 1989 to $32,409 in 1999. While the trend has shown growth, it has remained lower than State growth. From 1990 to 2000, Palo Alto County's total employment grew approximately, 6.2% and the median household income increased by 34.5% while Iowa State total employment grew by 10% and the median household income increased by 44.9%. (U.S. Bureau of Census, 2007).

3.15.1.1 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. "Fair treatment" means that no group, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the adverse environmental consequences resulting from industrial, municipal, or commercial operations or the execution of Federal, State, local, and tribal programs and policies.

In February 1994, President Clinton, issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629 (1994)). This order directs Federal agencies to incorporate environmental justice as part of their missions. Federal agencies are specifically directed to identify and, as appropriate, to address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The CEQ has issued guidance to Federal agencies to assist them with their NEPA procedures so that environmental justice concerns are effectively identified and addressed (CEQ, 1997). In this guidance, the Council encouraged Federal agencies to supplement the guidance with their own specific procedures tailored to particular programs or activities of an agency. DOE has prepared a document titled Draft Guidance on Incorporating Environmental Justice Considerations into the DOEs NEPA (DOE, 2000). The draft guidance is based on Executive Order 12898 and the CEQ environmental justice guidance. Among other things, the DOE draft guidance states that even for actions that are at the low end of the sliding scale with respect to the significance of environmental impacts, some consideration (which could be qualitative) is needed to show that DOE considered environmental justice concerns. DOE needs to demonstrate that it considered apparent pathways or uses of resources that are unique to a minority of low-income community before determining that, even in light of these special pathways or practices, there are no disproportionately high and adverse impacts on the minority or low-income populations.

The racial make-up of Palo Alto County is 99.2% white, 0.1% black, 0.1% American Indian and Alaska Native persons, 0.3% Asian, and 0.2% persons of more than one race (U.S. Bureau of Census, 2007). Additionally 0.9% of the population also describe themselves as Latino decent.

3.15.1.2 Socioeconomics

The median household income for Palo Alto County is $32,409 compared to a statewide median household income of $39,469. The poverty rate for individuals in Palo Alto County is 9.8, and for Emmetsburg, the individual poverty rate is 13.1%. Both the City and County poverty rates are close to the statewide poverty rate of 9.1% and the national poverty rate of 11.3% (Table 14; U.S. Bureau of Census, 2007). Table 3-20 summarizes the poverty, labor force, and unemployment status for the City, County, State, and Country.

Table 3-23 - Individual Poverty Status, Labor Force, and Unemployment for Palo Alto County, Emmetsburg, Iowa, and the United States

Political Unit	Individual Poverty Status	Labor Force (percent)	Unemployment (percent)
Palo Alto County	9.8%	62.4%	1.3%
Emmetsburg	13.1%	62.1%	1.2%
Iowa	9.1%	68.2%	2.8%
United States	11.3%	63.9 %	3.7%

Source: US Bureau of Census (2007)

3.15.2 Consequences of No Action Alternative

The construction personnel and permanent employees for the Starch Expansion are expected to come from existing skilled workers in the area. Local purchases of corn are predicted to have a positive affect on the local economy.

3.15.3 Consequences of Proposed Action

The construction personnel and permanent employees for Project LIBERTY are expected to come from existing skilled workers in the area. The additional use of local lignocellulose resources has been predicted to have a positive affect on the local economy.

4.0 Cumulative Impacts

4.1 Existing and Reasonably Foreseeable Projects

One existing industrial facility, AGP, is located immediately north of the Existing Plant. Other industrial facilities in the Emmetsburg area include:

- Emmetsburg Ready Mix, Inc. - a concrete batch plant;
- Ag Partners, LLC (Cargill) – a grain elevator;
- Emmetsburg Grain– a grain elevator; and
- SNC Manufacturing Company, Inc. - a manufacturer of transformers, coils, and high frequency magnetic and electric power assemblies.

Figure 17 – Surrounding Industrial Facilities shows the location of the above industrial facilities.

AGP operates a soybean processing facility that manufactures soybean oil and soybean meal. The AGP plant receives soybeans from local farmers by truck, stores the soybeans in grain silos, dries, and processes the soybeans to extract soybean oil. The soy bean oil extraction process uses n-hexane as the solvent. The facility also produces soy bean meal as a co-product with the oil. Meal and oil are shipped by rail and truck to off-site customers.

AGP can process up to 766,500 tons of soybeans per year (31.9 MMBu/year) if operated at their maximum capacity. The facility can receive up to 480 tons/hour which equates to a maximum of 19 bottom hopper type semi-trucks per hour. Actual receiving rates are normally substantially less than the maximum capacity. Based on the maximum grain receiving system capacity, the AGP facility would be expected to be able to process a maximum of approximately 200 trucks per day over two 8 hour shifts. On average, the facility will need to receive approximately 84 trucks per day to provide the soybeans for normal operation. Similar to the Existing Plant site, peak grain receiving will occur during the fall harvest season and in the spring when farmers are emptying out their grain bins for cleaning and preparation for the growing season.

In addition to grain receiving, AGP has the capacity to load approximately 6 trucks per hour with soybean meal. The actual daily load out is likely limited to less than 20 trucks per day with most of the meal being sent out by rail. Similarly, most of the soybean oil is also shipped by rail.

The AGP plant is a source of emissions to the air and has an air permit for their operations. The air permit includes grain receiving, handling, and storage systems, soybean processing equipment, a soybean oil extraction system, natural gas fired boilers, and soybean meal handling storage and shipment. The potential emissions from the AGP facility are summarized in Table 4-1 (Air Quality Operating Permit Number: 04-TV-013).

Table 4-1- Summary of AGP Potential to Emit

Pollutant	**AGP Potential to Emit Ton/year**
Total Suspended Particulate (PM)	64.8
PM_{10}	42.7
NO_X	175.2
SO_X	246.5
CO	17.3
VOC	248.8
Lead	0

The AGP facility gets all of its potable and process water from the District via a 10 inch water main that terminates at the AGP plant.

AGP does not have an NPDES discharge permit for waste water or non-contact cooling water. Based on surface topography, stormwater from the AGP site flows to the unnamed tributary to Cylinder Creek.

The AGP facility has building types that are similar to the Existing Plant, including grain silos, processing buildings, and above ground storage tanks. Typical hazardous materials at a soybean extraction plant includes hexane for soybean oil extraction, acids and bases for process vessel cleaning , boiler treatment chemicals, and cooling water chemicals.

The AGP facility also has similar exhaust plumes from boilers and cooling towers and lighting for general purpose and process specific needs.

Emmetsburg Ready Mix, Ag Partners, Emmetsburg Grain, and SNC Manufacturing have air construction permits, but only the SNC permits are available. Therefore, none of these facilities are expected to have significant air emissions. None of the facilities has a water use permit or a waste water discharge permit.

POET D&C has made inquiries to local and county representatives regarding other known or anticipated projects. Based on their own knowledge and the information received, no other industrial development is planned or anticipated in the project area.

4.2 Environmental Consequences

4.2.1 Air Quality and Meteorology

As discussed in Section 3.2, ambient air quality modeling has been completed for the Existing Plant and the Starch Expansion to demonstrate that the facility will not significantly cause or contribute to an exceedance of the NAAQS. Part of that analysis included adding a background concentration to the predicted concentrations from the Existing Plant plus the Starch Expansion. This background concentration is intended to account for sources of pollutants in the area of the facility being studied. The background concentration was developed by the IDNR for use in ambient air quality modeling and is based on actual monitoring data in Iowa. Therefore, the AGP emissions as well as those from Emmetsburg Ready Mix, Ag Partners, Emmetsburg Grain, and SNC Manufacturing were accounted for in the modeling analysis. The combined operations of the Existing Plant, AGP, and other sources will not cause or contribute to an exceedance of the NAAQS.

Construction and operation of Project LIBERTY would cause an increase in the amount of criteria air pollutants emitted from the biorefinery complex. The emissions from the combined biorefinery complex plus all background sources will not cause or contribute to an exceedance of the NAAQS.

Operation of the Existing Plant results in the generation of point source anthropogenic and biogenic GHGs. However, life cycle analysis indicates that replacement of gasoline combustion with ethanol combustion results in a net decrease in global GHG emissions. Similarly, operation of the Starch Expansion and Project LIBERTY will result in the generation of point source GHG emissions but a net reduction in global GHG emissions. Additionally, steam generation at Project LIBERTY will utilize a carbon neutral fuel source rather than non-renewable resource (natural gas) that generates anthropogenic GHGs.

Prior to construction of the Existing Plant, odors would have been due to typical agricultural activities. Operation of the Existing Plant has added potential odor sources including the DDGS dryers, fermentation systems, and wet cake storage. Soybean processing facilities are not typically considered to be significant sources of odors. Operation of the Starch Expansion and Project LIBERTY would not change the odor generation potential or types.

4.2.2 Geology and Soils

The Existing Plant and AGP facilities were constructed on land that had previously been farmland involved in the production of row crops, primarily corn and soybeans. The Existing Plant was constructed on land that consisted of Prime Farmland, Prime Farmland when drained, and Farmland of statewide importance. Based on regional soil types, it is likely that the AGP was also constructed on Prime Farmland. A total of 120 acres of land was converted from agricultural use to industrial use.

The Starch Expansion will require grading and site development activities around the Existing Plant that were areas previously developed with no additional conversion of farmland to industrial use.

Project LIBERTY would include development of approximately 60 acres of land that is currently Prime Farmland, Prime Farmland when drained, and Farmland of statewide importance and used for row crop production. Five acres of the 60 would be a temporary contractor lay-down area and would be re-seeded or farmed with row crops after completion of construction.

No other projects are known or expected to be completed in the area.

4.2.3 Biological Resources

According to National Wetland Inventory maps, no wetlands were present on either the Existing Plant or AGP sites prior to construction of those facilities. One wetland (wetland 1), 0.1 acre in size, was identified on the Project LIBERTY site as part of this EA and NOWI that predated construction of the Existing Plant.

Construction of the Existing Plant resulted in the inadvertent creation of 2.61 acres of new wetlands adjacent to on-site roads, rail spurs, and stormwater ponds. These wetlands have formed since 2004. The Starch Expansion will result in the removal of 0.39 acres of these new wetlands, leaving 2.22 acres of created wetlands. Project LIBERTY will not impact any wetlands on site.

No sensitive, threatened or endangered species were identified on the site or in the immediate area of the site.

No other projects are known or expected to be completed in the area.

4.2.4 Water Resources

The Existing Plant installed water wells for process water and obtained a water use permit for withdrawal of groundwater for operation of the Existing Plant. Available data indicates that regional groundwater levels have increased by approximately 11 feet since 2004. Local groundwater levels at the Existing Plant have decreased by approximately 7 feet. No well interference has been reported or observed from the Existing Plant operations. AGP obtains its process and potable water from the District.

Construction of the Starch Expansion and Project LIBERTY will require additional water wells and withdrawal of groundwater. Decreases in local water levels may occur as a result of additional groundwater use, which could increase the potential for impact to nearby wells. In the event that well interference is observed, POET is committed to completing potential mitigation measures as outlined in Iowa Administrative Code 567-54, which may include lowering the pump in the affected well, drilling a replacement well to greater depth to restore capacity, or connecting the residence to the District water system. Interference with the one private well is unlikely because the well is completed in a shallow water bearing zone that is not hydraulically connected to the Dakota Sandstone.

The Existing Plant discharges non-contact wastewater which consists of non-contact cooling tower blowdown, RO system reject, water softener blowdown, and green sand filter backwash through a dedicated pipeline to the West Fork Des Moines River. AGP has does not have a permitted discharge to surface water.

The Starch Expansion will increase the discharge of non-contact wastewater from the facility to approximately 0.37 cfs. Project LIBERTY would increase the total facility discharge of non-contact cooling water to 0.57 cfs.

The Existing Plant has completed WET testing of its effluent as required by the conditions of its current NPDES discharge permit and the projected discharge rate of non-contact wastewater from the entire biorefinery is not expected to alter the aquatic habit of the West Fork Des Moines River.

No other projects are known or expected to be completed in the area.

4.2.5 Waste Management and Hazardous Materials

The quantities and types of waste materials generated by AGP will not change as a result of any action completed by the Combined Biorefinery. The amounts, types and quantities of waste materials from the Combined Biorefinery would increase. POET D&C and Project LIBERTY would recycle as much of the construction debris and operational waste materials as possible. Project LIBERTY would also investigate and beneficially reuse solid byproducts from the Combined Biorefinery to the degree possible.

The amount of waste disposed in local permitted industrial landfills would increase. The existing landfills are permitted to accept the wastes expected to be generated by Project LIBERTY and have sufficient capacity to accept the maximum projected amount of waste generated for at least 35 years before reaching their existing capacity.

The Existing Plant stores flammable and hazardous materials on-site. The AGP facility stores commercial grade hexane (a flammable material) and soybean oil (a hazardous material) on site. The Starch Expansion and Project LIBERTY will increase the quantity of hazardous materials present but the hazards related to employee and public safety and the potential impacts due to spills or releases of hazardous materials to the environment will not change. Spill control measures, response plans, and employee training would be effective measures that would prevent impacts from spills of hazardous materials.

No other projects are known or expected to be completed in the area.

4.2.6 Infrastructure

The existing infrastructure for natural gas, electricity, water supply, wastewater and sanitary waste disposal was constructed to support the Existing Plant and AGP facilities. These system sufficient to meet the requirements of these plants.

The Starch Expansion will require drilling of a new groundwater production well, installation of a new electric substation, and construction of new natural gas pipelines. No wetlands, threatened and endangered species or other environmentally sensitive areas will be impacted by the construction of the production well or substation. The construction of the pipeline for the Starch Expansion will require completion of six stream crossings, one in Minnesota and five in Iowa. General practice is to horizontally bore under stream crossings to avoid impacting the stream bed. Four wetland areas, for a total area of approximately 1.2 acres will be disturbed will by the construction of the pipeline. NNG will mitigate the impacts to all wetlands that are under the jurisdiction of the USACE.

A new septic system would be required for Project LIBERTY. The proposed site has sufficient room and capacity to support the required septic system. Project LIBERTY would require drilling of a new groundwater production well, installation of a new electric substation, and construction of new natural gas pipelines. No wetlands, threatened and endangered species or other environmentally sensitive areas would be impacted by the construction of the production well or substation. The construction of the pipeline for Project LIBERTY will require completion of six stream crossings, one in Minnesota and five in Iowa. General practice is to horizontally bore under stream crossings to avoid impacting the stream bed. Four wetland areas, for a total area of approximately 1.1 acres will be disturbed will by the construction of the pipeline. NNG will mitigate the impacts to all wetlands that are under the jurisdiction of the USACE.

No other projects are known or expected to be completed in the area.

4.2.7 Cultural Resources

No cultural or archeological resources or historic standing structures were removed or impacted by the construction of the Existing Plant. No cultural or archeological resources or historic standing structures are known to be present in the areas where the Starch Expansion or Project LIBERTY would be constructed.

No other projects are known or expected to be completed in the area.

4.2.8 Land Use

The regional land use around Emmetsburg was agricultural prior to construction of the Existing Plant and AGP facility. The regional land use did not change as a result of their construction. The regional land use will not change as a result of the Starch Expansion or Project LIBERTY.

Operation of Project LIBERTY will require removal of cobs from the field that are normally left on site as a soil amendment and for erosion control. The cobs account for approximately 6% of crop residue left on the field. The stover represents the other 94% of the crop residue.

No other projects are known or expected to be completed in the area.

4.2.9 Noise

General noise levels in rural areas ranges between 35 and 45 dBA with mechanical farming activities tending to be on the higher end of the scale. The predicted noise levels from the Existing Plant at the NSA is 40.7 dBA. Similar noise levels are expected to occur from the AGP facility. However, since the two facilities are not adjacent, the noise levels are not additive.

The Starch Expansion will be adjacent to the existing plant and the distance to the NSA will remain constant, therefore the noise levels from the Starch Expansion will increase to 43.7 dBA. The noise levels from Project LIBERTY are expected to be similar to the Existing Plant and the sites are not immediately adjacent. The NSA to Project LIBERTY is approximately the same distance as from the convention al plant therefore the noise level from Project LIBERTY alone would be 40.7 dBA. All of the predicted noise levels at the nearest NSA are within the levels expected for rural areas.

No other projects are known or expected to be completed in the area..

4.2.10 Aesthetics

Grain elevators, barns and other agricultural structures were common in the Emmetsburg area prior to construction of the Existing Plant. Both the Existing Plant and AGP have grain storage silos, process buildings, and storage tanks. Both the Starch Expansion and Project LIBERTY would add similar structures to those already on-site and common in the area.

4.2.11 Traffic

Palo Alto County has been an agricultural center for corn and soybean products since well before the development of the AGP and Existing Plant. During that time, grain was harvested on local farms and trucked to local grain elevators, shown on Figure 13, for storage and later distribution. Large volumes of truck traffic were present on the roads into Emmetsburg and surrounding areas during harvest in the fall and to a lesser degree in the spring when farmers would clean out on-site storage bins to prepare for the fall harvest. Development of the AGP and Existing Plant resulted in some of the truck traffic being redirected from the grain elevators directly to each plant. On an annual basis, overall truck traffic in the Emmetsburg area likely remained relatively constant but is not as concentrated in the fall and spring because of the constant demand for grain from at the AGP and the Existing Plant.

Construction of the Starch Expansion will temporarily increase the amount of auto and truck traffic for construction staff and deliveries to the facility. Operation of the Starch Expansion will result in an increase in

truck traffic to the Plant site but since this grain was already being hauled to other facilities in the area, will not result in an overall increase in annual truck traffic in the Emmetsburg area.

Construction of Project LIBERTY would temporarily increase the amount of auto and truck traffic for construction staff and deliveries to the facility. This increase would not overlap with the Starch Expansion due to staggered construction schedules. Operation of Project LIBERTY would result in an increase in truck traffic to the site.

Palo Alto County has reviewed transportation corridors throughout the county and proposed upgrades to selected roads. Traffic flow patterns will likely change as a result of these road improvements which will take place beginning in the 2008 construction season. All modifications are scheduled to be completed by the end of the 2011 construction season. A copy of the road improvement map is included in Appendix F. The purpose of these improvements is to upgrade roads and to facilitate movement for the additional traffic. The traffic congestion mitigation measures include the Palo Alto county road improvements, addition of a second facility truck entrance, a traffic turn lane at Project LIBERTY would prevent adverse impacts to traffic flow around the facility.

4.2.12 Socioeconomics and Environmental Justice

Unemployment in Palo Alto County has historically been higher than the Iowa state average. The Existing Plant and AGP facilities each employ approximately 40 full-time employees.

Construction of the Starch Expansion and Project LIBERTY would use a sub-contractor labor force that would average around 200 employees, with a peak of nearly 325, for a construction schedule that would extend from late 2008 through early 2011. This workforce would be derived from a combination of existing local and regional resources. When completed, the Combined Biorefinery would employ approximately 86 full-time employees. It is expected that the majority of these employees would be derived from local resources.

No other projects are known or expected to be completed in the area. .

5.0 References

Air Quality Operating Permit Number: 04-TV-013, accessed at http://www.iowadnr.gov/air/prof/oper/tvfinal.html

Beranek, L. L. and Ver, I. L. Noise and Vibration Control Engineering, John Wiley & Sons Inc, 1992.

Casella USA Training Information, Decibel Addition and Subtraction, Undated

Center for Transportation Research, Argonne National Laboratory. "Life-cycle energy and greenhouse gas emission impacts of different corn ethanol plant types." Published 5/22/2007, IOP Electronic Journals. http://www.iop.org/EJ/article/1748-9326/2/2/024001/erl7_2_024001.html

Council on Environmental Quality (CEQ). Environmental Justice Guidance Under the National Environmental Policy Act, December 10, 1997.

Federal Energy Regulatory Commission (FERC), California State Lands Commission February 2002. Draft Environmental Impact Statement/Environmental Impact Report Kern River 2003 Expansion Project.

IDNR, Geological Survey Bureau. "Overview of the Bedrock Geology of Northwest Iowa." May 1997a. Reviewed 11/9/2007. http://www.igsb.uiowa.edu/gsbpubs/pdf/OFM-1997-1_txt.pdf

IDNR, Geological Survey Bureau, Energy and Geological Resources Division. "Bedrock Geology of Northwest Iowa, Digital Geologic Map of Northwest Iowa Phase 1: Northwest Iowa." August 1997b. Reviewed 11/9/2007. http://www.igsb.uiowa.edu/gsbpubs/pdf/OFM-1997-1.pdf

IDNR, Iowa Geological Survey. "Surficial Geologic Map of the Des Moines Lobe of Iowa, Phase 4: Humboldt County, Open Map File 2002-3." September 2002. Reviewed 11/9/2007. http://www.igsb.uiowa.edu/gsbpubs/pdf/ofm-2002-3_txt.pdf

IDNR, Air Dispersion Modeling Guidelines: Non-PSD Preconstruction Permit Applications; September 2004.

IDNR, Air Dispersion Modeling Checklist for Non-PSD Construction Permit Applications, Version Date 9/21/2007

IDNR, Iowa Geological Survey. "Iowa's Ecological Regions." Unspecified Date. Reviewed 11/9/2007. http://wqm.igsb.uiowa.edu/WQA/ecoregions.html

IDNR, Iowa Geological Survey. "Landform Regions of Iowa." Unspecified Date. Reviewed 11/9/2007. http://www.igsb.uiowa.edu/browse/landform.htm

Iowa, DNR, 2000 to 2004 Meteorological Data Representivity Analysis, Unspecified Date, Retrieved from http://www.iowadnr.gov/air/prof/tech/AERMODMetData.html

Iowa, DNR Water Use Database, http://programs.iowadnr.gov/wateruse/pages/logon.aspx, reviewed August 2008

IDNR Iowa Tonnages for Fiscal Year 2007, http://www.iowadnr.com/waste/sw/files/tonnage2007.pdf

Iowa Department of Transportation (DOT), Iowa 2006 Railroad Traffic Density, July 1, 2007.

Iowa Department of Water, Air and Waste Management. "1985 State Water Plan" 1985.

Iowa Geologic Survey (IGS). "Geology of the Precambrian surface of Iowa and the surrounding area." 2006. Reviewed 11/9/2007. http://www.igsb.uiowa.edu/gsbpubs/pdf/ofm-2006-7.pdf

Molecularsieve.org, 2006. Reviewed 8/11/2008. ***http://www.molecularsieve.org/***

Mineral Information Institute. Reviewed on 8/11/08**.** http://www.mii.org/Minerals/phototrona.html

Natural Resources Conservation Service (NRCS) Palo Alto County, Iowa, Soil Survey. 1977.

NRCS, Prime and Other Farmland Database, Palo Alto County, Iowa, Tabular Data Version 11, Tabular Data Version Date 3/20/2008, http://soildatamart.nrcs.usda.gov/,

Personal Interviews. June 11, 2008. Duhn, Chuck, Landfill Superintendent, Northern Plains Regional Landfill (712) 859-3185. McDonald, Deb, Landfill Engineer, Dickinson County Landfill (507)-526-2194. Landfill capacity and waste acceptance information.

Sawyer, J. and Mallarino, A. Carbon and nitrogen cycling with corn biomass harvest. *Integrated crop management*, IC-498(22). (2007), pages 250-251.

Traffic Flow Map Palo Alto County, Iowa Department of Transportation, January 1, 2004

US Bureau of Census, Reviewed November 2007, http://www.census.gov/

USDA NRCS "National Hydric Soils List". 2005

USDOE, Draft Guidance on Incorporating Environmental Justice Considerations into the Department of Energy's National Environmental Policy Act Process, issued by the Office of NEPA Policy and Assistance, April 2000.

US Environmental Protection Agency (EPA). 1978. Protective Noise Levels. Condensed Version of USEPA Levels Document. USEPA 550/9-79-100. November 1978.

USEPA, AERMOD Modeling System, Version 07026, January 26, 2007a, Retrieved from http://www.epa.gov/scram001/dispersion_prefrec.htm

USEPA. "Greenhouse Gas Impacts of Expanded Renewable and Alternative Fuels Use" EPA420-F-07-035. April 2007b. http://www.epa.gov/oms/renewablefuels/420f07035.htm

USEPA Airdata County Air Quality Report for Palo Alto County, Iowa. Last Modified October 5, 2007. http://www.epa.gov/oar/data/index.html

USEPA. "National Ambient Air Quality Standards" Last Modified March 28, 2008a. http://www.epa.gov/air/criteria.html

U.S. EPA, "Emissions Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel", EPA420-F-05-001, February 2005. http://www.epa.gov/OTAQ/climate/420f05001.htm

USEPA. Surf Your Watershed. Upper Des Moines Watershed – 07100002. Reviewed June 16, 2008b. http://cfpub.epa.gov/surf/huc.cfm?huc_code=07100002

USEPA, Stephen D. Page, Director Office of Air Quality and Planning Memorandum, Implementation of New Source Review Requirements in PM-2.5 Nonattainment Areas, Unspecified Date.

USEPA, Saccharomyces cerevisiae Final Risk Assessment, February 1997

USFWS, Wetlands Online Mapper, http://wetlandsfws.er.usgs.gov/wtlnds/launch.html, last modified March 12, 2008, accessed on August 21, 2008

U.S. Geological Survey, Emmetsburg, IA Topographic 7.5-minute quadrangle map, 1980.

USGS Water-Supply Paper 2215 "Availability and Quality of Water from the Dakota Aquifer, Northwest Iowa" 1984.

USGS. "Earthquake Hazards 201-Technical Information." Last Modified November 1, 2007. Reviewed 11/9/2007. http://earthquake.usgs.gov/research/hazmaps/haz101/faq/faq.php

USGS. "2002 Earthquake Probability Mapping." Last Modified June 28, 2007. Reviewed 11/9/2007. http://eqint.cr.usgs.gov/eqprob/2002/index.php

USGS. "2007 Central/Eastern US Maps (Preliminary)." Last Modified June 6, 2007. Reviewed 11/9/2007. http://earthquake.usgs.gov/research/hazmaps/products_data/48_States/

USGS. "A Tapestry of Time and Terrain: The Union of Two Maps - Geology and Topography, Physiographic Regions." Last Modified April 17, 2003. Reviewed 11/9/2007 http://tapestry.usgs.gov/physiogr/physio.html

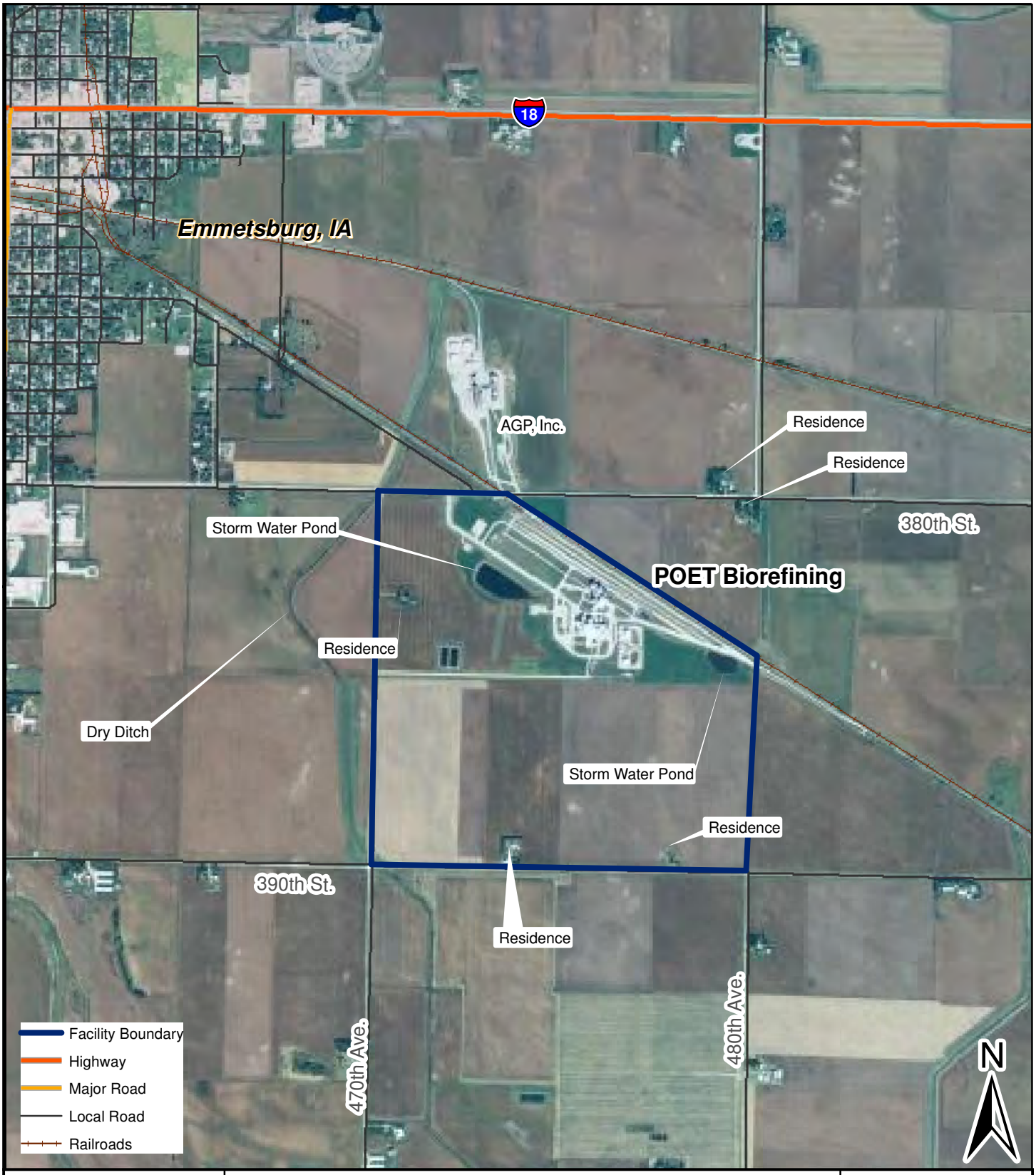
USGS. "Ground Water Atlas of the United States, Iowa, Michigan, Minnesota, Wisconsin, HA 730-J." 1992. Reviewed 11/9/2007. http://pubs.usgs.gov/ha/ha730/ch_j/index.html

USGS. National Water Information System. 05476750 Des Moines River at Humboldt, IA. Reviewed June 16, 2008. http://waterdata.usgs.gov/nwis/uv/?site_no=05476750&PARAmeter_cd=00065,00060,00062,72020

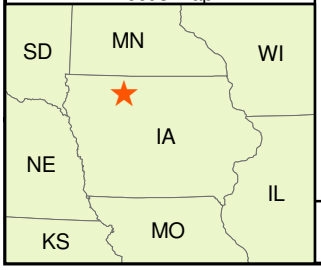
City-Data.com; Weather Information; http://www.city-data.com/county/Palo_Alto_County-IA.html

Appendix A

Figures



Locus Map



Project Site Features

Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

Scale 0 0.25 0.5 0.75 1 1.25 Miles

ENSR

Figure 1

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Figure 2 - Emmetsburg Process Flow Diagram
POET Biorefining- Emmetsburg
Emmetsburg, IA

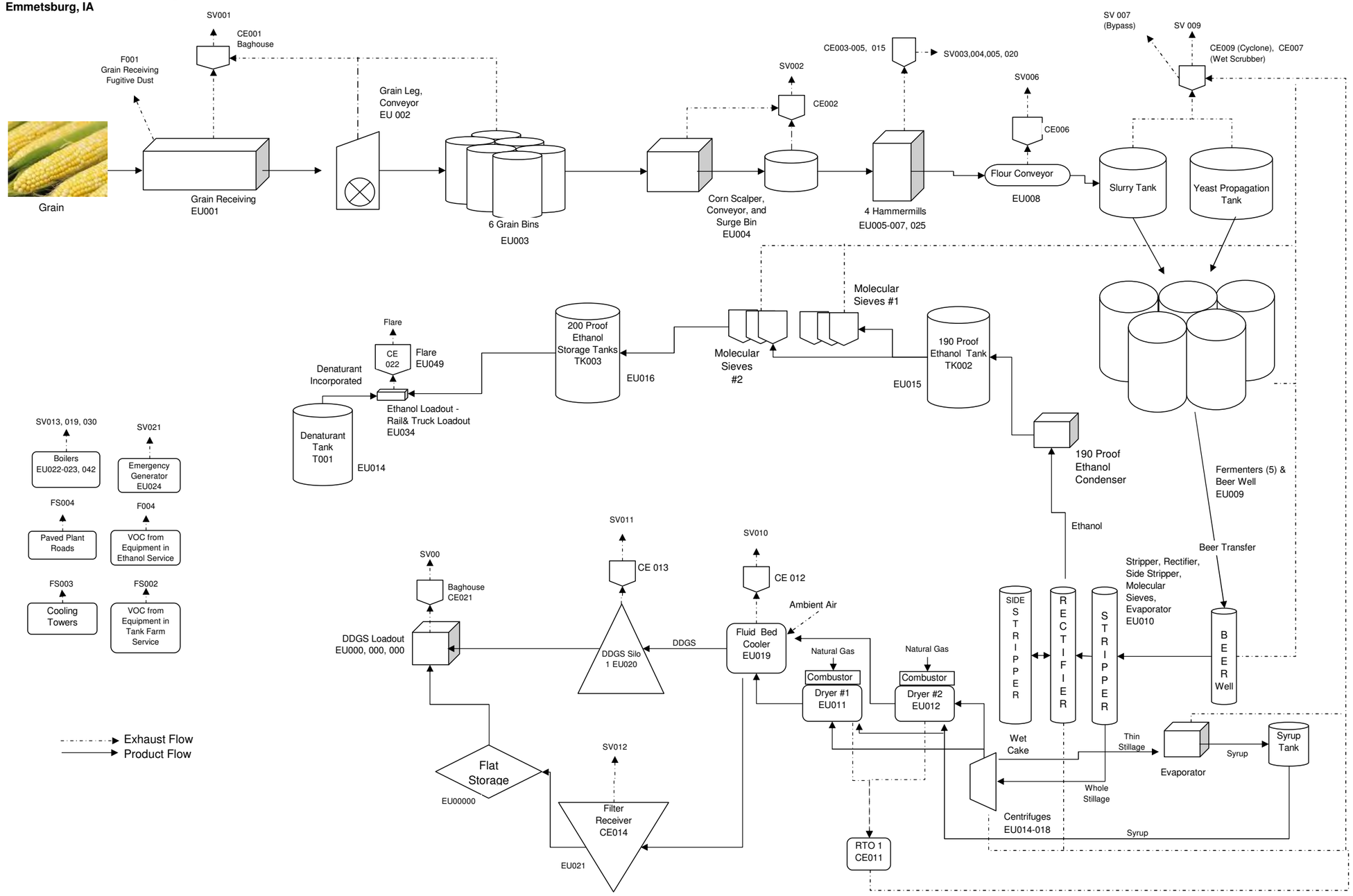
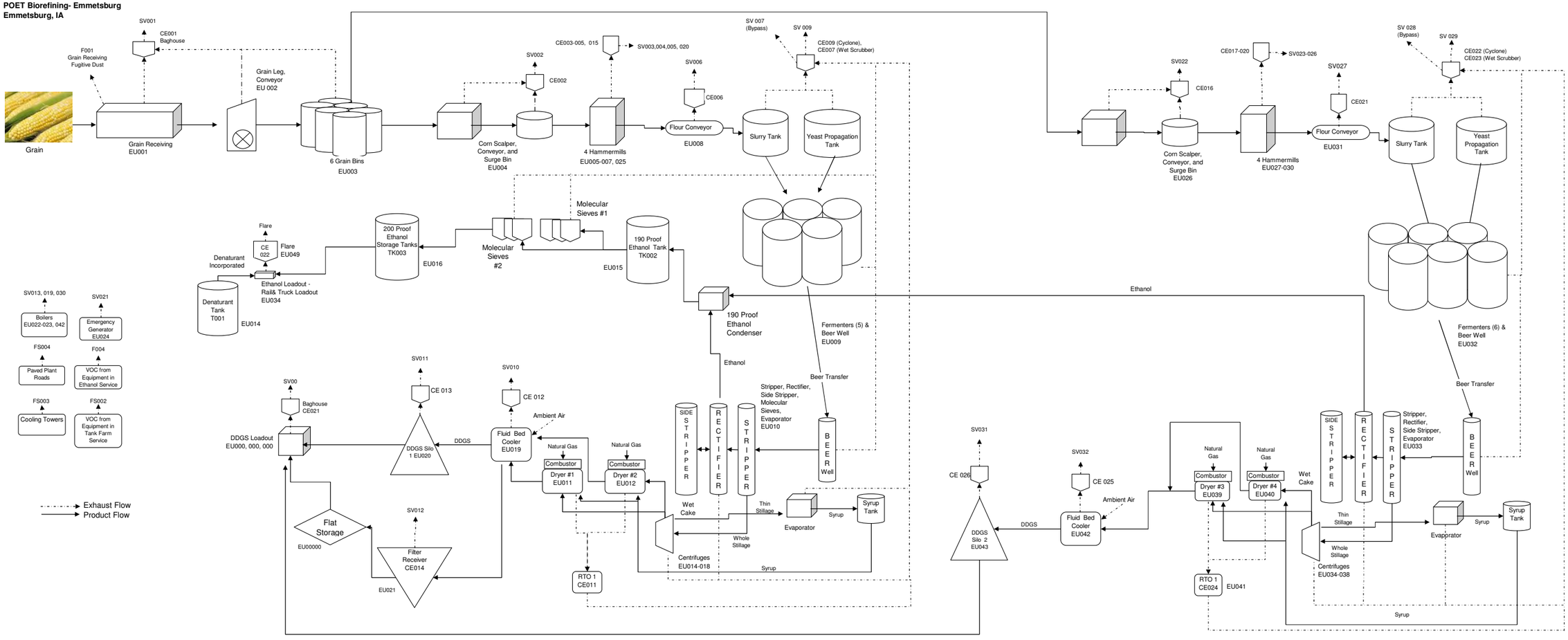
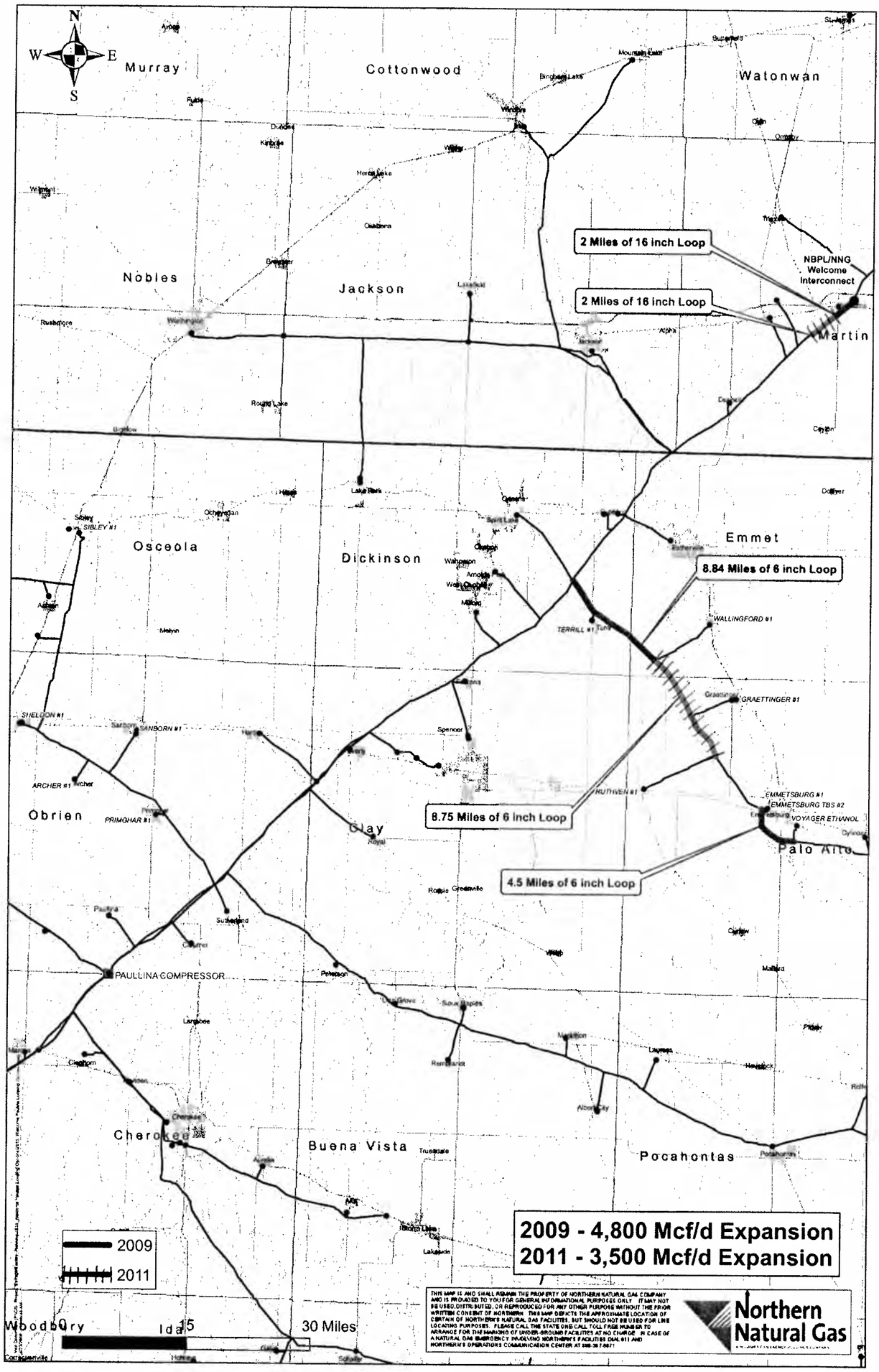


Figure 3 - Emmetsburg Flow Diagram with Starch Expansion
POET Biorefining- Emmetsburg
Emmetsburg, IA





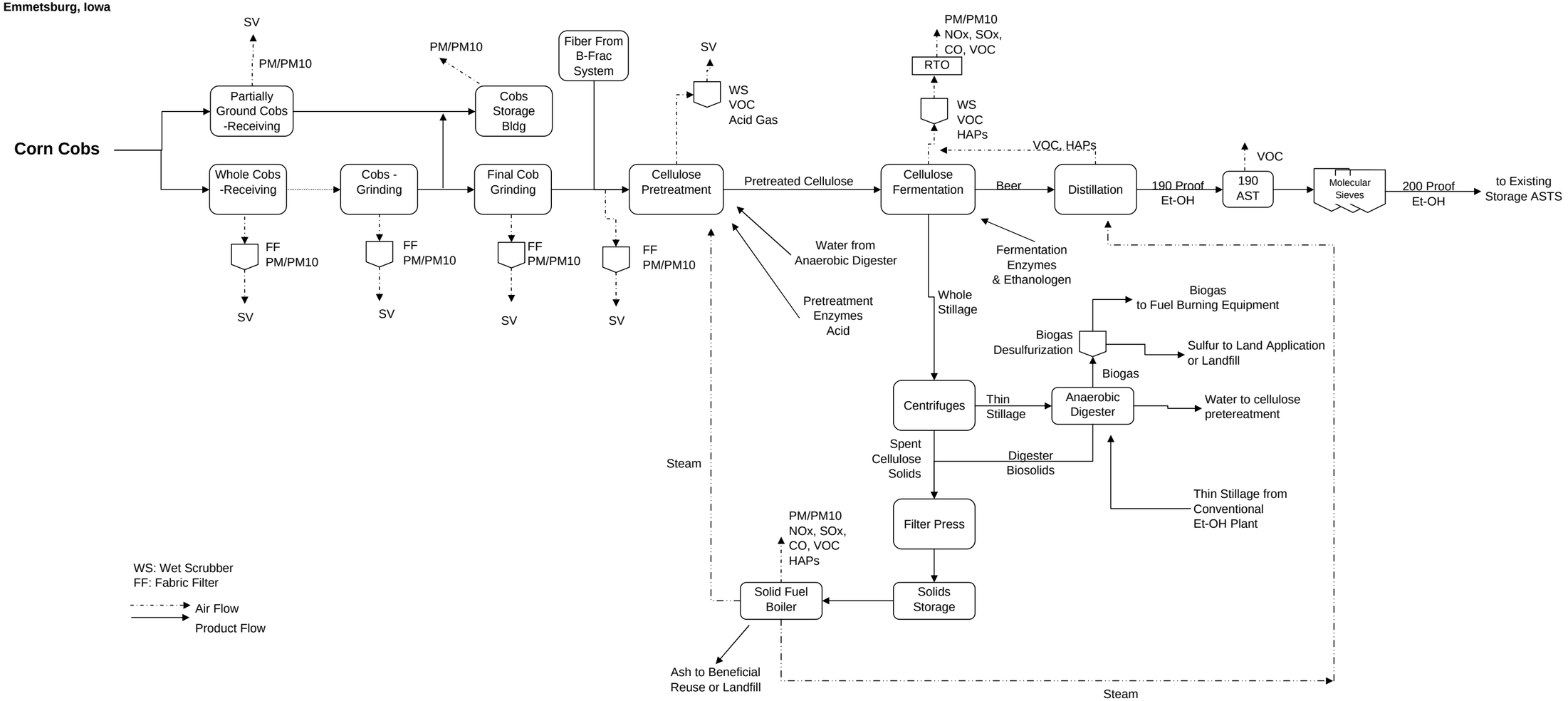
Proposed Natural Gas Pipeline Route

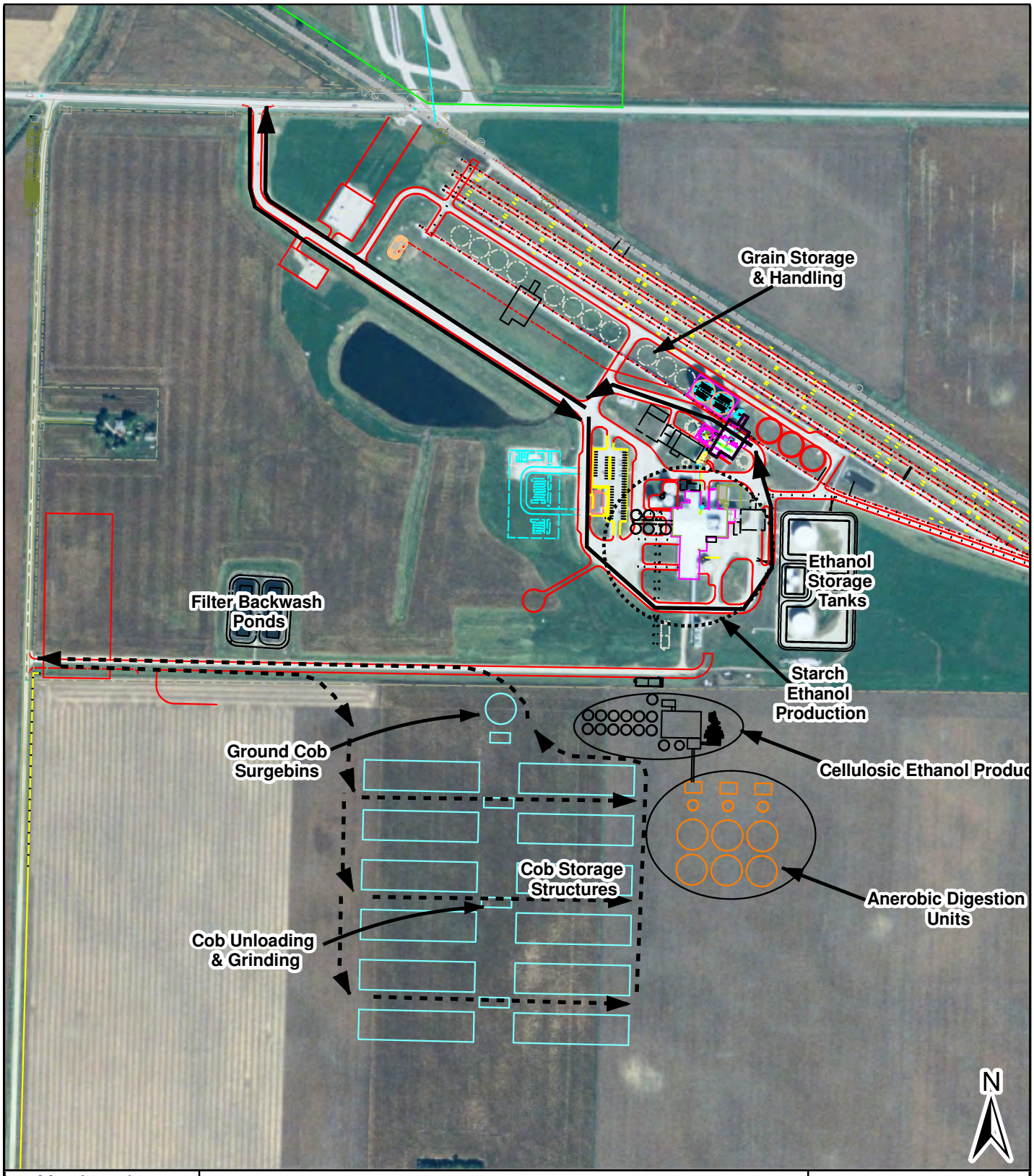
August 2008 Job No. 12074-020

Figure 4

www.ensraecom.com

Figure 5 - Project LIBERTY Process Flow Diagram
POET Biorefining - Emmetsburg
Emmetsburg, Iowa





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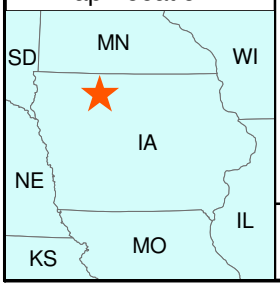

Plot Plan for Project LIBERTY

POET - Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

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ENSR

Project # 12074-020
June 2008

Figure F

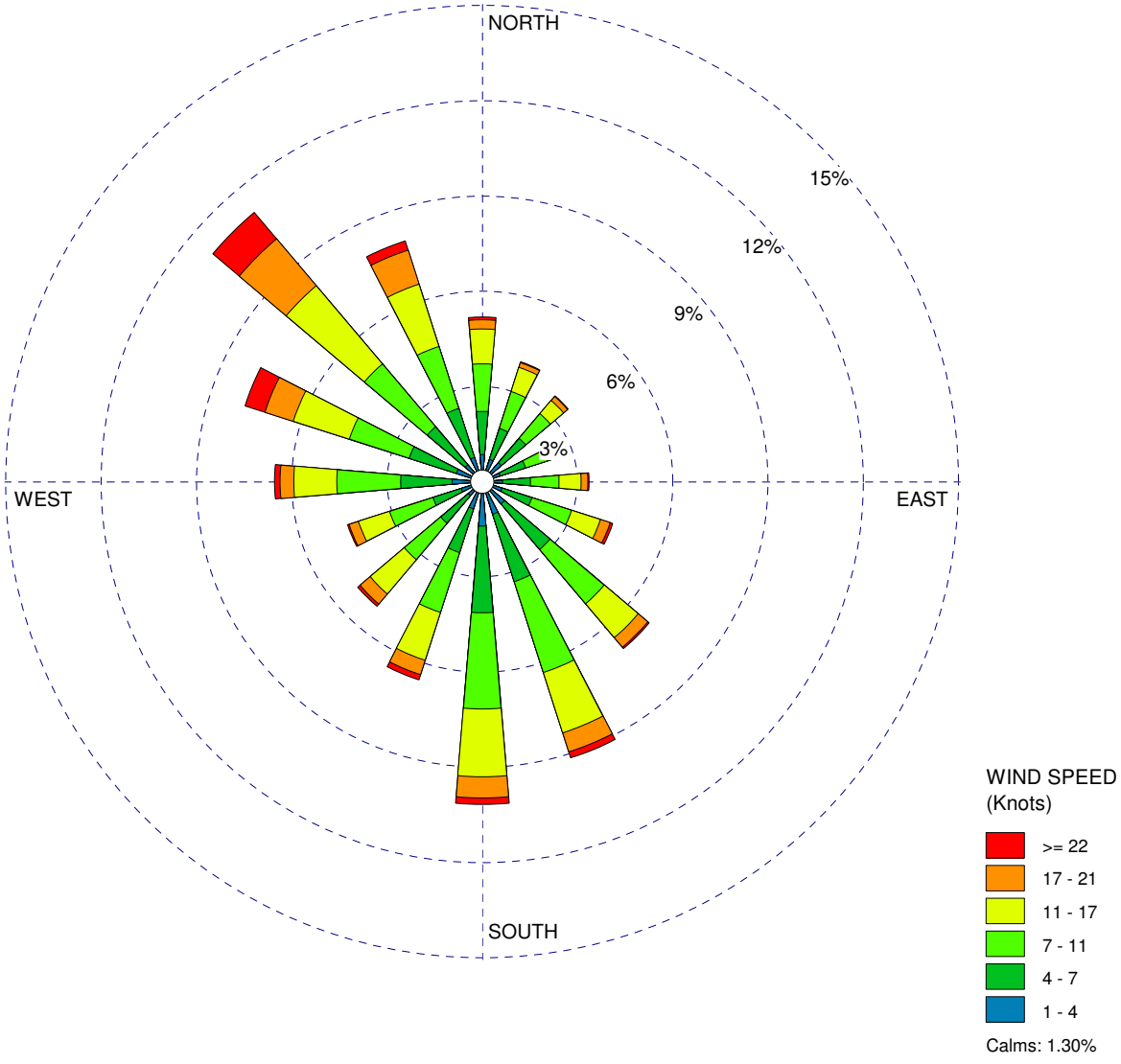
V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06232008.mxd Drawn By K.Nakada

WIND ROSE PLOT:

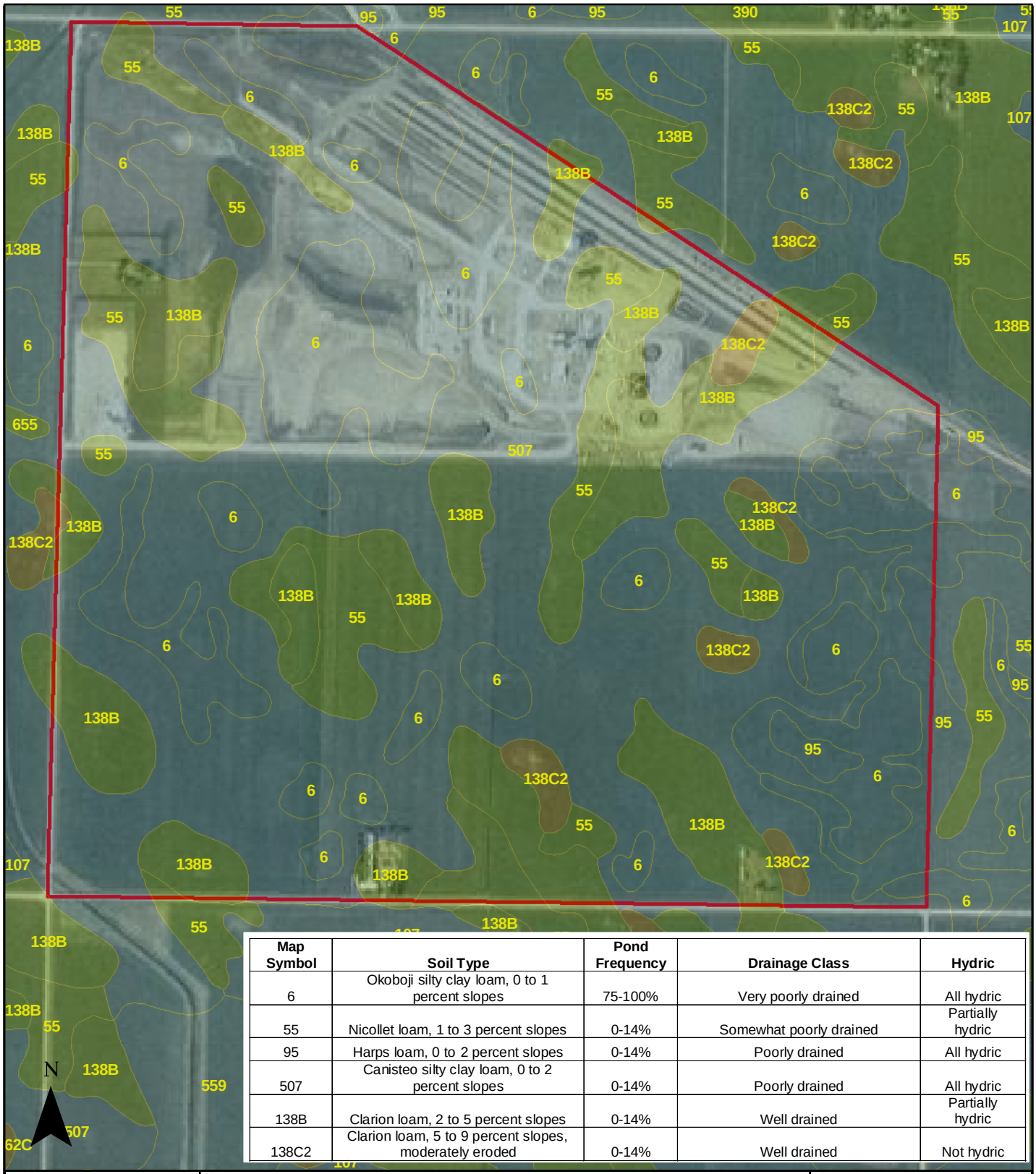
Mason City, IA
5-year (2000-2004) Wind Rose

DISPLAY:

Wind Speed
Direction (blowing from)

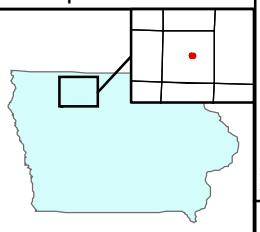


COMMENTS:	DATA PERIOD: **2000 2001 2002 2003 2004** **Jan 1 - Dec 31** **00:00 - 23:00**	Figure Fa Site Wind Rose	
		MODELER: **Kazumi Nakada**	ENSR
	CALM WINDS: **1.30%**	TOTAL COUNT: **43848 hrs.**	
	AVG. WIND SPEED: **9.96 Knots**	DATE: **11/7/2007**	PROJECT NO.: **12074-020**



Map Symbol	Soil Type	Pond Frequency	Drainage Class	Hydric
6	Okoboji silty clay loam, 0 to 1 percent slopes	75-100%	Very poorly drained	All hydric
55	Nicollet loam, 1 to 3 percent slopes	0-14%	Somewhat poorly drained	Partially hydric
95	Harps loam, 0 to 2 percent slopes	0-14%	Poorly drained	All hydric
507	Canisteo silty clay loam, 0 to 2 percent slopes	0-14%	Poorly drained	All hydric
138B	Clarion loam, 2 to 5 percent slopes	0-14%	Well drained	Partially hydric
138C2	Clarion loam, 5 to 9 percent slopes, moderately eroded	0-14%	Well drained	Not hydric

Map Location



Palo Alto County
Iowa

POET - Emmetsburg, Iowa
NRCS Soil Survey Map

- Site Boundary
- Soil Type Boundary
- All hydric
- Partially hydric
- Not hydric
- Unknown

Source: USGS 2M Color Aerial 6-15-03, USDA NRCS Soils Data (1977) from http://soildatamart.nrcs.usda.gov/

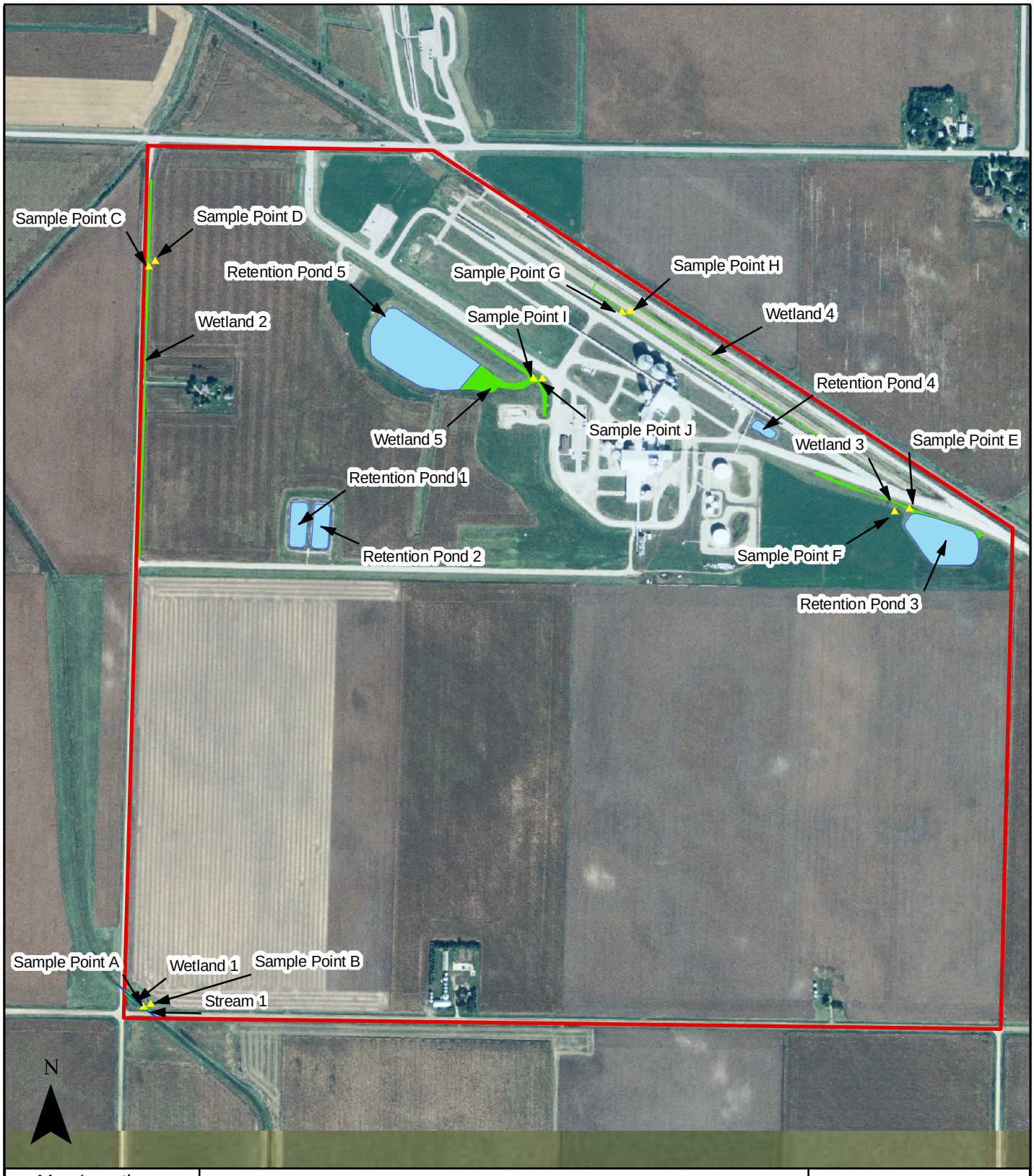
Scale: 1:10,000 0 500 1,000 2,000 Feet

POET

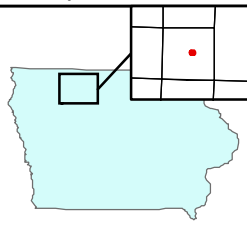
ENSR | AECOM

Project # 12074-020
13

12



Map Location



Palo Alto County
Iowa

POET - Emmetsburg, Iowa
Wetland Delineation Map

Sample Points | Wetland Feature | Water Feature | Site Boundary

Source: 2006 Orthophoto, USDA NAIP

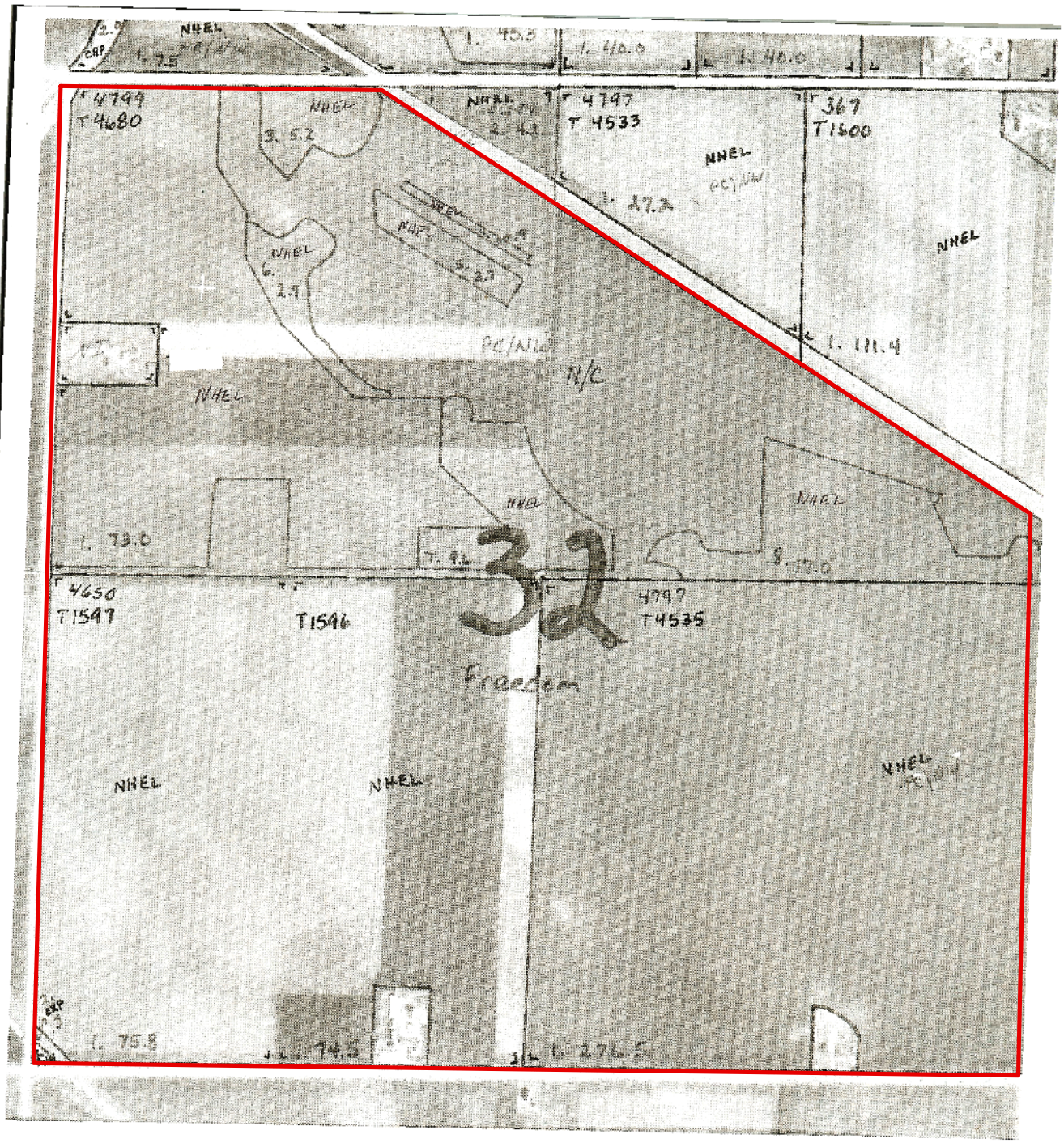
Scale: 1:10,000 0 495 990 1,980 Feet

POET™

ENSR | AECOM

Project # 12074-020
10

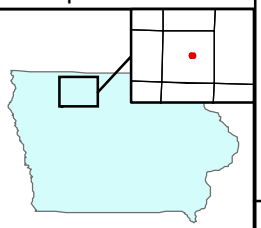
Figure 9



(1990 FLIGHT) PALO ALTO COUNTY – CROP YEAR_____ I-7

N

Map Location



Palo Alto County
Iowa

POET - Emmetsburg, Iowa
NRCS Map

Site Boundary

Source: USDA NRCS Wetland Map 1990

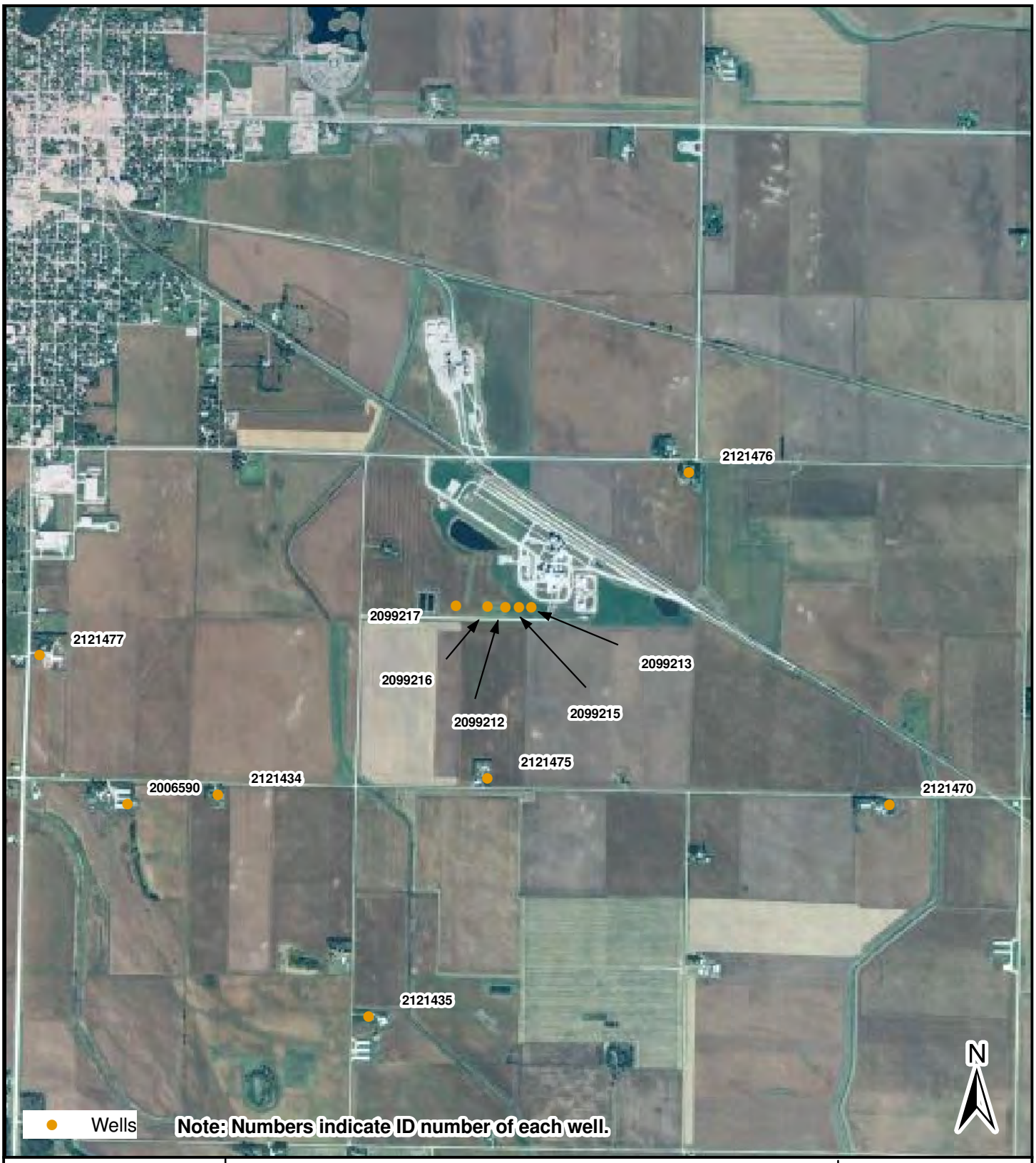
Scale: 1:10,000 0 500 1,000 2,000 Feet

POET

ENSR | AECOM

Project # 12074-020
August 2007

Figure 10



Locus Map

Location of Ground Water Wells
Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

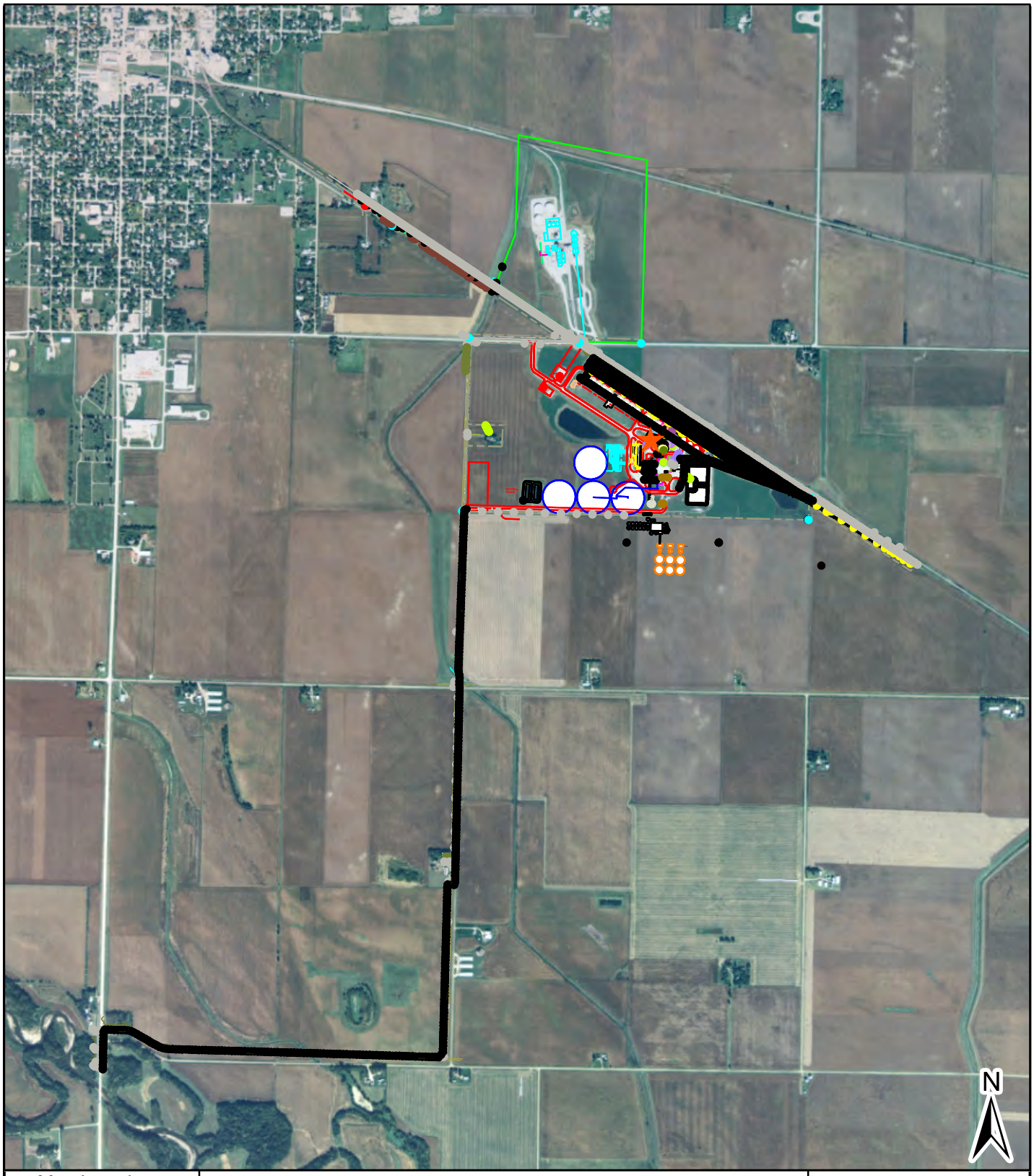
0 0.25 0.5 0.75 1 Miles

ENSR

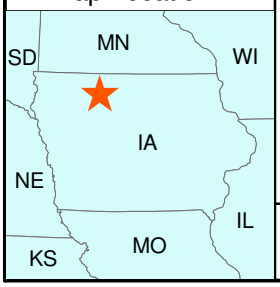
Project # 12074-020
August 2008

Figure 11

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06202008.mxd Drawn by K.N.



Map Location



NPDES Discharge Pipeline Route

POET - Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

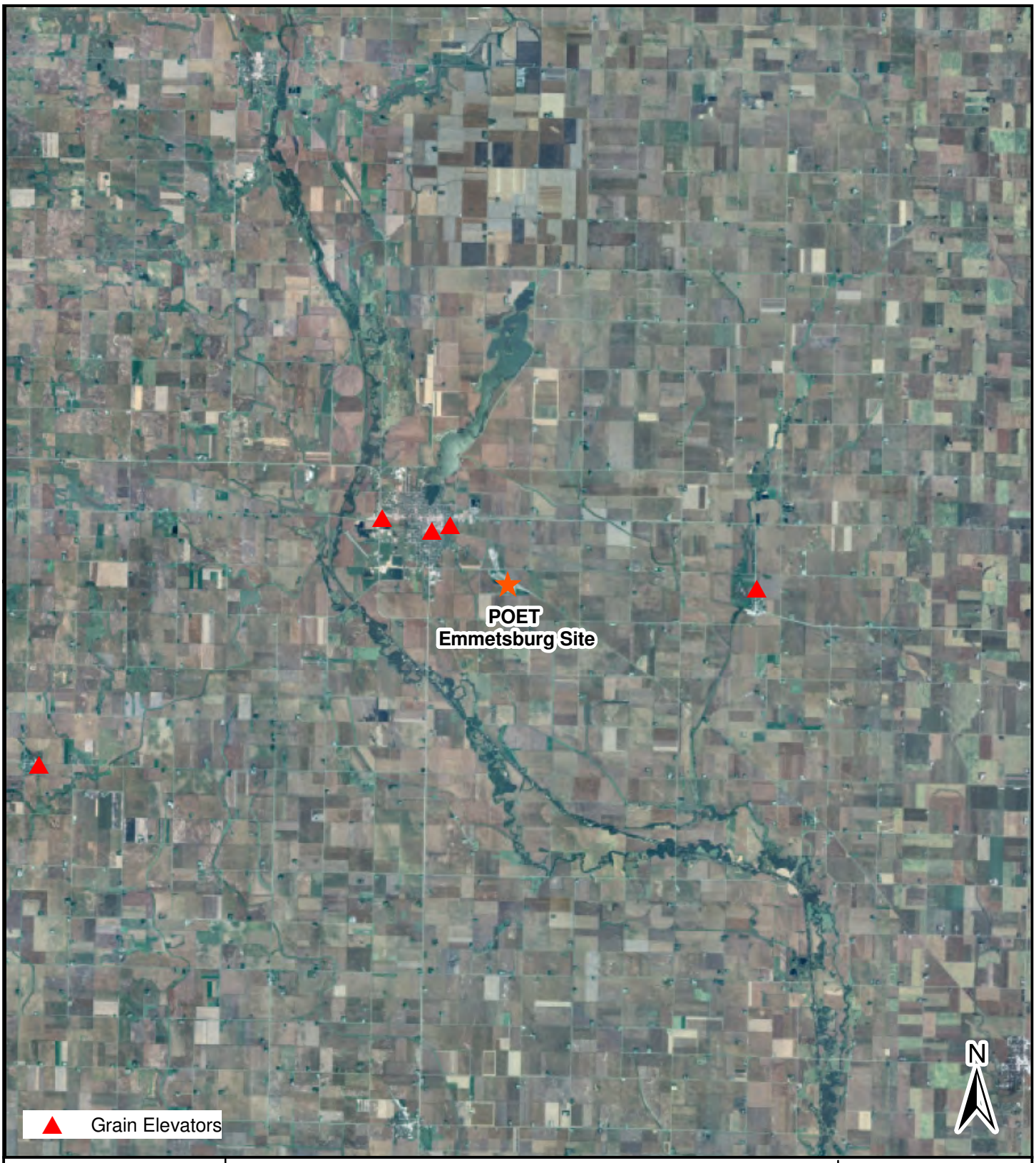
0 2,000 4,000 6,000 8,000 Ft

ENSR

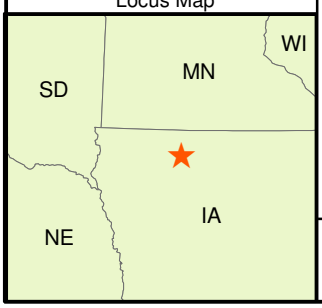
Project # 12074-020
June 2008

Figure 12

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06232008.mxd Drawn By K.Nakada



Locus Map



Location of Grain Elevators

Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: v92 on services.arcgisonline.com/ESRI_Imagery_World_2D

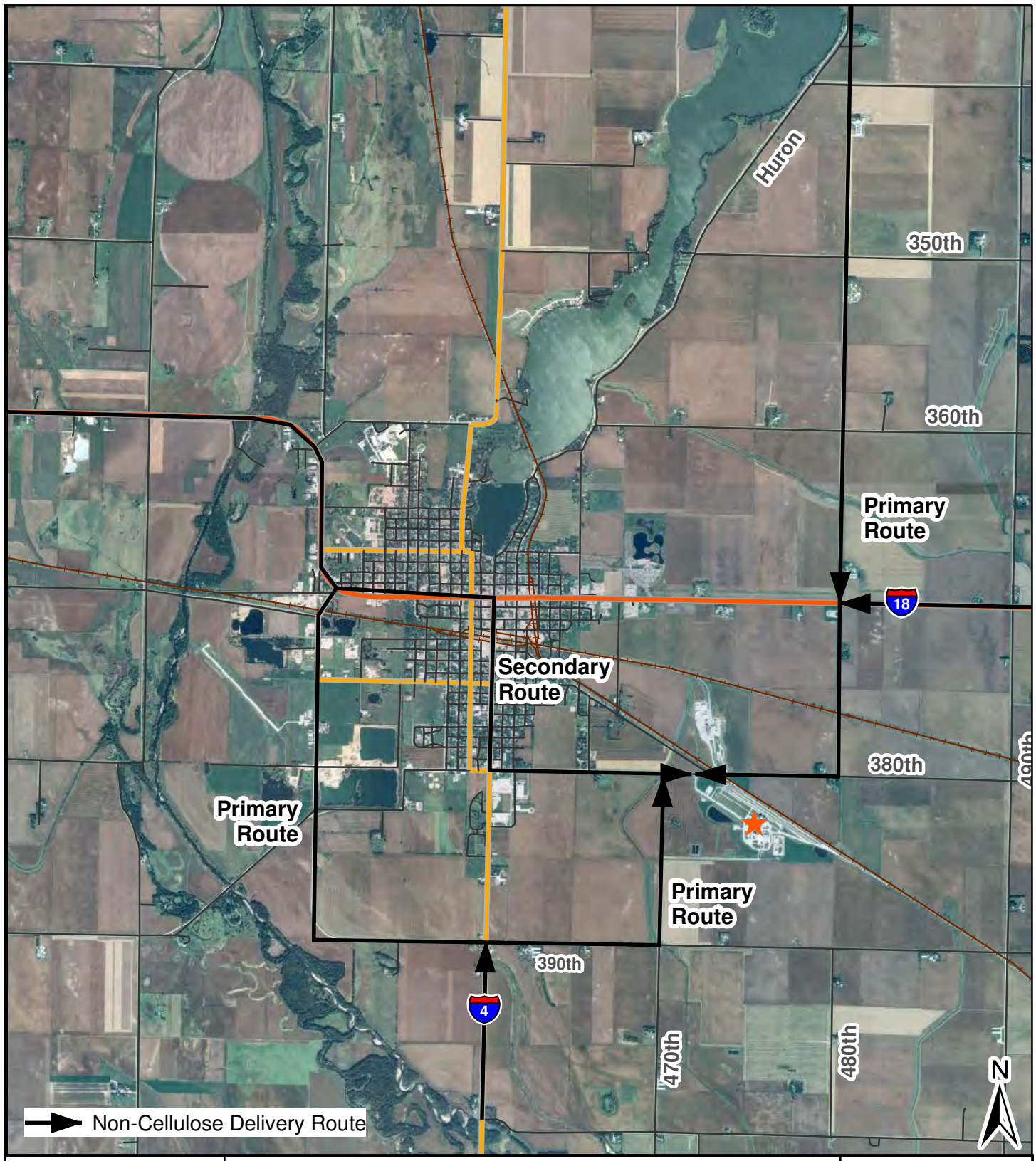
0 2 4 6 8 Miles

ENSR

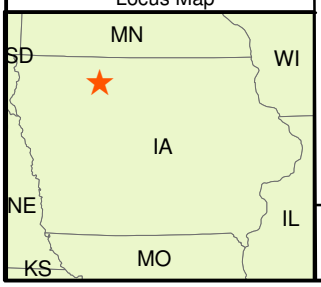
Project # 12074-020
August 2008

Figure 13

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06202008.mxd Drawn by K.N.



Locus Map



Non-Cellulose Delivery Routes

Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

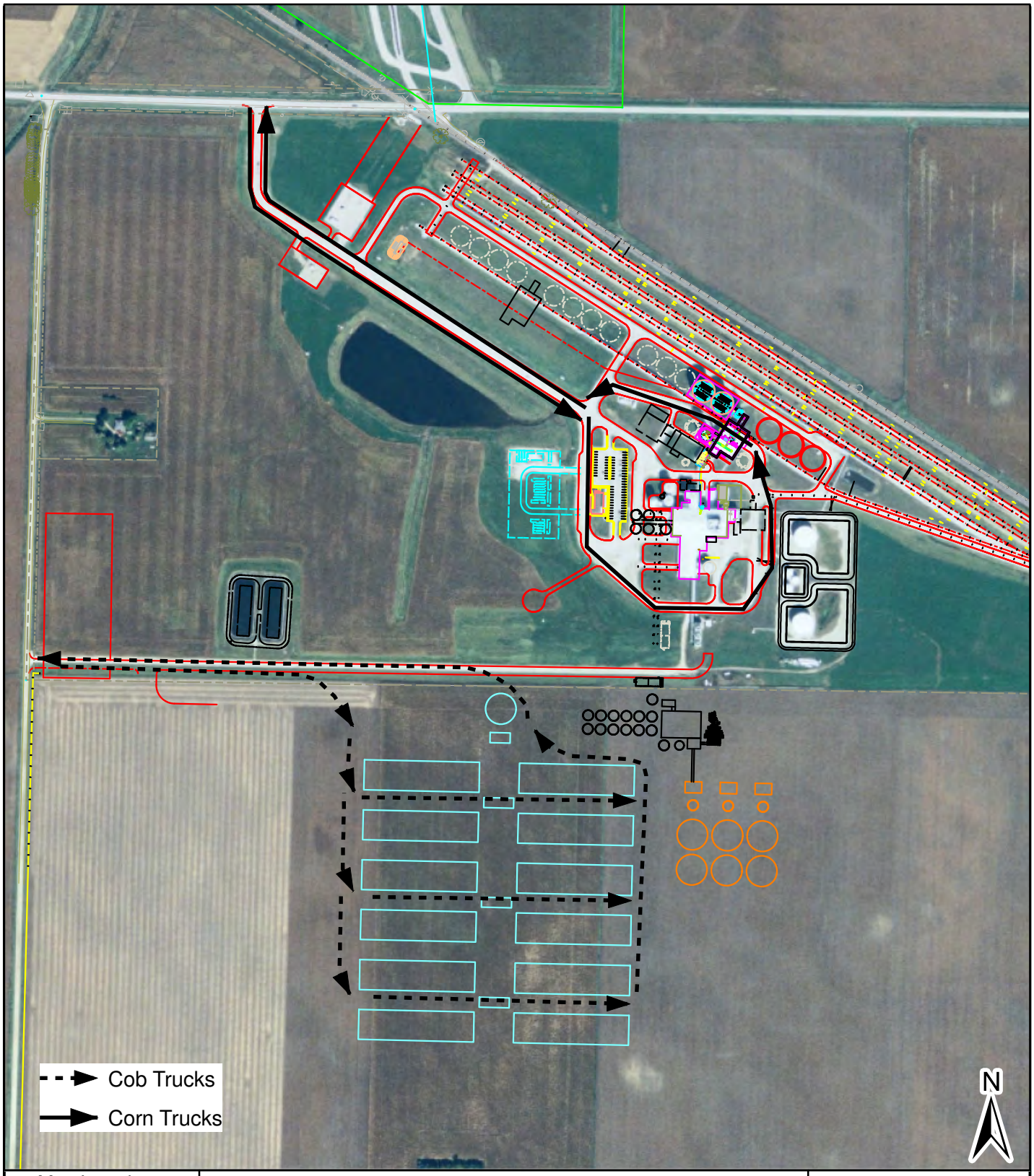
0 1 2 3 Miles

ENSR

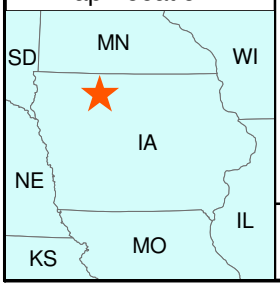
Project # 12074-020
June 2008

Figure 14

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06202008.mxd Drawn by K.N.



Map Location



Internal Truck Traffic Patterns

POET - Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

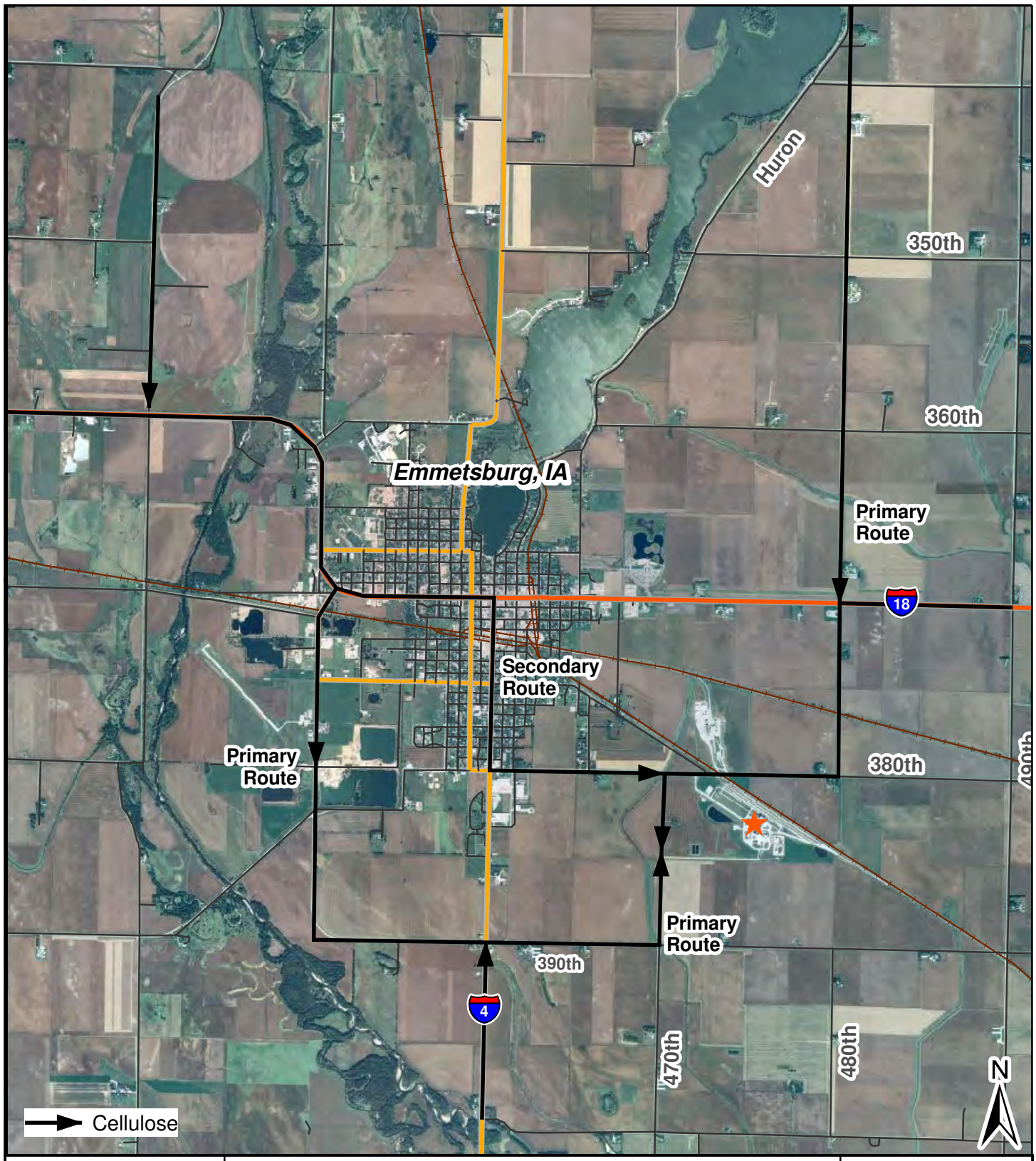
0 500 1,000 1,500 2,000 Ft

ENSR

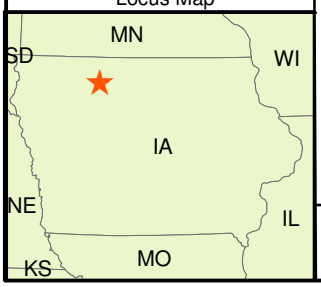
Project # 12074-020
June 2008

Figure 15

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06232008.mxd Drawn By K.Nakada



Locus Map



Cellulose Delivery Routes

Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

0 1 2 3 Miles

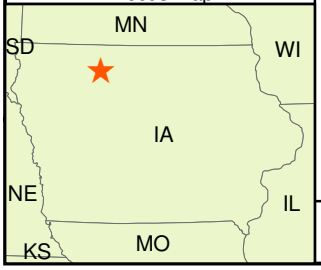
ENSR

Project # 12074-020
June 2008

Figure 16

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06202008.mxd Drawn by K.N.

Locus Map



Facilities with Air Permits

Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

ENSR

Figure 17

Scale 0 0.5 1 1.5 2 Miles

V:\Projects\12074 POET\12074-020 Project Liberty\12074-020 Project Liberty- 06202008.mxd Drawn by K.N.

Appendix B

Site Photographs

ENSR

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
POET-Project Liberty	Southeast of Emmetsburg, Iowa	12074-020

Photo No.	Date:
1	August 07

Direction Photo Taken:

West

Description:

View of the site showing representative corn crop, maintained ditch, and typical paved road.

Photo No.	Date:
2	August 07

Direction Photo Taken:

East

Description:

View of the site showing typical corn crop and small wetland area..

ENSR

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
POET-Project Liberty	Southeast of Emmetsburg, Iowa	12074-020

Photo No.	Date:
3	August 07

Direction Photo Taken:

Northwest

Description:

View of the site showing three grain bins and maintained grass near exiting farmstead.

Photo No.	Date:
4	August 07

Direction Photo Taken:

Northeast

Description:

View of the site showing the current POET ethanol plant and corn crop.

ENSR

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
POET-Project Liberty	Southeast of Emmetsburg, Iowa	12074-020

Photo No.	Date:
5	August 07

Direction Photo Taken:

Southeast

Description:

View of the site showing railroad spurs and railroad cars located within the current POET ethanol plant .

Photo No.	Date:
6	August 07

Direction Photo Taken:

Northwest

Description:

View of the site showing storm water retention pond #1.

ENSR

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
POET-Project Liberty	Southeast of Emmetsburg, Iowa	12074-020

Photo No.	Date:
7	August 07

Direction Photo Taken:

Northeast

Description:

View of the site showing storm water retention pond #2. corn crop and the POET ethanol plant.

Photo No.	Date:
8	August 07

Direction Photo Taken:

Southwest

Description:

View of the site showing storm water retention pond #3.

ENSR

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
POET-Project Liberty	Southeast of Emmetsburg, Iowa	12074-020

Photo No.	Date:
9	August 07

Direction Photo Taken:

North

Description:

View of the site showing ethanol loading rack and storm water retention pond #4.

Photo No.	Date:
10	August 07

Direction Photo Taken:

Northwest

Description:

View of the site showing Retention Pond 5.

Appendix C

Threatened and Endangered Species

Documentation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office
1511 47th Avenue
Moline, Illinois 61265
Phone: (309) 757-5800 Fax: (309) 757-5807

IN REPLY REFER TO:
FWS/RIFO

October 15, 2007

Mr. Shae Birkey
ENSR
27755 Diehl Road, Suite 100
Warrenville, Illinois 60555

Dear Mr. Birkey:

This is in response to your letter received August 23, 2007, requesting comments on the potential impacts on endangered species from the proposed construction of an ethanol plant in Palo Alto County, Iowa.

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the U.S. Fish and Wildlife Service (Service) if they determine their project "may affect" listed species or critical habitat. If Federal agencies or their non-federal representatives determine their actions will have "no effect" on listed species, their habitats, or designated critical habitat, consultation is not required. However, we recommend you maintain a written record of why "no effect" findings are warranted for your Federal actions.

Our data indicate that the species on the enclosed list may occur in the area of your proposed action. Descriptions of the habitat requirements are included with the list. You may use these descriptions to help you determine if there is suitable habitat within your project area.

We invite you to use a new tool the Service has designed to help with the consultation process – the new Section 7(a)(2) Technical Assistance webpage (http://www.fws.gov/midwest/endangered/section7/s7process/index.htm). By following the instructions, you can determine what your action area is, whether listed species may be found within the action area, and if the project may affect listed species.

You will find several products on the site that can streamline the consultation process for this and future projects. When determining if listed species may be located within a project area, you can download county specific species lists for all of the states in Region 3. Species specific best management practices will also eventually be available. Example letters and templates are available to assist with documenting "no effect" determinations and preparing requests for "not likely to adversely affect" concurrence.

If there are wetland and stream resources within the project area, the Corps of Engineers is the Federal agency responsible for wetland determinations, and we recommend that you contact them for assistance in delineating any wetland types and acreages within the project boundary. Priority consideration should be given to avoid impacts to any wetland areas. Unavoidable impacts will require a mitigation plan to compensate for any losses of wetland functions and values. The U.S. Army Corps of Engineers, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61204-2004, should be contacted for information about the permit process.

These comments are provided as technical assistance in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq).

If you have any questions regarding our comments, please contact Jody Millar of my staff at (309) 793-5800, extension 202.

Sincerely,

Richard C. Nelson
Field Supervisor

Enclosure

S:\Office Users\Kristen\Technical Assistance\Section 7
\2007\Iowa\Palo Alto 10-10-07.doc

Habitat Descriptions for Federal Threatened and Endangered Species in Palo Alto County, Iowa

The **prairie bush clover** (*Lespedeza leptostachya*) is listed as threatened and considered to potentially occur statewide in Iowa based on historical records and habitat distribution, although we have no record of occurrences in Palo Alto County. It occupies dry to mesic prairies with gravelly soil. There is no critical habitat designated for this species. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage, or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever prairie remnants are encountered.

The **western prairie fringed orchid** (*Platanthera praeclara*) is listed as threatened and considered to potentially occur statewide in Iowa based on historical records and habitat distribution although we have no record of occurrences in Palo Alto County. It occupies wet to mesic grassland habitats. There is no critical habitat designated for this species. Federal regulations prohibit any commercial activity involving this species or the destruction, malicious damage, or removal of this species from Federal land or any other lands in knowing violation of State law or regulation, including State criminal trespass law. This species should be searched for whenever wet prairie remnants are encountered.

Appendix D

Water Use Permit, Boring Logs and

Pumps Test Information

IOWA DEPARTMENT OF NATURAL RESOURCES

WATER USE PERMIT

Permit issued to:

Voyager Ethanol, L.L.C.
4724 380th St.
PO Box 318
Emmettsburg, IA 50536

Permit Number: 8790

Effective: October 28, 2004

Expires: October 27, 2014

The permittee is authorized to:

withdraw water from two newly-constructed Dakota Sandstone wells, about 275 feet deep, on land generally described as the SE ¼ of the NW ¼ of Section 32, and the SW ¼ of the NE ¼ of Section 32, all in T96N, R32W, Palo Alto County, Iowa, in the maximum amount of 240 million gallons per year at a maximum instantaneous pumping rate of 1000 gallons per minute, from the wells, throughout each year for general industrial-type purposes (proposed operation of a new ethanol production facility) at the above-described property.

This authorization to withdraw water has been granted pursuant to the provisions of Part 4 of Division III of Chapter 455B, Code of Iowa, and Chapters 50, 51, and 52 of Part 567, Iowa Administrative Code, and is further subject to the general permit conditions within this permit.

Conditions of this permit may be appealed as provided in rule 567--50.9, Iowa Administrative Code. Appeal must be in writing and must be received at the Department of Natural Resources; 401 SW 7th Street, Suite "M"; Des Moines, Iowa 50309-4611 within thirty days of the date of the certification of the mailing of the permit.

FOR THE DIRECTOR:

By: Michael K. Anderson, P.E. Date Executed: October 28, 2004

cc: Field Office No. 3 {Spencer}
file: Water Use Permit # 8790
(mtm)

CERTIFICATE OF MAILING

On the date shown below, a copy of the foregoing permit was mailed to the permittee and to each person entitled to receive a copy as provided by rule 567--50.8(2), Iowa Administrative Code.

10-29-04

GENERAL PERMIT CONDITIONS

1. Permittee shall maintain accurate and up-to-date records of water use from said sources and submit them annually to the department. Additional records on pumping rates from said sources and other data related to the regulation of this use of water shall be maintained and submitted as directed by the department.

2. Permittee shall be responsible for compliance with all applicable provisions of state law and the rules and regulations of this department and of federal and local health and water pollution control agencies in the operation of said irrigation well and the disposal of its wastes.

3. Permittee shall be responsible for securing such other permits or approvals as may be required by this department, federal, or local governmental agencies for the operation of said well or the discharge of water or other materials due to this operation.

4. Permittee shall cooperate with representatives of the department to determine that the authorized withdrawals do not violate the flow restrictions imposed herein.

5. Permittee shall construct, maintain, and monitor observation wells, as directed by the department to define the effects of permittee's water withdrawals on groundwater resources or on other water users who might be affected by the withdrawals authorized herein.

6. Once each spring prior to March 31, the permittee shall be responsible for accurately measuring the distance(s) to water (static water level) from the access port in all permitted wells. The distance to water shall be submitted to the department annually as part of the records of water use.

7. Existing wells shall not be replaced without notifying the Iowa Department of Natural Resources. Changes to the location, depth, source aquifer, or other physical features of said wells may require that this permit be modified to accommodate the changes.

8. With respect to each proposed or replacement well authorized as a source of water in this permit, withdrawals of water may be made only after the permittee has made the following information available to the Geological Survey Bureau: well location, well log, casing and grouting schedule, results of yield tests, and cutting samples.

9. Permittee shall submit to the department within 90 days of being notified by the department, or no later than the expiration date of this permit, whichever first occurs, a plan for implementing routine day-to-day water conservation measures and for implementing emergency water conservation measures during periods of water shortage. Until such a plan has been submitted to and approved by the department, permittee shall implement those emergency water conservation measures determined to be necessary by the department pursuant to Iowa Code Sections 455B.265 and 455B.266.

CAVEAT

Permittee is advised that pursuant to Section 455B.271, Code of Iowa, the authority to withdraw water provided by this permit may be modified, canceled or suspended in case of any breach of the terms or conditions herein, in case of any violation of state law pertaining to the permit, or if found necessary to prevent substantial injury to private or public interests.

Fields of Opportunities

STATE OF IOWA

THOMAS J. VILSACK, GOVERNOR
SALLY J. PEDERSON, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
JEFFREY R. VONK, DIRECTOR

Please print permittee's name and address below if different from that shown at left.

_____

_____

_____

Phone # (____)_____

Dear Permittee:

Iowa water use permits require permit holders to keep records of water use and to report the amounts used each year, including years in which no water usage occurs. If no water was used, report water use as "0". Follow the instructions below to complete the form on the reverse side. Each number in the instructions corresponds to a number in the form. This form must be completed and returned to the Department of Natural Resources (address at bottom) by January 31. Do not fill out the form until the end of a water use period.

1. PERMIT NUMBER: This refers to the number that appears on the mailing label above and/or on your water use permit. (Public water supplies: Please note that this number is not your PWSID number.)
2. PERMIT HOLDER: This refers to the person whose name is officially recorded on the water use permit.
3. WATER USE REPORTED IN: Indicate the units in which you are reporting your water use. If you are using units other than those given, please specify in the space provided.
4. TYPE OF SOURCE USED: If a permit allows withdrawals from more than one source (e.g., from a stream and a well, a pond and a well, etc.) **separate reports are required for each source, including standby sources**. If a permit includes more than one well and they are all in the same aquifer, they are considered one source. If they are in different aquifers, they are considered separate sources and separate reports must be filed.
5. STATIC WATER LEVEL: Static water level must be measured annually for each well. Measurement should be taken prior to the first spring use for seasonally used wells, or prior to March 31 for wells used throughout the year.
6. DETERMINATION OF WATER USE:
   METERING: If a flow meter was used to determine water use, check this box.
   CALCULATIONS: If your system is not equipped with a flow meter, use one of the following methods:
   GALLONS: Multiply the system's operating capacity (in gallons per minute) by the number of hours the system is run and multiply that result by 60 to obtain gallons.
   Example: During July, an irrigation system using 700 gallons per minute is run for 170 hours.
   700 gal/min x 170 hrs x 60 min/hr = 7,140,000 gallons
   ACRE-FEET: Multiply the number of acres irrigated by the number of inches of water applied and divide by 12 to obtain acre-feet. (To convert to gallons, multiply acre-feet by 326,000)
   Example: During August, 4.5 inches of water is applied to 31 acres of land.
   4.5 inches x 31 acres/12 inches/foot = 11.63 acre-feet (or 3,790,000 gallons)
7. YEAR: This refers to the calendar year for which you are reporting your water usage

8.-10. WATER USE APPLICATIONS: Complete only the section or sections that apply to you.

TOTAL: Add up the values in each column and enter the totals in this row.

Water Supply Section 401 SW 7th St. Suite M Des Moines, IA 50309-4611
515/725-0282 Fax 515/725-0348 www.state.ia.us/dnr

REPORT OF WATER USE BY REGULATED USERS

(Read instructions on reverse side before completing.)

1. PERMIT NO. _____

2. PERMIT HOLDER (Please print): _____

3. WATER USE REPORTED IN:

[ ] ACRE-FEET
[ ] GALLONS
[ ] OTHER (Specify): _____

4. TYPE OF SOURCE USED: (Follow instructions carefully.)
[ ] Well [ ] Gravel Pit/Quarry
[ ] Stream [ ] Reservoir/Lake/Pond

Name of source: _____

5. STATIC WATER LEVEL (Well #, Depth to water surface, prior to withdrawal, in ft)

Well # ___ , _____ ft Well # ___ , _____ ft Well # ___ , _____ ft

6. DETERMINATION OF WATER USE: [ ] Metering [ ] Calculation

7. YEAR 200___		8. IRRIGATION CROP: ACRES:	CROP: ACRES:	CROP: ACRES:	9. BENEFICIAL USE (municipal, industrial, commercial, etc.)	10. AGGREGATE PRODUCTION OR MINING DEWATERING	WASHING & PUGGING	OTHER SPECIFY:_____
M	JAN							
O	FEB							
N	MAR							
T	APR							
H	MAY							
L	JUN							
Y	JUL							
	AUG							
U	SEP							
S	OCT							
E	NOV							
	DEC							
11. TOTAL								

NAME (Print) _____ SIGNATURE & DATE _____

REPORT PREPARED BY: [ ] Permit Holder [ ] Agent [ ] Tenant [ ] New Owner [ ] Other (Specify) _____

Broin Voyager Ethanol Plant Emmetsburg
Elbert Bros Well Drilling inc

515-884-2231

Production Well #1 : 8" PVC -271' Deep - 50' SS Screen .018 Slot

Location : Longitude: 43.09106 N
Latitude: -94.64976 W

Static Water Level : 29'

Maximum drawdown when pumping 500 gpm: 32'

The well had 30' of drawdown after pumping 400 gpm for five minutes, the water level did not change after pumping for one hour.

The well was then pumped at 500 gpm, the draw down was 32' after pumping for ten minutes, the water level did not change after pumping for twenty four hours and twenty minutes or 724,000 gallons of water.

The recovery rate of the well was 23' in 3 Minutes
5' in 3 Minutes
2' in 4 Minutes
2' in 3 Minutes
Back to original Static water level in 13 Minutes

Monitor Well #1 West : 2" PVC - 231' deep - 5' SS Screen .018 slot

Location: 225' West of Production Well #1

Longitude: 43.09109 N
Latitude: -94-65059 W

The well was developed and airlifted at 25 gpm

Static Water Level: 28'

Maximum Drawdown when pumping 500 gpm : Zero

Monitor Well #1 East : 2" PVC 225' Deep - 5' SS Screen .018 slot

Location : 200' East of Production Well # 1

Longitude: 43.09106 N
Latitude: -94.64902 W

Static water Level : 29'

Maximum drawdown when pumping 500 gpm : Zero

Broin Ethanol Plant Emmetsburg

Elbert Bros Well Drilling Inc 515-884-2231

		Date	Time	Waterlevel	Change in Waterlevel
Start	Static	4/10/04	14:15	29'	
	400 gpm	4/10/04	14:18	58'	29'
	400 gpm	4/10/04	14.22	59'	1'
	400 gpm	4/10/04	14:25	59'	
	400 gpm	4/10/04	14:30	59'	
	400 gpm	4/10/04	14:45	59'	
	500 gpm	4/10/04	15:15	59'	
	500 gpm	4/10/04	15:18	61'	2'
	500 gpm	4/10/04	15:22	61'	
	500 gpm	4/10/04	15:25	61'	
	500 gpm	4/10/04	15:30	61'	
	500 gpm	4/10/04	16:00	61'	
	500 gpm	4/10/04	17:00	61'	
	500 gpm	4/10/04	18:00	61'	
	500 gpm	4/10/04	19:00	61'	
	500 gpm	4/10/04	20:00	61'	
	500 gpm	4/11/04	6:00	61'	
	500 gpm	4/11/04	7:00	61'	
	500 gpm	4/11/04	8:00	61'	
	500 gpm	4/11/04	12:00	61'	
Stop	500 gpm	4/11/04	14:20	61'	
	0 gpm	4/11/04	14:23	38'	23'
	0 gpm	4/11/04	14:26	33'	5'
	0 gpm	4/11/04	14:30	31'	2'
	0 gpm	4/11/04	14:33	29'	2'
	0 gpm	4/11/04	15:00	29'	

Iowa Department of Natural Resources Geological Survey Bureau
109 Trowbridge Hall, Iowa City, IA 52242-1319 PH (319) 335-1575

WELL RECORD

RECEIVED
APR 21 2004

Permit No. _____

Site identification

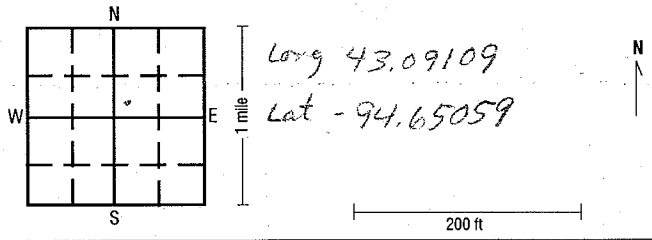
Property Owner Broin Voyagen Ethanol Well Number Mon W
Address 2209 E 57th St N. Sioux Falls SD
Tenant Emmetsburg Ethanol Plant 57104
Well Depth 231 ft Date completed 4 / 9 / 04

Location

County Palo Alto

½ mi. (N/S) and ½ mi. (E/W) of intersection of 470th and 380th
SW 1/4 of the SW 1/4 of the NE 1/4 of Sec 32 TWP 96 RNG 32 (E/W)

Show exact location of well in section grid with a dot (●). Sketch map of well location on property.



☐ upland ☐ hillside ☐ valley Elevation (if known) _____

Formation log

From	To	Color	Hardness	Formation description
0	3	Blk	Soft	Top Soil
3	18	yel	Med	Clay
18	176	Gray	Med	Clay
176	219	Gray	Med	fine Dirty Sand
219	240	Clay	Med	fine Clean Sand

use additional sheets as needed

Remarks (including depth of lost drilling fluids, materials, or tools)

Well use

☐ Domestic ☐ Municipal ☐ Commercial
☐ Livestock ☐ Public supply ☒ Monitoring
☐ Test well ☐ Irrigation ☐ Other _____ (explain)

Drill method

☒ rotary ☐ auger ☐ cable other _____

Hole size

6½ inch from 0 ft to 240 ft
_____ inch from _____ ft to _____ ft

hole size continued
_____ inch from _____ ft to _____ ft
_____ inch from _____ ft to _____ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Drive shoe (yes / no) Pitless adapter (yes / no)

Size (ID/OD)	Type / Wt	Depth top	Depth bottom	Amount (length)
2"	PVC 250	-2	226	228

Perforated or slotted casing? (yes / no)

Perforated / slotted from _____ ft to _____ ft
Perforated / slotted from _____ ft to _____ ft

Casing grouted? (yes / no) Placement method _____

Type	Depth Top	Depth bottom	Amount (vol/wt)
Bentonite	0	180	18%

Well screen? (yes / no)

Diameter	Slot size	Depth Top	Depth Bottom	Length	Material
~~2"PS~~	~~0.018~~	~~-2~~	~~226~~	~~228~~	~~SS~~
2"PS	0.018	226	231	5	SS

Bottom capped (yes / no) with SS Cap
Seals / Packers (yes / no) kind _____ depth _____ ft
Gravel packed (yes / no) from 180 ft to 225 ft
type Silica Sand amount 300 lbs

Well developed? (yes / no)

Explain airlift to open Screen
(pumped, airlifted, bailed) for 15 min hrs at 25 GPM.

Pump installed? (yes / no) Date ____ / ____ / ____

Installer's name _____
Type of pump _____ Depth to intake _____ ft
Pump diameter _____ Rated capacity _____ GPM

Water information

Aquifer: ☒ sand / gravel ☐ limestone ☐ sandstone
Main water-supply zone from 226 ft to 231 ft ☐ seepage well
Static water level 28 ft (below / above) GL; ☐ tape ☒ airline ☐ E-line ☐ estimate
Pumping water level 29 ft below GL; ☐ tape ☐ airline ☐ E-line ☒ estimate
At yield of 25 GPM; ☐ orifice ☐ volumetric ☒ estimate
Measurements taken at 6 : 00 (AM / PM) Date 4 / 9 / 04

Water quality test? (yes / no) Date tested ____ / ____ / ____

Tested by _____

Contractor Elbert Bros Well Drilling Inc
Address Whittemore Ia 50598
Driller Rick Elbert Certification no. 40131

white copy – **Iowa DNR, Geological Survey Bureau** blue copy – **Well Contractor** pink copy – **Customer** yellow copy – **County Health Officer**

Iowa Department of Natural Resources Geological Survey Bureau
109 Trowbridge Hall, Iowa City, IA 52242-1319 PH (319) 335-1575

WELL RECORD

RECEIVED
APR 21 2004

Permit No. _____

Site identification

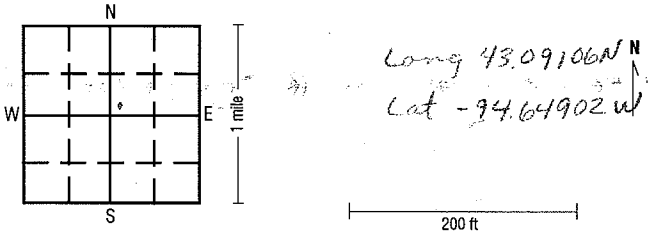
Property Owner Brain Voyager Ethanol Well Number Mon E
Address 2209 S 57th St N Sioux Falls SD
Tenant Emmetsburg Ethanol Plant 57104
Well Depth 225 ft Date completed 4/9/04

Location

County Palo Alto

½ mi. (N) (S) and ½ mi. (E) (W) of intersection of 470th and 380th
SW 1/4 of the SW 1/4 of the NE 1/4 of Sec 32 TWP 96 RNG 32 (E) (W)

Show exact location of well in section grid with a dot (●). Sketch map of well location on property.



☒ upland ☐ hillside ☐ valley Elevation (if known) _____

Formation log

From	To	Color	Hardness	Formation description
0	2	Blk	Soft	Top Soil
2	19	Yel	Med	Clay
19	174	Gray	Med	Clay
174	196	Gray	Med	fine Dirty Sand
196	228	Clear	Med	& large Sand Clean
228	230	Gray	Med	Clay

use additional sheets as needed

Remarks (including depth of lost drilling fluids, materials, or tools)

Well use

☐ Domestic ☐ Municipal ☐ Commercial
☐ Livestock ☐ Public supply ☒ Monitoring
☐ Test well ☐ Irrigation ☐ Other _____ (explain)

Drill method

☒ rotary ☐ auger ☐ cable other _____

Hole size

6 ½ inch from 0 ft to 239 ft
_____ inch from _____ ft to _____ ft

hole size continued
_____ inch from _____ ft to _____ ft
_____ inch from _____ ft to _____ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Drive shoe (yes / no) Pitless adapter (yes / no)

Size (ID/OD)	Type / Wt	Depth top	Depth bottom	Amount (length)
2"	PVC ~~160~~ 250	-2	220	222

Perforated or slotted casing? (yes / no)

Perforated / slotted from _____ ft to _____ ft
Perforated / slotted from _____ ft to _____ ft

Casing grouted? (yes / no) Placement method Tremie

Type	Depth Top	Depth bottom	Amount (vol/wt)
Bentonite	0	180	18%

Well screen? (yes / no)

Diameter	Slot size	Depth Top	Depth Bottom	Length	Material
2" rs	0.018	220	225	5	SS
	0.___				

Bottom capped (yes / no) with SS Cap
Seals / Packers (yes / no) kind _____ depth _____ ft
Gravel packed (yes / no) from 180 ft to 225 ft
type Silica Sand amount 200 lbs

Well developed? (yes / no)

Explain airlift to open Screen
(pumped, airlifted, bailed) for 15 min hrs at 25 GPM.

Pump installed? (yes / no) Date ___/___/___

Installer's name _____
Type of pump _____ Depth to intake _____ ft
Pump diameter _____ Rated capacity _____ GPM

Water information

Aquifer: ☒ sand / gravel ☐ limestone ☐ sandstone
Main water-supply zone from 220 ft to 225 ft ☐ seepage well
Static water level 29 ft (below / above) GL; ☐ tape ☒ airline ☐ E-line ☐ estimate
Pumping water level 30 ft below GL; ☐ tape ☐ airline ☐ E-line ☒ estimate
At yield of 25 GPM; ☐ orifice ☐ volumetric ☒ estimate
Measurements taken at 10:00 (AM) PM) Date 4/9/04

Water quality test? (yes / no) Date tested ___/___/___

Tested by _____

Contractor Elbert Bros Well Drilling Inc
Address Whittemore Ia 50598
Driller Rick Elbert Certification no. 40-131

white copy – **Iowa DNR, Geological Survey Bureau** blue copy – **Well Contractor** pink copy – **Customer** yellow copy – **County Health Officer**

Iowa Department of Natural Resources Geological Survey Bureau
109 Trowbridge Hall, Iowa City, IA 52242-1319 PH (319) 335-1575

WELL RECORD

RECEIVED
APR 21 2004
605-965-2200

Permit No. _____

Site identification

Property Owner Broin Voyager Ethanol Well Number Prod #1
Address 2209 E 57th St N. Sioux Falls SD
Tenant Emmetsburg Ethanol Plant 57104
Well Depth 271 ft Date completed 4/8/04

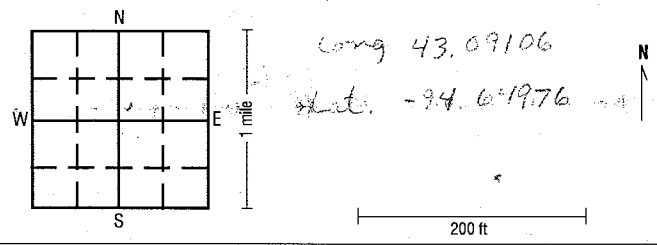
Location

County Palo Alto

½ mi. (N/S) and ½ mi. (E/W) of intersection of 470th and 380th

SW 1/4 of the SW 1/4 of the NE 1/4 of Sec 32 TWP 96 RNG 32 (E/W)

Show exact location of well in section grid with a dot (●). Sketch map of well location on property.



☒ upland ☐ hillside ☐ valley Elevation (if known) _____

Formation log

From	To	Color	Hardness	Formation description
0	2	Blk	Soft	Top Soil
2	18	yel	Med	Clay
18	174	gray	Med	Clay
174	217	gray clear	Med	Very Fine dirty Sand
217	273	clear	Med	Fine Sand

use additional sheets as needed

Remarks (including depth of lost drilling fluids, materials, or tools)

The well was test Pumped for 24 hrs @ 500 gpm - with 30' of Draw down

Well use

☐ Domestic ☐ Municipal ☒ Commercial
☐ Livestock ☐ Public supply ☐ Monitoring
☐ Test well ☐ Irrigation ☐ Other _____ (explain)

Drill method

☒ rotary ☐ auger ☐ cable other _____

Hole size

12¾ inch from 0 ft to 275 ft
_____ inch from _____ ft to _____ ft

hole size continued
_____ inch from _____ ft to _____ ft
_____ inch from _____ ft to _____ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Drive shoe (yes / ~~no~~) Pitless adapter (yes / ~~no~~) Not @ this time

Size (ID/OD)	Type / Wt	Depth top	Depth bottom	Amount (length)
~~40~~	~~Steel~~	~~+1~~		
8"	PVC 200	1½	221	222½

Perforated or slotted casing? (yes / ~~no~~)

Perforated / slotted from _____ ft to _____ ft
Perforated / slotted from _____ ft to _____ ft

Casing grouted? (yes / no) Placement method Tremie

Type	Depth Top	Depth bottom	Amount (vol/wt)
Bentonite	0	180	18%

Well screen? (yes / no)

Diameter	Slot size	Depth Top	Depth Bottom	Length	Material
8" PS	0.018	221	271	50	SS
	0.___				

Bottom capped (yes / no) with S.S. Cap
Seals / Packers (yes / ~~no~~) kind _____ depth _____ ft
Gravel packed ((yes) / no) from 200 ft to 271 ft
(Pea Rock 189-200 Tail) type Silica Sand amount 4000 lbs

Well developed? (yes / no)

Explain airlift - Jet w/water / Surge / Airlift until clean
(pumped, ~~airlifted~~, bailed) for 3 hrs at 560 GPM

Pump installed? (yes / ~~no~~) Date ___/___/___

Installer's name Not @ this time
Type of pump Subm Depth to intake 105 ft
Pump diameter 8" Rated capacity _____ GPM

Water information

Aquifer: ☒ sand / gravel ☐ limestone ☐ sandstone
Main water-supply zone from 221 ft to 271 ft ☐ seepage well
Static water level 29 ft (below / above) GL; ☐ tape ☐ airline ☒ E-line ☐ estimate
Pumping water level 61 ft below GL @ 500 gpm ☐ tape ☐ airline ☒ E-line ☐ estimate
At yield of 500 GPM; ☐ orifice ☐ volumetric ☐ estimate water meter
Measurements taken at for 24 hrs (AM / PM) Date 4/11/04

Water quality test? (yes / no) Date tested ___/___/___

Tested by Broin

Contractor Elbert Bros Well Drilling Inc.
Address Po Box 333 Whittemore IA 50598
Driller Rick Elbert Certification no. 40-131

Open # 2335

white copy – **Iowa DNR, Geological Survey Bureau** blue copy – **Well Contractor** pink copy – **Customer** yellow copy – **County Health Officer**

Well Log

Broin Voyager Ethanol Plant Emmetsburg
Elbert Bros Well Drilling inc

515-884-2231

Production Well #2 : 8" PVC -280' Deep - 50' SS Screen .018 Slot

Location : Longitude: 43.09106 N
Latitude: -94.65163 W

Static Water Level : 25'

Maximum drawdown when pumping 610 gpm: 33'

The well had 33' of drawdown after pumping 610 gpm for Forty five minutes, the water level did not change after pumping for one hour.

The well was then pumped at 610 gpm, for twenty four hours and twenty minutes or 1,464,000 gallons of water.

The recovery rate of the well was 23' in 3 Minutes
4' in 15 Minutes
3' in 30 Minutes
3' in 60 Minutes
Back to original Static water level in 60 Minutes

Monitor Well #1 West : 2" PVC - 231' deep - 5' SS Screen .018 slot

Location: 225' West of Production Well #1

Longitude: 43.09109 N
Latitude: -94-65059 W

The well was developed and airlifted at 25 gpm

Static Water Level: 29'

Maximum Drawdown when pumping 610 gpm : Zero

Broin Ethanol Plant Emmetsburg

Prod Well 2 Elbert Bros Well Drilling Inc 515-884-2231

		Date	Time	Waterlevel	Change in Waterlevel
Start	Static	9/13/04	14:00	25'	
	610 gpm	9/13/04	14:03	55'	30'
	610 gpm	9/13/04	14:06	55'	
	610 gpm	9/13/04	14:10	55'	
	610 gpm	9/13/04	14:15	55'	
	610gpm	9/13/04	14:30	55'	
	610 gpm	9/13/04	14:45	58'	3'
	610 gpm	9/13/04	15:00	58'	
	610 gpm	9/13/04	15:30	58'	
	610 gpm	9/13/04	16:00	58'	
	610 gpm	9/13/04	16:30	58'	
	610 gpm	4/10/04	17:00	58'	
	610 gpm	4/10/04	18:00	58'	
	610 gpm	4/10/04	18:00	58'	
	610 gpm	4/10/04	19:00	58'	
	610 gpm	4/10/04	20:00	58'	
	610 gpm	4/11/04	23:00	58'	
	610 gpm	4/12/04	8:00	58'	
	610 gpm	4/12/04	10:00	58'	
	610 gpm	4/12/04	12:00	58'	
	610 gpm	4/12/04	13:45	58'	
Stop	0 gpm	4/12/04	14:00	35'	23'
	0 gpm	4/12/04	14:15	31'	4'
	0 gpm	4/12/04	14:30	28'	3'
	0 gpm	4/12/04	14:45	27'	1'
	0 gpm	4/12/04	15:00	26'	1'

Broin Ethanol Plant Emmetsburg

0 gpm	4/12/04	15:15	25'	1'
0 gpm	4/12/04	15:30	25'	
0 gpm	4/12/04	15:45	25'	

Iowa Department of Natural Resources Geological Survey Bureau
109 Trowbridge Hall, Iowa City, IA 52242-1319 PH (319) 335-1575

WELL RECORD

Permit No. _____

Site Identification

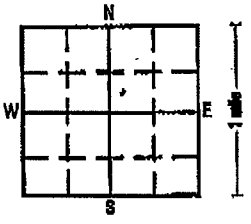
Property Owner Broin Heyoga Ethanol Well Number Prod #2
Address 2209 E 57th St N Sioux Falls SD
Tenant Sioux Labriag Ethanol Plant 57104
Well Depth 280 ft Date completed 8/11/04

Location

County Kossuth

1/2 mi. N/S and 1/2 mi. E/W of intersection of 470th and 380th
SW 1/4 of the SW 1/4 of the NE 1/4 of Sec 32 TWP 96 RNG 32 E/W

Show exact location of well in section grid with a dot (●). Sketch map of well location on property.



Long 43.09106
Lat -94.65863

N

200 ft

☒ upland ☐ hillside ☐ valley Elevation (if known) _____

Formation log

From	To	Color	Hardness	Formation description
0	2	BLK	S	Top Soil
2	18	yel	M	Clay
18	175	gray	M	Clay
175	221	clear gray	M	very fine Sand dirty
221	226	gray	M	Clay
226	282	Clear	M	Course Sand

use additional sheets as needed

Remarks (including depth of lost drilling fluids, materials, or tools)

Well use

☐ Domestic ☐ Municipal ☒ Commercial
☐ Livestock ☐ Public supply ☐ Monitoring
☐ Test well ☐ Irrigation ☐ Other _____ (explain)

Drill method

☒ rotary ☐ auger ☐ cable other _____

Hole size

12 3/4 inch from 0 ft to 280 ft
_____ inch from _____ ft to _____ ft

Hole size continued

_____ inch from _____ ft to _____ ft
_____ inch from _____ ft to _____ ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Drive shoe (yes / no) Pitless adapter (yes / no)

Size (in OD)	Type / Wt	Depth top	Depth bottom	Amount (length)
10"	Steel	1 1/2	235	6 1/2
8"	PVC 200	5	230	225

Perforated or slotted casing? (yes / no)

Perforated / slotted from _____ ft to _____ ft
Perforated / slotted from _____ ft to _____ ft

Casing grouted? (yes / no)

Placement method Tremie

Type	Depth Top	Depth bottom	Amount (vol/wt)
Bentonite	0	180	18 3/4

Well screen? (yes / no)

Diameter	Slot size	Depth Top	Depth Bottom	Length	Material
8PS	0.018	230	280	50	SS
	0.____				

Bottom capped (yes / no) with SS Plate
Seals / Packers (yes / no) kind _____ depth _____ ft
Gravel packed (yes / no) from 180 ft to 280 ft
Pea Rock Silica Sand amount 4000 lbs

Well developed? (yes / no)

Explain Jet w/ water - Surge / airlift
(pumped, airlifted, bailed) for 2 1/2 hrs at 500+ GPM.

Pump installed? (yes / no)

Date ___/___/___
Installer's name Not @ this time
Type of pump Submr Depth to intake 105 ft
Pump diameter 6" Rated capacity 500 GPM

Water Information

Aquifer: ☒ sand / gravel ☐ limestone ☐ sandstone
Main water-supply zone from 230 ft to 280 ft ☐ seepage wall
Static water level 25 ft (below / above) GL; ☒ tape ☐ airline ☐ E-line ☐ estimate
Pumping water level 35 ft below GL; ☐ tape ☐ airline ☐ E-line ☒ estimate
At yield of 600 GPM; ☐ orifice ☐ volumetric ☒ estimate
Measurements taken at 6 : ____ (AM / PM) Date 8/11/04

Water quality test? (yes / no)

Date tested ___/___/___
Tested by Not @ this time

Contractor Elbert Bros Well Drilling Inc
Address Whittemore IA 50598
Driller Rob Elbert Certification no. 2335

IOWA DEPARTMENT OF NATURAL RESOURCES

WATER USE PERMIT

Permit issued to:
Emmetsburg Municipal Utilities
2021 Main Street
P. O. Box 417
Emmetsburg, IA 50536

Permit Number: 5009-R3

Effective: November 10, 2002

Expires: November 9, 2012

The permittee is authorized to:

withdraw water from four existing alluvial wells, each approximately 40 feet deep, and one Dakota Sandstone well, approximately 280 feet deep, all on land generally described as the SW ¼ of the NE ¼ of Section 25, and the NW ¼ of the NE ¼ of Section 36, all in T96N, R33W, Palo Alto County, Iowa, in the maximum quantity of 210 million gallons per year at a maximum rate of 1,100 gallons per minute throughout each year for municipal purposes within and without the permittee's corporate limits consistent with its municipal distribution system and other provisions of law.

This authorization to withdraw water has been granted pursuant to the provisions of Part 4 of Division III of Chapter 455B, Code of Iowa, and Chapters 50, 51, and 52 of Part 567, Iowa Administrative Code, and is further subject to the general permit conditions within this permit.

Conditions of this permit may be appealed as provided in rule 567--50.9, Iowa Administrative Code. Appeal must be in writing and must be received at the Department of Natural Resources; Henry A. Wallace Building; 900 East Grand; Des Moines, Iowa 50319-0034 within thirty days of the date of the certification of the mailing of the permit.

FOR THE DIRECTOR:

By: _____ Date Executed: November 20, 2002
(tbv)

c: Field Office No. 3
File CON 3-9, #5009

CERTIFICATE OF MAILING

On the date shown below, a copy of the foregoing permit was mailed to the permittee and to each person entitled to receive a copy as provided by rule 567--50.8(2), Iowa Administrative Code.

_____

GENERAL PERMIT CONDITIONS

1. Permittee shall maintain accurate and up-to-date records of water use from said sources by means of water meters and submit them annually to the department. Additional records on pumping rates from said sources, water levels in said wells, and other data related to the regulation of this use of water shall be maintained and submitted as directed by the department.

2. Permittee shall be responsible for compliance with all applicable provisions of state law and the rules and regulations of this department and of federal and local health and water pollution control agencies in the operation of its water supply facilities and in the disposal of its wastes.

3. Permittee is responsible for securing such other permits or approvals as may be required by this department, federal, or local governmental agencies for the operation of said water supply facility or the discharge of water or other materials due to this operation.

4. Permittee shall construct, maintain, and monitor observation wells, as directed by the department to define the effects of permittee's water withdrawals on groundwater resources or on other water users who might be affected by the withdrawals authorized herein.

5. Once each spring prior to March 31, the permittee shall be responsible for accurately measuring the distance(s) to water (static water level) from the access port in all permitted wells. The distance to water shall be submitted to the department annually as part of the records of water use.

6. Existing wells shall not be replaced without notifying the Iowa Department of Natural Resources. Changes to the location, depth, source aquifer, or other physical features of said wells may require that this permit be modified to accommodate the changes.

7. Permittee shall cooperate with representatives of the department to determine that the authorized withdrawals do not violate the flow restriction imposed herein.

8. Permittee shall submit to the department within 90 days of being notified by the department, or no later than the expiration date of this permit, whichever first occurs, a plan for implementing routine day-to-day water conservation measures and for implementing emergency water conservation measures during periods of water shortage. Until such a plan has been submitted to and approved by the department, permittee shall implement those emergency water conservation measures determined to be necessary by the department pursuant to Iowa Code Sections 455B.265 and 455B.266.

9. This permit supersedes Water Use Permit No. 5009-MR2.

CAVEAT

Permittee is advised that pursuant to Section 455B.271, Code of Iowa, the authority to withdraw water provided by this permit may be modified, canceled or suspended in case of any breach of the terms or conditions herein, in case of any violation of state law pertaining to the permit, or if found necessary to prevent substantial injury to private or public interests.

SUMMARY REPORT

Permittee has applied to renew an existing permit that presently authorizes the requested withdrawals of water. The requested use of water conforms to the relevant criteria in Part 4 of Division III of Chapter 455B, Code of Iowa, and Chapter 52 of Part 567, Iowa Administrative Code. The department has received no allegations of public or private damage resulting from the use of water authorized under the predecessors to this permit since the original permit was granted.

Appendix E

An Intensive Phase I Cultural Resources, Architectural, and Geomorphological Investigation for the Proposed Lignocellulose Fuel Ethanol Plant at Poet Biorefining, A.K.A. Project LIBERTY, Freedom Township, Palo Alto County, Iowa

Submitted Under Separate Cover

JUL 14 2008

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

July 9, 2008

State Historical Society of Iowa
State Historic Preservation Office
State of Iowa Historical Building
600 E. Locust Street
Des Moines, IA 50319-0290

SUBJECT: Notice of Scoping and Section 106 Consultation Regarding POET Project Liberty, Emmetsburg, Palo Alto County, Iowa

The U.S. Department of Energy (DOE) is initiating formal Section 106 consultation in compliance with the National Historic Preservation Act (NHPA) while also coordinating with your office as required under the National Environmental Policy Act (NEPA). This letter transmits a cultural resources survey report, entitled *An Intensive Phase I Cultural Resources, Architectural, and Geomorphological, Investigation for the Proposed Cellulosic Fuel Ethanol Plant at POET Biorefining, A.K.A. Project LIBERTY, Freedom Township Palo Alto County, Iowa*. The report includes a cultural resource, architectural and geomorphological survey. Also enclosed is a completed *Request for SHPO Comment on a Project* form.

The U.S. Department of Energy (DOE) is proposing to provide funding to POET Project Liberty, LLC to convert an existing dry-mill ethanol plant in Emmetsburg, Iowa into an integrated corn-to-ethanol and cellulose-to-ethanol biorefinery, designated "POET Project LIBERTY". Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021), DOE is preparing a draft Environmental Assessment (EA).

The enclosed Phase I cultural resources, architectural, and geomorphological survey was conducted in accordance with the National Historic Preservation Act and the Secretary of the Interior's standards for the identification of historic properties. The fieldwork and corresponding report on investigations were designed and conducted in order to meet or exceed the guidelines for archeological investigations in Iowa. The enclosed report details the information gathering process concerning cultural resource properties that may exist in or near the proposed ethanol plant. It provides descriptions of cultural resources when encountered, their natural contexts, and contains recommendations concerning the potential impact of the proposed developments on cultural resource properties. This investigation includes archival research and landform evaluations in addition to a pedestrian survey and subsurface archeological site testing.

The area of potential effect (APE) for the proposed project is approximately 125.5 ha (310 ac.) and occupies drained Woden Member marsh landforms and some upland landforms. The proposed project would be constructed immediately adjacent to an existing POET fuel ethanol

plant located at 4724 380th Street, approximately 1 mile southeast of the City of Emmetsburg, in the south half of Section 32, Township 96N, Range 32W, Palo Alto County, Iowa. The site is an irregularly-shaped area comprising approximately 534 acres of land located at approximately 1200 feet above mean sea level (MSL)

DOE has determined that "no historic properties will be affected" (36 CFR 800.4 (d) (1)) as a result of this project and is requesting your concurrence with this finding. Furthermore, as part of the process for determining the scope of issues related to the Proposed Action, we request your comments and any other information that you can identify as important or relevant to the proposed project by August 20, 2008. Please direct any comments regarding the enclosed to Kristin Kerwin at 303-275-4968, email Kristin.Kerwin@go doe.gov

Please contact me at 303-275-4723 with any questions regarding this consultation. We will also provide you the opportunity to review and comment on the Draft Environmental Assessment when it is available.

Sincerely,

Steve Blazek
NEPA Compliance Officer

Enclosure

CONCUR

NAME Douglas W. Jones
ARCHAEOLOGIST, SHSI

DATE 7/30/2008

JUL 14 2008
080714 045

REQUEST FOR SHPO COMMENT ON A PROJECT

Submit one copy with *each* property for which our comment is requested. Please print or type.
Return to: State Historical Society of Iowa, State Historic Preservation Office, 600 E Locust St, Des Moines, IA 50319-0290

I. **GENERAL INFORMATION** ☒ **This is a new submittal**
☐ **This is more information relating to SHPO R&C #:** _____

a. Property Name: POET Biorefining – Emmetsburg
b Property Street & Number: 4724 380th Street, Emmetsburg
c. County: Palo Alto: Zip: 50536
d. Federal Agency: Department of Energy Federal Funding Program/Permit: Energy Policy Act (EPAct) of 2005
e. Agency Project No.: _____ If HUD, circle one: 24 CFR Part *50* or Part *58*

f. Contact Person on Project: Ms. Kristin Kerwin
g. Contact Address: 1617 Cole Boulevard, Golden, Colorado Zip: 80401-3393 email: Kristin.kerwin@go.doe.gov

II. **IDENTIFICATION OF HISTORIC PLACES**

Scope of Effort Applied

☐ As agreed in programmatic or other agency agreements with SHPO (if applicable)
☒ Includes the attached elements required under 36 CFR 800.4(a)
1) Area of potential effects, as defined in 800.16(d), is shown on map
2) Existing information has been reviewed on historic properties in the property area at SHPO office and/or other locations of inventory data
3) Information has been sought from parties likely to have knowledge about historic properties in the project area
4) Information gathered from Indian tribes, as appropriate

Identification Results
History and Architecture
☒ An attached Iowa Site Inventory form is completed for each building 50 years of age or older

Archaeology
☒Yes ☐No The project will involve excavation
If yes, submit all of the following information (use attachments of necessary)
1) Precise project location map (preferably U.S.G.S. 7.5 min Quad with name, date, & location)
2) Site plan showing limits of proposed excavation
3) Number of acres in project 310
4) Legal location: Section(s) 32 Township(s) 96N Range(s) 32W
5) Description of width and depth of proposed excavation and current conditions of project area

III. **APPLICANT CERTIFICATION (Check Either Adverse Effect or No Adverse Effect for Historic Property Affected category)**

Findings (Check One)

☒ **No historic properties will be affected** (i.e., none are present or there are historic properties present but the project will have no effect upon them) and adequate documentation under 800.11 is provided, including:
1) A description of the undertaking, specifying the Federal involvement, and its area of potential effects, including photographs, maps, drawings, as necessary ***and***
2) A description of the steps taken to identify historic properties, including, as appropriate, efforts to seek information pursuant to 800.4(b) ***and***
3) The basis for determining that no historic properties are present or affected.

I understand that the SHPO has 30 days from receipt to object to the finding, after which the applicant's responsibilities under Section 106 of the Historic Preservation Act are fulfilled

☐ **An historic property will be affected** for which documentation is provided as required in 36 CFR Part 800.11(e) and, in applying the criteria of adverse effect under 800.5, propose that the project be considered to have **(Check One)**:
☐ A **No Adverse Effect** under which, in consultation with the SHPO, the project will be modified or conditions imposed to avoid adverse effects. I understand that failure of the SHPO to provide a dated response within 30 days from receipt to the finding shall be considered agreement of the SHPO with the finding
☐ An **Adverse Effect** is found and the applicant, or other federally authorized representative, will consult with the SHPO and other consulting parties to resolve the adverse effect under 800.6

Federally Authorized Signature: _____ Date: 7/9/08
Type name below ➔ Steve Blazek
United States Department of Energy
NEPA Compliance Officer

IV. **STATE HISTORIC PRESERVATION OFFICE COMMENT**

☒ Agree with the finding in section III above (move to reader's file) ☐ See attached follow-up letter
☐ Object to the finding for reasons indicated in attached letter
☐ Cannot review until information is sent as follows: _____
Authorized Signature: Douglas W. Jones Date: 7/30/2008

Please mail a copy of this signed statement to your contact person at the Federal Agency

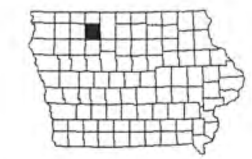
Version: 12/18/02

Appendix F

Planned Palo Alto County Road Improvements

Roughly ~ 11 million bond

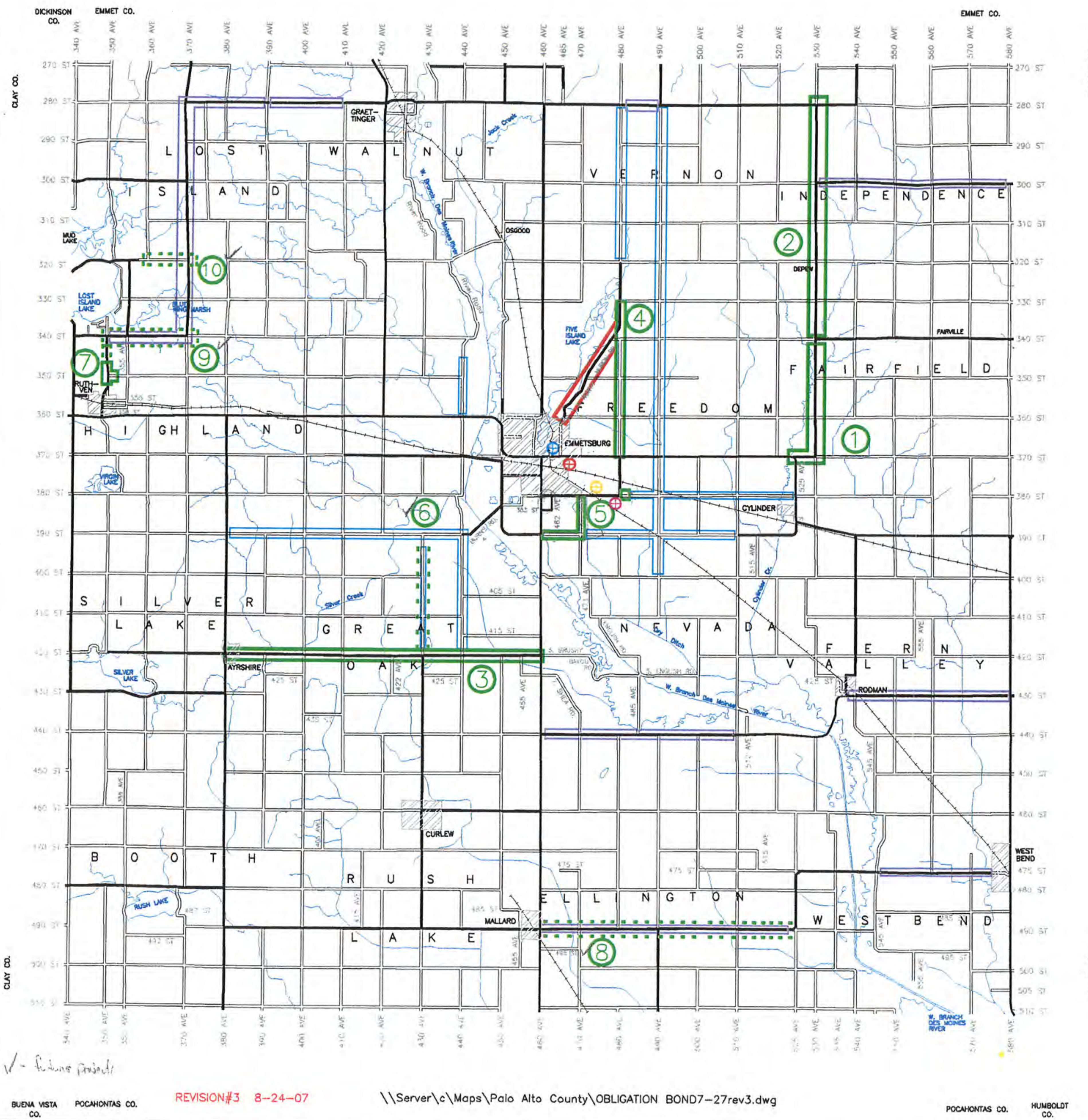
PALO ALTO COUNTY



① Core Proposal must needs
② Official Support from DOT to continue economic growth.
③ Ballpark Value of Project Liberty
④

PROPOSED CONSTRUCTION

LEVERAGING ALL FUNDING SOURCES INCLUDING AN ESSENTIAL PURPOSE GENERAL OBLIGATION BOND



REVISION#3 8-24-07

\\Server\c\Maps\Palo Alto County\OBLIGATION BOND7-27rev3.dwg

✓ - future project

PAVING 2008

⑦ ¾ MILE
- SHOULDER WIDENING AND RESURFACING TO SUPPORT RUTHVEN CORRUGATED SOLUTIONS
- POSSIBLY ADD ONE MORE MILE OF OVERLAY
- FUNDED WITH RISE AND FM

PAVING 2009

① 3.5 MILES
- RECONSTRUCT/BASE STABILIZE 8"X 24' PCC
- FUNDED WITH FEDERAL GRANT AND COUNTY BOND

② 6 MILES
- RECONSTRUCT/BASE STABILIZE 8"X 24' PCC
- FUNDED WITH COUNTY BOND

③ 8 MILES
- BUY ROW, GRADE STABILIZE 8"X 24' PCC
- FUNDED WITH COUNTY BOND
- $100,000 SPENT PATCHING IN 2007

GRADE 2009, PAVE 2011

④ 3 MILES
- BUY ROW-GRADE STABILIZE 8"X 24' PCC
  1 MILE
- RECONSTRUCT, 8"X 24' PCC
- PAVING FUNDED WITH FM FUNDS
- ROW FUNDED WITH COUNTY BONDS

⑤ 2.2 MILES
- BUY ROW, REGRADE
- PAVE 8"X 24' PCC
- POTENTIALLY FUNDED WITH RISE GRANT AND TIFF ON ADDED VALUE OF THE ETHANOL PLANT
- ROW FUNDED WITH COUNTY BOND

REGRADE/PREP FOR FUTURE PAVING

(PAVING WOULD NEED TO BE FUNDED) IN FUTURE BOND

⑥ 3 MILES (430TH AVE)
- BUY ROW, REGRADE, HEAVY ROCK
- FUNDED BY COUNTY BOND FUTURE 1.2 MILES PAVE (390TH ST)

⑧ 7 MILES
- BUY ROW, SHOULDERING PROJECT TO PREP FOR FUTURE RECONSTRUCTION
- ROW FUNDED WITH COUNTY BOND

⑨ 1 MILE
- BUY ROW, CULVERT REPLACEMENT/EXTENSIONS
- REGRADE AT TIME OF FUTURE 2.2 MILE PAVING

⑩ 1.2 MILES
- BUY ROW AND REGRADE

PAVED ROADS- ADDITIONAL HIGH COST ROADS TO MAINTAIN DUE TO HEAVY TRUCK LOADING

GRAVEL ROADS- TRUCK FEEDER ROUTES TO BE HEAVILY ROCKED
- $450 MATERIAL FUNDED WITH COUNTY BONDS (1/3 COST)
- LABOR, EQUIPMENT, AND FUEL TO BE FUNDED WITHIN NORMAL SECONDARY ROAD BUDGET (2/3 COST)

⊕ READY MIX PLANT
⊕ KERBER MILLING
⊕
⊕ POET/LIBERTY ETHANOL PLANT

Appendix G

DOE Scoping Letter and Distribution List

Department of Energy
Golden Field Office
1617 Cole Boulevard
Golden, Colorado 80401-3305

June 24, 2008

TO: Distribution List

SUBJECT: Notice of Scoping – POET Project LIBERTY Proposed Commercial Scale Lignocellulosic Ethanol Plant, Emmetsburg, Iowa.

The U.S. Department of Energy (DOE) is proposing to provide funding to POET Project Liberty, LLC to convert an existing dry-mill ethanol plant in Emmetsburg, Iowa into an integrated corn-to-ethanol and lignocellulose-to-ethanol biorefinery, designated "POET Project LIBERTY". Pursuant to the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and DOE's implementing procedures for compliance with NEPA (10 CFR Part 1021), DOE is preparing a draft Environmental Assessment (EA) to:

- Identify any adverse environmental effects that cannot be avoided should this proposed action be implemented.
- Evaluate viable alternatives to the proposed action, including a no action alternative.
- Describe the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.
- Characterize any irreversible and irretrievable commitments of resources that would be involved should this proposed action be implemented.

The EA will describe and analyze any potential impacts on the environment that would be caused by the project and will identify possible mitigation measures to reduce or eliminate those impacts. The EA will describe the potentially affected environment and the impacts that may result to:

- Air Quality and Meteorology
- Geology and Soils
- Ecological Resources
- Water Resources (including storm-water, surface water, and ground water)
- Waste Management and Hazardous Materials
- Cultural and Historical Resources
- Land Use
- Odor, Noise and Visual Resources
- Infrastructure
- Transportation and Traffic
- Socioeconomics and Environmental Justice

The proposed project is described in the attachment to this letter.

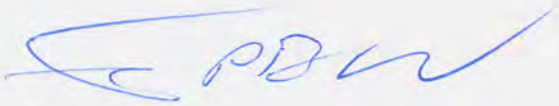
DOE plans to complete the draft EA for public review by August, 2008. This letter as well as the draft EA, when it is available, will be posted in the DOE Golden Field Office online reading room: http://www.eere.energy.gov/golden/reading_room.aspx.

The DOE Golden Field Office welcomes your input throughout our NEPA process. **Please provide any comments on this scoping letter on or before July 31, 2008 to:**

Kristin Kerwin
NEPA Document Manger
Department of Energy
1617 Cole Boulevard
Golden, Colorado 80401
kristin.kerwin@go.doe.gov

We look forward to hearing from you.

Sincerely,



Steve Blazek
NEPA Compliance Officer

Attachment

Proposed Project Description

Project LIBERTY would transform an existing corn-to-ethanol biorefinery, POET Biorefining – Emmetsburg, into an integrated corn-to-ethanol and lignocellulose-to-ethanol biorefinery. Currently, the biorefinery has a name-plate capacity of 50 million gallons per year and is one of 23 POET biorefineries. Once complete the facility would produce 125 million gallons of ethanol per year (mgpy), 25 of which would come from lignocellulosic feedstock, specifically corn cobs and corn fiber. Additionally, the facility would produce annually 80,000 tons of Dakota Gold Corn Germ Dehydrated and 100,000 tons of Dakota Gold HP animal feed. Project LIBERTY technologies are intended to be replicable.

The objectives of the proposed project are to:

- Transform an existing conventional corn dry mill ethanol plant into a commercial-scale biorefinery that would use advanced corn dry milling and lignocellulosic conversion technologies to produce ethanol from corn cobs and corn fiber.

- Implement a sustainable corn cob collection, storage and delivery system to provide feedstock to the bio-refinery.

- Maximize alternative energy production and minimize traditional energy usage:
    - 11% more bio-fuel from a bushel of corn
    - 27% more bio-fuel from an acre of corn
    - Significantly less non-renewable energy to power the biorefinery

- Operate the cob collection and biorefinery systems to:
    - Validate the technology at commercial scale
    - Validate the economics at commercial scale
    - Enable replication at other biorefineries

The feedstock for the lignocellulosic portion of the biorefinery would be a mix of corn fiber and corn cobs. The corn fiber would come from a corn fractionation process that would separate the fiber from the germ and starch. The cobs would be purchased from local farmers.

Cobs would be ground and the lignocellulose would be converted to sugars which would be fermented into ethanol using a proprietary design developed by POET. The ethanol would be distilled, denatured, stored, and shipped for use as a vehicle fuel.

Project LIBERTY would use two technologies to reduce the in-plant use of fossil fuels. The spent feedstock from the fermentation system would be used for fuel in a solid fuel boiler to produce steam for the plant. The used water from the fermentation process would be processed in an anaerobic digester to produce methane gas which could also be used for fuel in the facility boilers or other fuel combustion equipment. The remaining solids from the anaerobic digester would also be burned in the solid fuel boiler.

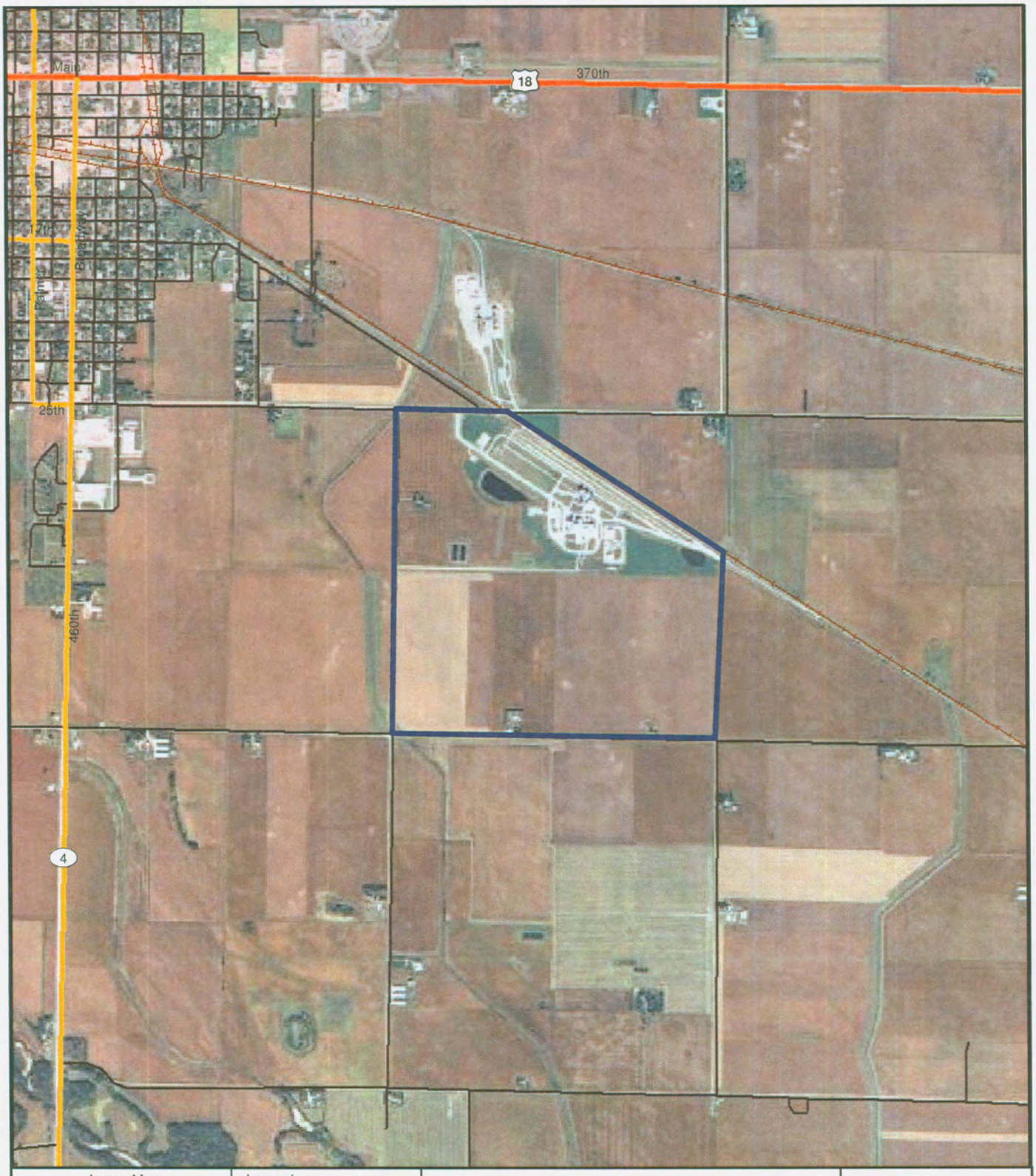
The proposed project would be constructed immediately adjacent to an existing POET fuel ethanol plant located at 4724 380th Street, approximately 1 mile southeast of the City of Emmetsburg, in the south half of Section 32, Township 96N, Range 32W, Palo Alto County, Iowa (See Figures 1 and 2). The site is an irregularly-shaped area comprising approximately 534 acres of land located at approximately 1200 feet above mean sea level (MSL).

The proposed site is situated in an area that is generally rural agricultural crop land. Farmsteads and row crops, mostly corn and soybeans, are predominant in the area. The nearest school, hospital, and residential area are in the City of Emmetsburg, approximately one mile to the northwest of the proposed project location. The closest residential property is approximately one half mile from the proposed site. AGP, Inc. a soybean processing facility, is located immediately to the north of the project site.

There are no naturally occurring water bodies on the project site. POET constructed storm water ponds during the development of the existing fuel ethanol plant. Dry Ditch, approximately 200 feet in length, is present on the southwestern portion of the project site. Dry Ditch is an intermittent tributary of Cylinder Creek.

The site grading design would be completed to minimize the impact to the surrounding environment. Much of the area proposed for use has already been developed with the original ethanol plant construction, but there are areas which would be converted to serve the new industrial purpose.

POET would be required to apply for and obtain several new and modified permits to construct and operate the facility. Prior to starting construction, POET would apply for an Emission Unit Air Construction Permit, and modify the existing construction Storm Water Pollution Prevention Plan (SWPPP) and National Pollutant Discharge Elimination System (NPDES) permit for Storm Water Discharge Associated with Construction. Prior to the start of operation POET would modify the existing NPDES permit for Storm Water Discharge Associated with Industrial Activities, the NDPES permit for Non-Contact Water Discharge (if necessary), the operation SWPPP, and the Iowa Water Use Permit. Within six months of the start of operation POET would be required to modify the existing Spill Prevention, Control, and Countermeasure Plan (SPCC). Within twelve months after the start of operation POET would be required to submit an application to modify the existing Title V Air Operating Permit.



Locus Map

Legend

- Facility Boundary
- Highway
- Major Road
- Local Road
- Railroads

Project Location
Emmetsburg, Iowa

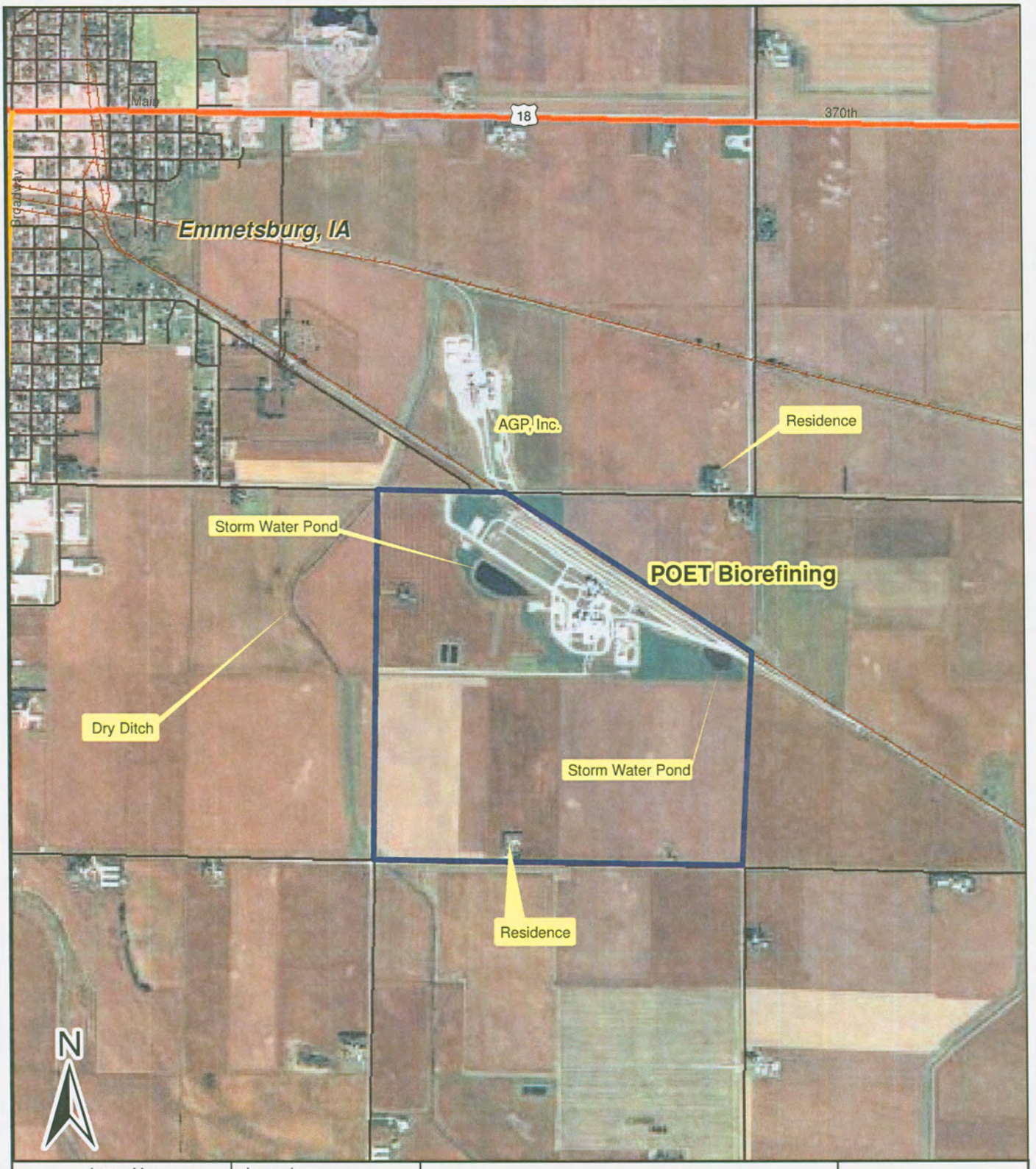
Map Data Source: ESRI 2006

Scale 0 0.25 0.5 0.75 1 1.25 Miles

ENSR

Figure 1

V:\Projects\12074 POET\12074-020 Project Liberty Drawn by K.N.



Locus Map

Legend

- Facility Boundary
- Highway
- Major Road
- Local Road
- Railroads

Project Site Features
Emmetsburg, Iowa

Map Data Source: Data & Maps and StreetMap USA ESRI 2006
Aerial Photo Source: Iowa Geographic Map Server ortho.gis.iastate.edu/

Scale 0 0.25 0.5 0.75 1 1.25 Miles

ENSR

Figure 2

V:\Projects\12074 POET\12074-020 Project Liberty Drawn by K.N.

Distribution List for the Notice of Scoping
POET Project LIBERTY Environmental Assessment

Iowa Township Officers

Booth Township	Ellington Township	Emmetsburg Township	Fairfield Township
Allen Stangl 4711 355th Ave. Ayrshire, IA 50515	Howard Morey 4812 510th Ave. Mallard, IA 50562	Bob Soenen 3760 410th Ave. Emmetsburg, IA 50536	Michael Reding 5474 350th St. Cylinder, IA 50528
Daniel Noonan 4675 390th Ave. Curlew, IA 50527	Dennis Schumacher 4584 490th Ave. Mallard, IA 50562	Robert Gress 3375 460th Ave. Emmetsburg, IA 50536	Howard Finnestad 3443 530th Ave. Cylinder, IA 50528
Deryll Brodersen 4509 390th Ave. Curlew, IA 50527	Phillip Kacmarynski 4653 490th St. Mallard, IA 50562	April Soenen 4316 340th St. Emmetsburg, IA 50536	David Bolte 5636 340th St. Cylinder, IA 50528
Penny Rubel 3827 490th St. Curlew, IA 50527	Neal Heldt 4965 490th St. Mallard, IA 50562	Nick Fank 3810 420th Ave. Emmetsburg, IA 50536	Donna M. Besch 5479 390th St. Cylinder, IA 50528

Fern Valley Township	Freedom Township	Great Oak Township	Highland Township
Byron Anliker 5404 430th St. West Bend, IA 50597	Maurice J. Drew 5142 380th St. Cylinder, IA 50528	Patrick Kibbie 4285 440th Ave. Emmetsburg, IA 50536	W.K. Pete Grange 3498 370th St. Ruthven, IA 51358
Thomas Steier 5715 400th St. PO Box 95 Whittemore, IA 50598	Dan Zeigler 4763 360th St. Emmetsburg, IA 50536	Gary Kauffman 4343 410th St. Emmetsburg, IA 50536	Leo Geelan 3556 370th Ave. Ruthven, IA 51358
John Banwart 5468 430th St. West Bend, IA 50597	Gene Opheim 3323 510th Ave. Cylinder, IA 50528	Bruce Johnson 4126 410th St. Emmetsburg, IA 50536	James Schoning 1006 Bruce St. Ruthven, IA 51358
Jay Bargman 5579 430th St. West Bend, IA 50597	Philip R. Stillman 4730 370th St. Emmetsburg, IA 50536	Dale Reed 4109 430th Ave. Emmetsburg, IA 50536	Paul Molitor 3550 380th St. Ruthven, IA 51358

Distribution List for the Notice of Scoping
POET Project LIBERTY Environmental Assessment

ndependence Townshi	Lost Island Township	Nevada Township	Rush Lake Township
Tim Naig 5235 330th St. Cylinder, IA 50528	Curt Berkland 3059 360th Ave. Ruthven, IA 51358	Aletha King 3926 515th Ave. Cylinder, IA 50528	Eldon Hurley 4176 490th St. Curlew, IA 50527
Tillford Egland 605 Main St. Cylinder, IA 50528	Brian Westergard 3699 280th St. Graettinger, IA 51342	Mary Moser 5107 420th St. Cylinder, IA 50528	Martin Bergstrom 4585 500th St. Mallard, IA 50562
Stewart Ohrtman 2842 560th Ave. Ringsted, IA 50578	Mark McGrauth 3097 375th Ave. Ruthven, IA 51358	Kenneth O. Sikora 5068 390th St. Cylinder, IA 50528	Vernon White 4807 440th Ave. Mallard, IA 50562
Randall R. Jacobs 3283 530th Ave. Cylinder, IA 50528	Graig Thu 3619 300th St. Cylinder, IA 50528	Kathryn A. Mortenson 4361 Shea Rd. Mallard, IA 50562	Troy Auten 4928 455th Ave. Mallard, IA 50562
Silver Lake Township	**Vernon Township**	**Walnut Township**	**West Bend Township**
Gary Rouse 4456 350th Ave. Ayrshire, IA 50515	Ritchie L. Berkland 3216 510th Ave. Cylinder, IA 50528	Steven Dobbins 3211 420th Ave. Graettinger, IA 51342	Dennis Barber 4641 535th Ave. West Bend, IA 50597
Vitus J. Terveer 4261 390th Ave. Ayrshire, IA 50515	Tim Twaiten 4297 370th St. Emmetsburg, IA 50536	Willard R. Herke 4368 280th St. Graettinger, IA 51342	Thomas Gambell 4627 560th Ave. West Bend, IA 50597
Mike Sikora 3605 400th St. Ruthven, IA 51358	Gerald Twait 4868 280th St. Graettinger, IA 51342	Gary L. Swanson 3212 400th Ave. Emmetsburg, IA 50536	Edward M. Schmalen 4891 580th Ave. West Bend, IA 50597
Darrel Reed 3857 410th St. Ayrshire, IA 50515	Ronn Naig 35029 Huron Rd. Emmetsburg, IA 50536	Jerry Joyce 4408 320th St. Emmetsburg, IA 50536	Donald E. Banwart 4725 525th Ave. West Bend, IA 50597

Interested Parties

Craig Brownlee 2112 Main P.O. Box 480 Emmetsburg, IA 50536 brownlee@ncn.net	Craig Kassel 4106 420th St Emmetsburg, IA 50536 kasseldc@ncn.net	Todd Mathisen 3341 530th Ave Cylinder, IA 50528 toddjana@ncn.net	Ed Noonan 3486 430 St Ayrshire, IA 50515 ednoonan15@yahoo.com
Jim Kibbie 4258 420 St Emmetsburg, IA 50536 jimkay@ncn.net	Pat Kibbie 4285 440th Ave Emmetsburg, IA 50536 kibbies5@ncn.net	Derek Young 2276 455th Ave Wallingford, IA 51365 djyoung@yourstarnet.net	Linus Solberg 3780 510th Ave Cylinder, IA 50528 lsolberg@ncn.net

Distribution List for the Notice of Scoping
POET Project LIBERTY Environmental Assessment

Nearby Residents/Businesses

Fred Perkins 4664 380th St. Emmetsburg, IA 50536	Marlin Schmeling 3826 470th Ave. Emmetsburg, IA 50536	Robert Darrah 4739 390th St Emmetsburg, IA 50536	Dennis Hanson 4796 380th St. Emmetsburg, IA 50536
Dan Chism 4791 380th St. Emmetsburg, IA 50536	Jeff Elbert 4656 390th St. Emmetsburg, IA 50536	Mike Mundus 3968 470th Ave. Emmetsburg, IA 50536	Travis Rouse 3949 470th Ave. Emmetsburg, IA 50536
Tom Domek 3918 480th Ave. Emmetsburg, IA 50536	AGP 4739 380th St. Emmetsburg, IA 50536		

Local Authorities

John Schad, Mayor Emmetsburg City Hall 2021 Main Street P.O. Box 417 Emmetsburg, IA 50536	John Bird, City Administrator Emmetsburg City Hall 2021 Main Street P.O. Box 417 Emmetsburg, IA 50536	Steve Cody, Chairman Planning and Zoning Commission Emmetsburg City Hall 2021 Main Street P.O. Box 417 Emmetsburg, IA 50536	Palo Alto County, Board of Supervisors Palo Alto County Courthouse P.O. Box 95 Emmetsburg, IA 50536
Joel D. Frantz, PE County Engineer Palo Alto County Courtho P.O. Box 95 Emmetsburg, IA 50536	Palo Alto County Sanitation and Zoning, Joe Neary Suite 108, Box 271 Emmetsburg, IA 50536	Palo Alto County Emergency Management, Mark 1907 11th St. Emmetsburg, IA 50536	

Local Newspaper and Library

The Emmetsburg Report/ Emmetsburg Democrat P.O. Box 73 Emmetsburg, IA 50536	Emmetsburg Public Library 707 N. Superior St. Emmetsburg, IA 50536	

Distribution List for the Notice of Scoping
POET Project LIBERTY Environmental Assessment

List of Government Agencies

Iowa Department of Transportation District 3 Office 2800 Gordon Drive P.O. Box 987 Sioux City, IA 51102- Attn: Tony Lazarowicz, District Engineer	Iowa Department of Natural Resources Field Office #3 1900 North Grand Ave, Suite E17 Spencer, IA 51301 Attn: Ken Hessenius: Supervisor	State Historical Society of Iowa Advisory Council on Historic Preservation State of Iowa Historical Building 600 East Locust Des Moines, IA 50319-	Iowa Department of Public Safety State Fire Marshal Division 215 East 7th Street Des Moines, Iowa 50319
Iowa Office of Energy Independence Lucas State office Building 321 East 12th Street Des Moines, IA 50319 Attn: Roya Stanley, Director	Iowa Department of Agriculture and Land Stewardship Soil Conservation Division Wallace State Office Building 502 E. 9th Street Des Moines, IA 50319	United States Fish and Wildlife Service Rock Island Field Office 1511 47th Avenue Moline, Illinois 61265 Mr. Richard C. Nelson, Field Supervisor	Iowa Department of Natural Resources Henry A. Wallace Building 503 East Ninth Street Des Moines, IA 50319- Mr. Richard Leopold Director