Supplement Analysis

for the

Environmental Assessment

for the

Construction and Operation of a Proposed Lignocellulosic Bioethanol Refinery

POET Project LIBERTY, LLC.

Emmetsburg, Iowa

DOE/EA-1628

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1.0 Purpose

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 facility has been selected for co-location with a biorefinery with lignocellulosic conversion technologies to produce ethanol and co-products. This lignocellulosic plant is called Project LIBERTY. The Existing Plant currently has a name-plate capacity of 50 million gallons per year (mgy). Project LIBERTY would produce up to an additional 25 mgy of ethanol from a feedstock of cellulosic material, namely corn cobs, husks and high-cut material from the corn plant (biomass). Figure 1 illustrates the site location and general layout for Project LIBERTY.

In September 2008, the Department of Energy (DOE) published the final Environmental Assessment and Notice of Wetland Involvement (EA) for the *Construction and Operation of a Proposed Lignocellulosic Ethanol Plant, Poet Project LIBERTY, LLC, Emmetsburg, Iowa (2008 EA).* The Mitigated Finding of No Significant Impact (MFONSI) was published by the DOE on September 29, 2008. The EA was conducted to determine potential environmental and socioeconomic impacts that would result from the construction and operation of the cellulosic ethanol production facility near the town of Emmetsburg, Palo Alto County, Iowa.

Subsequent to the issuance of the MFONSI, POET Design and Construction (POET D&C) has made several changes to the design and operating parameters of the proposed cellulosic ethanol facility. In compliance with NEPA (42 U.S. Code [USC]§ § 4321 *et. seq.)* and DOE's NEPA implementing regulations (10 Code of Federal Regulations [CFR} Section 1021.330) and procedures, this Supplement Analysis (SA) examines the potential environmental impacts of the changes to the original project (Proposed Action) design.

This SA will be made available to the public and interested parties on the DOE Golden Field Office Online Public Reading Room. (http://www.eere.energy.gov/golden/Reading_Room.aspx)

DOE proposes to provide financial assistance that would cover up to 40% of project costs but would not exceed $100 million. As noted above, DOE is required to evaluate the potential environmental impact of this funding decision. Environmental impacts could result from this funding decision as a direct result of construction supported by the financial assistance or from the subsequent operation of the facility, which is directly tied to its construction. Initial analysis of the proposed POET Project LIBERTY determined that no significant impacts to the human environment would result. However, because NEPA encourages completion of environmental analysis early in the project process, it is not unusual for project design to change from the preliminary designs analyzed through an EA, resulting in the need for additional analysis. Because of the changes to design and operation since completion of the 2008 EA, DOE has chosen to complete a SA to address potential impacts from those changes.

The proposed Starch Expansion, described in the 2008 EA, was part of the No Action Alternative and was a part of the cumulative effects evaluated in the 2008 EA. The Starch Expansion was a planned 55 MMgal/year expansion of the Existing Plant that would have used corn as the feedstock to a conventional corn to ethanol facility. The Starch expansion would have included construction of a corn fractionation system that would have provided corn fiber to the Project LIBERTY.

The construction of the Starch Expansion by POET D&C will not occur in the foreseeable future. The construction would have been independent of any decision by DOE to provide federal funds for the design and construction activities related to Project LIBERTY. Potential cumulative environmental impacts reported in the 2008 EA will not occur since the starch expansion is not being constructed or planned for construction.

Therefore, the current No Action Alternative is continued operation of the Existing Plant without modification.

2.0 Description of the Modified Proposed Action

DOE is proposing to provide federal funding to POET D&C for the construction and operation of the Project LIBERTY which would produce up to 25 mgy of ethanol from biomass. The proposed expansion of the POET facility will consist primarily of new production equipment associated with Project LIBERTY. Natural gas fired units (DDGS Dryers #1 and #2, RTO #1, Boiler #1, and Boiler #2) at the Existing Plant will be modified to be capable of combusting both natural gas and the biogas produced by the proposed Project LIBERTY anaerobic digestion systems.

This section presents a description of changes to the Project LIBERTY from the 2008 EA. Where changes have been made to the project profile, the description presented in the original (2008 EA) and modified (Project LIBERTY SA) are outlined. Figure 2 – Project LIBERTY Process Flow Diagram, shows a process flow diagram for the modified Project LIBERTY. Those portions of the project profile that have not changed are not discussed in the SA.

Modifications to the proposed Project LIBERTY include:

- Biomass harvesting equipment and methods have been developed and implemented;
- The biomass transport and handling system designs have been established;
- The biomass storage yard has been constructed and is operating; biomass has been purchased by Project LIBERTY;
- Process design has changed from the original description to:
    - Handle and process bales of biomass rather than loose biomass;
    - Construct an anaerobic digestion system to generate biogas to supply Project LIBERTY and reduce the natural gas demand at the Existing Plant;
- A solid fuel fired boiler will not be installed, biogas from the anaerobic digestion systems will be used at both Project LIBERTY and the Existing Plant;
- The primary disposal option from digester sludge will be landfilling or land-application instead of being used in the solid fuel boiler. Beneficial reuse remains an option for the digester sludge;
- Air emissions with modeling demonstrating that the Combined Biorefinery will not cause or contribute to an exceedance of the National Ambient Air Quality Standards (NAAQS) has been completed and submitted to the Iowa Department of Natural Resources (IDNR);
- The IDNR has issued air emission unit construction permits for Project LIBERTY;
- The starch expansion of the Existing Plant will not be completed; and
- Corn fractionation systems will not be installed at the Existing Plant.

The study areas that are included in this SA include:

- Air Quality
- Waste Management
- Hazard Review, Accident and Risk Analysis
- Infrastructure
- Aesthetics
- Traffic

- The Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity
- Irreversible and Irretrievable Commitments of Resources
- Unavoidable Adverse Impacts

Certain resource areas previously evaluated in the 2008 EA would not have potential for additional or altered impacts as a result of the modification to the proposed facility design and operation. Therefore, the SA does not further evaluate potential impacts to:

Study Area	
Health and Safety Hazards	Surface Water
Meteorology	Storm Water
Odor	Hazardous Materials Storage and Handling
Geology and Soils	Cultural Resources
Biological Resources	Land Use
Groundwater	Noise
Socioeconomics and Environmental Justice	

2.1 Project Location and Site Plan

Project LIBERTY would be constructed immediately adjacent to the Existing Plant. The project location has not been changed from that described in the 2008 EA. However, the site plan has been modified. Figure 1 – General Layout Drawing for Project LIBERTY shows the proposed site layout.

2.2 Proposed Plant Process Description

This section presents descriptions of the plant processes that have been modified from the 2008 EA. Where processes have been modified, the original description (September 2008) of the part of the process that has been modified is presented in the “original” section followed by the description of the “modified” part of the process.

2.2.1 Lignocellulose Supply

Original Lignocellulose Supply

Lignocellulose for Project LIBERTY would be derived from corn cobs and potentially corn fiber separated from the corn kernel or the facility may use corn cobs exclusively. Using corn cobs only will result in the greatest potential environmental impacts and was therefore the default condition used in the 2008 EA. Corn cobs would be purchased from local farmers and brought to Project LIBERTY for processing.

Modified Lignocellulose Supply

Corn fiber separated from the corn kernel at the Existing Plant and Starch Expansion will not be used as a lignocellulose supply because the fractionation system required to supply the corn fiber has not and will not be constructed in the foreseeable future. The default condition used in the 2008 EA, a feedstock consisting of corn cobs, has been modified.

Feedstock for Project LIBERTY would consist of cobs, husks and high-cut material from the corn plant (biomass). Use of the high cut material would be required to provide the binder necessary to allow production of round and square bales. The collection of biomass requires minimal additional farming effort. Numerous studies reveal low soil nutrient value in cobs. A detailed, multi-year study of the environmental sustainability of the collection of biomass and other parts of the corn plant is currently underway with Iowa State University.

After three years of research, results show that removal of 25% of the above ground corn crop residue or 1-2 BDT per acre has minimal impact on soil nutrient levels.

2.2.2 Biomass Harvesting and Field Storage

Original Cob Harvesting and Field Storage

The original EA stated that 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.

Modified Biomass Harvesting

Agriculture equipment companies have developed methods that can harvest biomass and grain while not significantly slowing the harvest. POET collaborated with leading agricultural equipment manufacturers like AGCO, Case IH, Vermeer, John Deere, and Redekop. The equipment was tested on 4,000 acres in 2007, nearly 10,000 acres in 2008 and over 15,000 acres in 2009. Corn crop residue from over 50,000 acres was harvested by 85 farmers in 2010. Following these three years of testing, CCM and whole ear corn have been eliminated as harvesting options for Project LIBERTY.

Several biomass collection systems are available, but the best biomass harvest option will be determined by each farmer. However, many farmers prefer second pass baling. With this method, farmers drop cobs and high cut material in windrows behind the combine during the grain harvest. Either harvesting option removes no more than 25% of the above ground corn crop residue. Farmers then use tractors to pull balers that collect the material and form bales that are stored on the farmers' fields until delivery to the biorefinery. Farmers produce round or square bales; LIBERTY will accept either. Some farmers have indicated a preference for first pass baling, in which the baler is towed directly behind the combine.

2.2.3 Biomass Delivery, On-site Storage, and Handling

Original Cob Delivery, On-site Storage, and Handling

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.

Modified Biomass Delivery, On-site Storage, and Handling

Based on biomass receiving and unloading activities completed during 2010, Project LIBERTY has determined that the peak unloading rate for round biomass bales would be, approximately 2,500 BDT biomass/day (200 trucks per day). The amount of biomass to meet normal operational needs, plus approximately 25% extra to build a reserve, would be approximately 1,350 BDT biomass/day (108 trucks per day), 5 days per week for round bales. If square bales are purchased, the same tonnage would be transported but the number of trucks would decrease because a truckload of square bales is heavier by approximately 5 tons than a truckload of round bales. A limited amount of biomass may be delivered on trailers smaller than a semi-load.

Biomass would be stored in bales at the existing 22 acre outdoor stackyard, which is capable of storing a maximum inventory of approximately 20,000 BDT of biomass.

2.2.4 Lignocellulose Pretreatment

Original 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 biomass or a mixture of biomass and up to approximately 190 BDT/day of corn fiber.

Modified Lignocellulose Pretreatment

Project LIBERTY would utilize biomass. Corn fiber will not be used. Project LIBERTY would still use 770 BDT/day of biomass for the process.

2.2.5 Ethanol Storage and Distribution

Original Ethanol Storage

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.

Modified Ethanol Storage

Two additional tanks would be constructed for Project LIBERTY. TK 007 and TK008 with 180,000 and 250,000 gallon capacities, respectively, would store 190 and 200 proof ethanol, respectively. The ethanol 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.

200 proof ethanol from the two new tanks would be pumped to the Existing Plant for addition of denaturant and load-out to trucks and rail cars as described in the 2008 EA.

2.2.6 Anaerobic Digestion

Original 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.

Modified Anaerobic Digestion

The stillage from the beer stripper would be transferred to an anaerobic membrane bioreactor (AnMBR) system. Biogas from the AnMBR system would be used in the both the Existing Plant and Project LIBERTY for fuel combustion uses. Sufficient biogas would be generated to supply Project LIBERTY and replace approximately 30% of the natural gas demand of the Existing Plant.

During initial operations, sludge associated with the AnMBR system would be dewatered in a filter press or similar equipment and would be either disposed off-site at a licensed landfill or beneficially reused as a soil amendment. POET would evaluate the sludge disposal and may install a dryer to further reduce the moisture content of the sludge. This option would only be exercised if technically and economically feasible.

Water from the AnMBR system would be treated to reduce pollutant levels and some of the water would be evaporated, condensed and recycled to the process or reused in the cooling towers. Excess water would be discharged under the Project LIBERTY National Pollutant Discharge Elimination System (NPDES) permit.

The mineral syrup from the evaporator would be either disposed off-site at a licensed landfill or beneficially reused as a soil amendment. POET would evaluate the mineral syrup disposal and may install a dryer to further reduce the moisture content of the syrup. This option would only be exercised if technically and economically feasible.

A total of approximately 200,000 tons of the AnMBR sludge and mineral syrup would be generated annually.

2.2.7 Solid Fuel Boiler

Original Solid Fuel Boiler

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.

Modified Solid Fuel Boiler

Under the modified Project LIBERTY, the solid fuel boiler system described in the 2008 EA would not be constructed.

Instead of the steam that would have been generated by the solid fuel boiler, biogas from the AnMBR system would be used in Project LIBERTY for fuel combustion uses. Biogas would also replace approximately 30% of the natural gas used at the Existing Plant.

2.2.8 Supporting Infrastructure

Original 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#3) to supply process water. Potable water would be provided by the Emmetsburg Municipal Utilities District (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.

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.

Modified Supporting Infrastructure

Project LIBERTY would require supporting infrastructure including process water, potable water, electricity, natural gas, cooling water discharge systems and sanitary wastewater treatment systems. The figure showing the location of the water discharge pipeline in the 2008 EA was incorrect. The attached Figure 3, Water Discharge Pipeline Route, shows the correct location of the water discharge pipeline.

In the event that the boiler or other combustion sources are not in operation, the biogas from the AnMBR system would be vented to a flare. The electric substation, septic system, production water well #3, and non-contact water discharge would still be required.

2.2.9 Start up, Shutdown, Maintenance, and Emergency Conditions

Original Start-up, Shutdown, Maintenance, and Emergency Conditions

SOPs would be developed for each operating system and the associated pollution control systems. The SOPs for the biomass 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 digesters.

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.

Modified Start-up, Shutdown, Maintenance, and Emergency Conditions

SOPs would be developed for each operating system and the associated pollution control systems. The SOPs for the biomass 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 AnMBR system; and
- The aerobic digester and evaporator system.

Spent lignocellulose from Project LIBERTY would be dewatered in a filter press or similar equipment and the solids either sent to a licensed landfill or beneficially reused as a soil amendment.

2.2.10 Construction Staffing

Original Construction Staffing

At the peak of construction, POET D&C would employ six people on-site full time. The subcontractor 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.

Modified Construction Staffing

At the peak of construction, POET D&C would employ six people on-site full time. The subcontractor labor force would be approximately 100-200. 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.

2.2.11 Roads and Facility Access

Original 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.

Modified Roads and Facility Access

POET D&C will not pave the new or existing roads as part of Project LIBERTY.

2.2.12 Major Buildings and Structures

Original 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 2-1 Original Summary of Project LIBERTY Structures

Structure	Description	Structure Size
Biomass Unloading Building	Equipment for unloading biomass, moving biomass to and from storage, and pollution control equipment	17,000 square feet ($ft^{2)}$
Biomass Storage	Structures for long-term biomass 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

Structure	Description	Structure Size
		Cellulose: 5,000 ft^2

Modified Major Buildings and Structures

Neither the Corn Fractionation Building nor solid fuel boiler unit operation will be built. Two additional ethanol storage tanks with volumes of 180,000 and 250,000 gallons, would be added. An AnMBR system would also be added, as depicted in Figure 1, General Layout Drawing.

Table 2-2 Modified Summary of Project LIBERTY Structures

Structure	Description	Approximate Structure Size
Biomass Unloading Building	Equipment for unloading biomass, moving biomass to and from storage, and pollution control equipment	75,000 square feet (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	6,000 ft^2
Process Tanks	Pretreatment, Fermentation and Yeast Tanks	Total Area ~52,500 ft^2, maximum height ~55 feet
Ethanol Storage Tanks	190 Proof Ethanol Product Tank 200 Proof Ethanol Product Tank	180,000 gallons 250,000 gallons
Cooling Tower	Structure to cool water by evaporation	8,000 ft^2
Anaerobic Digestion Process Building	Equipment for processing lignocellulose waste streams, lab	12,000 ft^2
AnMBR System	Tanks and associated equipment for generating biogas from spent biomass plus sludge storage	~200' diameter x ~32 'tall each
Biogas Surge Tank	Surge tank for biogas generated in the anaerobic digester	20' diameter x 20' tall
Dewatering Building	Equipment for dewatering lignocellulose sludge	4,000 ft^2
Biogas Process Building	Equipment for cleaning biogas	2,400 ft^2
Sulfur Storage Building/Pad	Storage for elemental sulfur	3,750 ft^2
Thermal Oxidizer	Pollution control equipment	7,500 ft^2

2.2.13 Construction Schedule

Original 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 2-3 Original Proposed Construction Schedule

Unit Operations	Start Date	Finish Date
Corn Fiber Feedstock	Third Quarter 2010	Third Quarter 2011
Biomass 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

Modified Construction Schedule

The order of construction has not been modified from the original construction schedule. However, the start date has been delayed approximately one year. The Modified Proposed Construction Schedule is as follows:

Table 2-4 Modified Proposed Construction Schedule

Unit Operations	Start Date	Finish Date
Biomass Feedstock Collection	Third Quarter 2011	First Quarter 2013
Biogas Production & Process Water Recycle	Second Quarter 2012	First Quarter 2013
Lignocellulosic Ethanol	First Quarter 2012	First Quarter 2013

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

2.3 Operations

2.3.1 Material Balance and Logistics

Original 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 if it were built per the 2008 EA. Additional details were presented in the 2008 EA.

Table 2-5 Original 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 Biomass 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

Input Description	Conventional Plant With Starch Expansion	LIBERTY	Cumulative
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
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 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

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 months 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.

Modified Material Balance and Logistics

Table 2-6 summarizes the resources and products that Project LIBERTY would require for the production of 25 MMgal/year of denatured lignocellulosic ethanol after modifications since the 2008 EA are considered. These changes include:

- The starch expansion would not be built.
- Corn fractionation capabilities would not be built and fiber from this the fractionation would not be used as a feedstock.
- The proposed solid fuels boiler will not be built, and as a result, boiler ash from the solid fuels will not be created.
- Natural gas will be replaced by biogas from the AnMBR system for Project LIBERTY fuel needs and approximately 30% of the Existing Plant needs.
- Solids listed as solid fuels for the solid fuel burner will be put to a beneficial use or disposed of at a landfill.

Additional details are presented below the table.

Table 2-6 Modified Summary of Project LIBERTY Material Balance

Input Description	**Conventional Plant**	**LIBERTY**	**Cumulative**
Corn	18 MMBu/year	0 Bu/year	18 MMBu/year
Corn Biomass	0 tons/year	0.32 million tons/year	0.32 million tons/year
Process Water	0.5 MMgal/day	0.44 MMgal/day	0.94 MMgal/day
Potable Water	1,600 gal/day	1,200 gpd	2,800 gpd
Fermentation Enzyme	1.3 tons/day	23 tons/day	24.3 tons/day
Ethanologen (yeast)	3,700 lbs/week	6,000 lbs/week	9,700 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)	2.6 MMgal/year	1.2 MMgal/year	3.8 MMgal/year
Process Chemicals (Acids, bases, detergents, etc.)	28,000 gallons/week	16,000 gallons/week	44,000 gallons/week
Natural gas usage	6,900 MMBtu/Day	0 Btu/day	6,900 MMBtu/day
Electricity	8.5 MWh/hour	10 MWh/hour	18.5 MWh/hour
Output Description	**Conventional Plant**	**Facility Products**	**Cumulative**
Ethanol @ 5% Denaturant	55 MMgal/year	25 MMgal/year	80 MMgal/year
DDGS	0.15 million tons/year	0 tons/year	0.15 million tons/year
Wet Cake/ Syrup	275 tons/week	0 tons/year	275 tons/week
Waste Material Description	**Conventional Plant**	**Annual Production**	**Cumulative**
Water discharge	0.12 MMgal/day	0.13 MMgal/day	0.25 MMgal/day
Non-hazardous solid waste	25 tons/week	25 tons/week	50 tons/week
Non-hazardous AnMBR sludge and mineral Syrup	0 tons/day	550 wet tons/day	550 wet tons/day
Sulfur	0 tons/week	8 tons/day	8 tons/day
Bale wrap	0 tons/week	4 tons/day	4 tons/day

Input Description	Conventional Plant	LIBERTY	Cumulative
Air Potential Emissions			
PM	68.6 tons/year	84.1 tons/year	152.7 tons/year
PM_{10}	54.4 tons/year	48.8 tons/year	103.2 tons/year
NO_x	93.5 tons/year	87.3 tons/year	180.8 tons/year
CO	92.0 tons/year	155.3 tons/year	247.3 tons/year
VOCs	98.9 tons/year	45 tons/year	143.9 tons/year
SO_2	2.2 tons/year	26.7 tons/year	28.9 tons/year
Input Description	**Conventional Plant**	**LIBERTY**	**Cumulative**
GHGs			
CO_2 Biogenic CO_2 Anthropogenic CO_2	 207,000 tons/year 125,000 tons/year	 140,400 tons/year 0 tons/year	 347,000 tons/year 125,000 tons/year
Methane	20 tons/year	7 tons/year	27 tons/year
Nitrous Oxide	0.3 tons/year	0.1 tons/year	0.4 tons/year

Biomass bales would be delivered by truck and unloaded in a new unloading building or into the storage area. On average, about 62 trucks per day of bales would be required for continuous operation. Normal operations would be to receive about 108 trucks of bales per day, five days per week. This would allow for normal operations plus about 25% extra to build a reserve. During the fall and early winter, additional biomass bale deliveries would be accepted to build a stockpile. Up to 200 bale trucks per day could be unloaded between the biomass receiving building and the outside storage areas. Bales in excess of daily requirements delivered during the majority of the year would be directed to the storage area.

Bale wrap would be generated at a rate of approximately 4 tons per day. POET evaluated potential recycling options in 2010, however, none have proven to be technically or economically feasible to date due to the admixture of biomass. Therefore, the bale wrap would be shipped off-site to a licensed landfill for disposal.

The digester would produce a biogas at a rate sufficient to replace approximately 30% of the natural gas at the Existing Plant and supply Project LIBERTY. 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 or disposed of in a licensed landfill. Elemental sulfur would be produced at a rate of approximately 8 tons per day.

2.3.2 Permits, Approvals, and Plans

The types of environmental permits, approvals, and plan revisions for construction and operation required for the modified Project LIBERTY would not be changed by the modifications made since the 2008 EA. An air permit was issued by the IDNR for Project LIBERTY as described in this SA.

2.3.3 Operational Workforce

Original 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.

Modified Operational Workforce

Operating the new cellulosic ethanol facility will require approximately 40 new jobs. Local opportunities for about 65 new jobs are estimated for third party biomass supply logistics and biomass harvest equipment support. In addition, there will be many new opportunities for part-time, seasonal farm laborers. Finally, hundreds of jobs will be created and/or preserved by the agriculture equipment companies to manufacture

biomass harvest systems. The surrounding area has sufficient population and skilled personnel to hire the necessary people from existing local resources.

3.0 Potential Environmental Impacts of the Modified Proposed Action

3.1 Air Quality

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 enforcing a 10 mile per hour speed limit and by maintaining the roads as needed. Fugitive dust would also be generated from the biomass 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.

Table 3-1 summarizes the potential to emit from the Project LIBERTY sources.

Table 3-1 Summary of Project LIBERTY Potential to Emit

Input Description	Existing Plant	LIBERTY	Cumulative
PM	68.6 tons/year	84.1 tons/year	152.7 tons/year
PM_{10}	54.4 tons/year	48.8 tons/year	103.2 tons/year
NO_x	93.5 tons/year	87.3 tons/year	180.8 tons/year
CO	92.0 tons/year	155.3 tons/year	247.3 tons/year
VOCs	98.9 tons/year	45 tons/year	143.9 tons/year
SO_2	2.2 tons/year	26.7 tons/year	28.9 tons/year

The USEPA has established and the IDNR has adopted the National Ambient Air Quality Standards (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).

As part of the permitting process, the IDNR requires that an ambient air quality modeling analysis be completed. The modeling analysis was completed and submitted with the air permit application. The analysis shows that the Project LIBERTY and the Existing Plant would not cause or contribute to an exceedance of the Primary or Secondary NAAQS. Table 3-2 summarizes the results of the modeling analysis.

Table 3-2 Summary of Modeling Analysis for the Combined Biorefinery

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)	Modeled Maximum Impact ($\mu g/m^3$)	Background ($\mu g/m^3$)	Background + Modeled ($\mu g/m^3$)	Percent of NAAQS (%)	Compliant
PM10	24-Hour	150	81.4	45	126.4	84%	Yes
PM10	Annual	50	13.1	22	35.1	70%	Yes
SO2	3-Hour	1300	96.7	20	116.7	9%	Yes
SO2	24-Hour	365	29.4	20	49.4	14%	Yes
SO2	Annual	80	3.2	20	23.2	29%	Yes
NOX	Annual	100	21.8	11	32.8	33%	Yes
CO	1-Hour	40000	2056.3	0	2056.3	5%	Yes
CO	8-Hour	10000	682.9	0	682.9	7%	Yes

The IDNR requires new facilities that would have significant air emissions to acquire an air construction permit prior to beginning construction. The air permits for the modified Project LIBERTY have been issued by the IDNR.

3.1.1 Greenhouse Gases

Direct (Point Source) GHG Emissions

The Project LIBERTY and the Existing Plant would generate GHG primarily from the fuel combustion equipment and the fermentation process. The AnMBR system would provide sufficient biogas to supply the Project LIBERTY boilers and RTO and replace approximately 30% of the natural gas used by the Existing Plant. Thus, the CO_2, methane, and nitrous oxide (NO) from Project LIBERTY and a portion of the Existing Plant would be biogenic instead of anthropogenic. Table 3-3 summarizes the potential emissions of GHGs from the Project LIBERTY and the Existing Plant.

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)	Biogas Combustion (Biogenic)	Fermentation (Biogenic)	Total
CO_2	125,000 tons/year	117,000 tons/year	230,000 tons/year	472,000 tons/year
Methane	14 tons/year	13 tons/year	0 tons/year	27 tons/year
NO	0.2 tons/year	0.2 tons/year	0 tons/year	0.4 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 shut-down conditions.

Life Cycle GHG Analysis

All of the fuel inputs for Project LIBERTY, except minimal amounts of natural gas for cold startup use, would come from the biogas system. As such, the GHG emissions from the Project LIBERTY 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 conversion of a portion of the Existing Plant to biogas combustion would offset 53,500 tons/year of potential anthropogenic CO_2 emissions from natural gas combustion.

The 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 used the Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) model developed by Argonne National Laboratories which 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 fuel equivalent CO_2 emissions from Project LIBERTY would be 148,964 tons/year (86% x 173,214 tons/year). With the additional offset from biogas conversion of the Existing Plant fuel combustion sources, the total CO_2 reduction would be up to 227,000 tons/year.

3.1.2 Conclusion Regarding Air Quality

The potential emissions of criteria pollutants and HAPs from the Existing Plant, the Starch Expansion, and the Project LIBERTY identified in the original EA where greater than those proposed for the revised project described herein. Additionally, the changes to the project profile have increased the total lifecycle CO_2 reduction by approximately 121,000 tons per year.

Thus, the potential impacts from the revised project would be less than originally discussed in the existing EA. The existing EA adequately evaluated the potential impacts to air quality.

3.2 Waste Management and Hazardous Materials

The hazardous waste and the non-hazardous waste generation (other than biosolids) will not change from those described in the September 2008 EA. The cancellation of the Starch Expansion will reduce the amount of non-hazardous solid waste associated with the No Action Alternate generated by approximately 25 tons/week.

The modified Project LIBERTY would produce approximately 550 tons per day (200,000 tons per year) of solid waste in the form of spent biosolids from the AnMBR digesters and mineral syrup from the aerobic digester evaporator system. This represents an increase from the 320 tons per day (approximately 112,000 tons annually) of biosolids described in the 2008 EA.

The sulfur produced by the modified Project LIBERTY would not be altered from the 2008 EA, and could be used as described there. The modified Project LIBERTY would not produce the 16 tons per day of boiler ash described in the 2008 EA.

The options for disposal of the biosolids in the 2008 EA were:

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 modified options for disposal of the biosolids would be:

1. Land application as a soil amendment; or
2. Disposal as a solid waste in a local landfill.

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 general facility trash, AnMBR biosolids and mineral syrup, netwrap, and sulfur. POET has met with both landfills and shared information about the type and quantity of material that will be generated. A Memorandum of Understanding (MOU) has been established with both landfills. In each MOU, POET and the landfills have agreed to work together to work toward a contract for the disposal of waste generated by Project LIBERTY.

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. The landfill is currently receiving 150 to 160 tons/day. The capacity of the Northern Plains Regional landfill has a current available capacity of approximately 6.2 million tons.

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 the landfill has a current capacity of 4.5 million tons.

Thus, the combined capacity of the two landfills that have agreed to take solid waste from POET is approximately 10.7 million tons. Combined current disposal rate for the two landfills is approximately 120,000 tons per year. With the estimated total non-hazardous solid waste from the modified Project LIBERTY of approximately 200,000 tons per year (565 tons per day*350 days), the combined amount of waste being landfilled at both facilities would be approximately 320,000 tons per year. Therefore, under worst case conditions where all of the non-hazardous general trash, biosolids, minerals, and sulfur have to be landfilled, local landfills have the capacity to accept the additional waste generated by Project LIBERTY for approximately 33 years without expansion.

However, POET has collected data on the probable chemical and physical properties of the biosolids at their Research and Development facility in South Dakota. POET has provided this data to an agronomist who has determined that the biosolids are a candidate for land application through an Iowa DNR permit. POET has communicated with the Iowa DNR and is pursuing the land application of the biosolids. This will divert approximately 175,000 tons per year (500 tons/day, 350 days per year)from the landfill and is expected to be fully implemented beginning in the third year after startup . With land application of biosolids, the combined amount of non-hazardous waste being landfilled from POET at both facilities would be approximately 23,000 tons per year (65 tons/day, 350 days per year) in year three of operation and beyond.

3.2.1 Conclusion Regarding Waste Management

The analysis in the existing EA determined that life expectancy of the local landfills have the capacity to accept the additional waste generated by Project LIBERTY for at least 35 years.

Based on the current waste generation rate information, under worst case conditions, the local landfills have the capacity to accept the additional waste generated by Project LIBERTY for approximately 33 years without expansion. However, it is likely that beneficial reuse of the biosolids will be applicable to approximately 80% of Project Liberty non-hazardous solid waste thus extending the local landfill life expectancy to greater than 35 years. The option for beneficial reuse through land application was considered in the existing EA.

Therefore, the existing EA adequately evaluated the potential impacts due to waste management.

3.3 Hazard Review, Accident and Risk Analysis

The Existing Plant has replaced their Integrated Contingency Plan (ICP) with a separate Spill Prevention, Control, and Countermeasure (SPCC) plan and Storm Water Pollution Prevention Plan (SWPPP). The SPCC and SWPPP for the Existing Plant are sufficient for the current operations.

The SPCC, SWPPP and associated release analyses for the Existing Plant would need to be updated to include Project LIBERTY. However, this is the same scope of work, contained in two documents instead of one ICP, which was described in the 2008 EA.

3.3.1 Conclusion Regarding Hazard Review, Accident and Risk Analysis

The proposed use of two documents, a SPCC and a SWPPP instead of an ICP does not increase the potential impact to the environment from the revised Project LIBERTY. Therefore, the existing EA adequately evaluated the potential impacts from the revised Project LIBERTY hazardous material storage.

3.4 Infrastructure

The process water production well and supplemental natural gas supply, associated pipeline and wetland impacts described in the 2008 EA required for the Starch Expansion will not be constructed.

The environmental consequences of the modified Project LIBERTY would be as described in the 2008 EA, namely:

- Project LIBERTY would require approximately 85,000 Mw-hours of electric power for process operation. Start-up, shut-down, 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; and
- POET D&C will install a production well (PW#3) to supplement the existing groundwater supply. PW#3 would 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 3.6.3.1 of the 2008 EA.

POET D&C will not pave the new or existing roads as part of Project LIBERTY. POET would utilize Best Management Practices (BMPs) as described in the revised SWPPP for the Existing Plant and Project LIBERTY discussed further in Section 3.4.2 to control sediment entrainment in stormwater. POET completed an ambient air quality analysis as part of the air permit application. The model, which was reviewed and approved by the IDNR, showed that the use of on-site gravel surface roads would not cause or contribute to a potential exceedance of the NAAQS.

3.4.1 Conclusion Regarding Infrastructure

The revised Project LIBERTY would have fewer impacts related to infrastructure. Therefore, the existing EA adequately evaluated the potential impacts from revised Project LIBERTY infrastructure.

3.5 Aesthetics

The affected environment for the Existing Plant has not been modified from that described in the 2008 EA. The building and structures associated with the Starch Expansion will not be constructed.

Project LIBERTY has constructed an outdoor biomass stackyard that covers approximately 22 acres. Round or square bales of biomass would be stored in the stackyard. Storage of round and/or square bales of hay is common in rural farm areas. The size of the stackyard would be larger than most locations but not inconsistent with stackpiles located at feed lots or alfalfa pelletizing operations.

3.5.1 Conclusion Regarding Aesthetics

Due to the similarity in use, buildings and structures, no significant change in appearance would occur as a result of Project LIBERTY. Therefore, the existing EA adequately evaluated the potential impacts from revised Project LIBERTY aesthetics.

3.6 Traffic

Traffic projected to occur due to construction and operation of the Starch Expansion will not occur. A maximum of approximately 150 cars per day and an average of 80 cars per day were expected to be associated with construction staff. The average number of grain trucks arriving at the facility was expected to double to approximately 160 per day. However, peak receiving was expected to remain steady at approximately 280 per day because POET D&C was not planning to change the grain receiving system or the grain storage capacity of the facility.

Shipping of ethanol by truck was expected to increase from approximately 4 per week to approximately 5 per day due to the addition of E-85 blending capacity. Shipment of DDGS and wet cake by truck was expected to increase from approximately 8 trucks per day to approximately 12 per day. These increases in traffic will not occur due to the cancellation of the Starch Expansion.

The subcontractor labor force for Project LIBERTY would average between 100 and 200 employees. Truck delivery schedules and numbers are expected to be up to 6 steel trucks a day 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.

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.

Project LIBERTY would require a maximum of 200 trucks per day to deliver biomass bales during operations. The maximum delivery periods are expected to be in the fall and early winter. In addition, approximately 6 trucks per day would be used to bring fermentation enzymes and process chemicals to the facility. Shipment of biosolids from the AnMBR system and mineral syrup could reach a maximum of approximately 50 trucks per day. Therefore, the total maximum additional truck traffic from Project LIBERTY could reach 250 trucks per day and the total number of trucks arriving at the Project LIBERTY and Existing Plant could reach 450 per day.

3.6.1 Conclusion Regarding Traffic

With the cancellation of the Starch Expansion, the annual average number of trucks would be less than for the revised Project LIBERTY. Daily maximum number of trucks would be essentially the same. Therefore, the existing EA adequately evaluated the potential traffic impacts from revised Project LIBERTY.

3.7 The Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

Council on Environmental Quality regulations require consideration of “the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16).

Construction and operation of the facility would require short-term uses of land and other resources. Short-term use of the environment, as used here, is that used during the life of the project (estimated at 40 years), whereas long-term productivity refers to the period of time after the project has been decommissioned, the equipment removed, and the land reclaimed and stabilized. The short-term use of the project site for the

proposed facility would not affect the long-term productivity of the area. If it is decided at some time in the future that the project has reached its useful life, the facility and foundations could be decommissioned and removed, and the site reclaimed and re-vegetated to resemble a similar habitat to the pre-disturbance conditions.

The local and regional land use has been dedicated to agricultural use for over 100 years. The short term use of biomass for production of liquid fuels would not affect the local or regional land use. Studies completed by the University of Iowa have determined that short term removal of biomass from the agricultural lands for Project LIBERTY would not impact long term agricultural productivity.

Project LIBERTY would require use of approximately 440,000 gallons of water per day. This water would be extracted from existing water wells owned and operated by POET plus one additional water well to be installed on-site for Project LIBERTY. The existing aquifer is capable of providing the required amount of water without impacting the neighboring residents or businesses.

3.7.1 Conclusion Regarding the Relationship Between Local Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity

The potential impacts of the revised Project LIBERTY on the environment are less than or equal to described in the existing EA. Therefore, the existing EA adequately evaluated the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

3.8 Irreversible and Irretrievable Commitments of Resources

The proposed project would not cause an irretrievable commitment of land required for construction and operation of the new facility. The facility and foundations could be decommissioned and removed, and the site reclaimed and re-vegetated to resemble a similar habitat to the pre-disturbance conditions.

There would be an irreversible commitment of energy and construction materials used to construct the facility and utility lines. DOE would also have expended the finances associated with the funding for the proposed project.

The biomass is currently being produced and would continue to be produced on farms around Project LIBERTY. The difference would be the harvest and transport of the biomass. Thus, the proposed project will not result in an irreversible or irretrievable commitment of biomass resources.

Project Liberty would require use of approximately 85,000 MWH of electricity for process operations. Since approximately 70% of the power production in Iowa is from non-renewable resources, the fuel used to produce the majority of the electric power for the Project LIBERTY would be irretrievable.

Approximately 300 gpm (0.44 mgd) of water from the process and cooling towers would be evaporated into the atmosphere or discharged to a local ditch. The evaporated water would eventually condense and return to the earth in the form of rainfall. However, this would not occur in the immediate area of Emmetsburg. The discharged water would ultimately go to the Des Moines River, not recharge the local aquifer. Therefore, this would be an irretrievable use of the resource.

3.8.1 Conclusion Regarding the Irreversible and Irretrievable Commitments of Resources

The potential impacts of the revised Project LIBERTY on the environment are less than or equal to described in the existing EA. Therefore, the existing EA adequately evaluated irreversible and irretrievable commitments of resources.

3.9 Unavoidable Adverse Impacts

Construction and operation of the proposed facility would cause unavoidable emissions of some criteria air pollutants. However, air pollutant concentrations would not exceed significance thresholds established by the USEPA and IDNR. Short-term adverse impacts from noise generated during the construction of the proposed facility would occur; however, activities would comply with all local noise ordinances. The need for construction materials, such as steel and concrete would be unavoidable, but would represent a small fraction of available materials. Traffic increases would occur on the local roads. The proposed mitigation presented in the mitigation action plan would be implemented to address adverse impacts.

3.9.1 Conclusion Regarding Unavoidable Adverse Impacts

The potential impacts of the revised Project LIBERTY on the environment are less than or equal to described in the existing EA. Therefore, the existing EA adequately evaluated unavoidable adverse impacts.

3.10 EA Study Elements Not Affected by the Project LIBERTY Modifications

The following study areas were not affected by the modifications to the Project LIBERTY.

Table 3-4 List of Study Areas Not Affected by the Project LIBERTY Modifications

Study Area	Study Area
Health and Safety Hazards	Surface Water
Meteorology	Storm Water
Odor	Hazardous Materials Storage and Handling
Geology and Soils	Cultural Resources
Biological Resources	Land Use
Groundwater	Noise
Socioeconomics and Environmental Justice	

4.0 Conclusions and Determination

The potential impacts and environmental risks of the Modified Proposed Action were evaluated as discussed in the SA Sections above, and were similar to those identified for the Proposed Action. Based on the comparisons above, the following conclusions can be drawn:

- The Modified Proposed Action has been evaluated as compared to the Proposed Action and No Action alternative considered in DOE/EA-1628.

- The potential environmental impacts from the Modified Proposed Action are within the range of environmental impacts presented in DOE/EA-1628 for the Proposed Action and No Action alternative.

Determination:

The Department has determined that the Modified Proposed Action would not constitute a substantial change in actions previously analyzed and would not present any new circumstances or information relevant to the environmental concerns and bearing on the previously analyzed actions or impacts, within the meaning of 40 CFR 1502.9(c) and 10 CFR 1021.314. Accordingly, the Department has determined that a supplement to the EA is not required.

5.0 References

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6.0 Acronyms, Abbreviations, and Terms

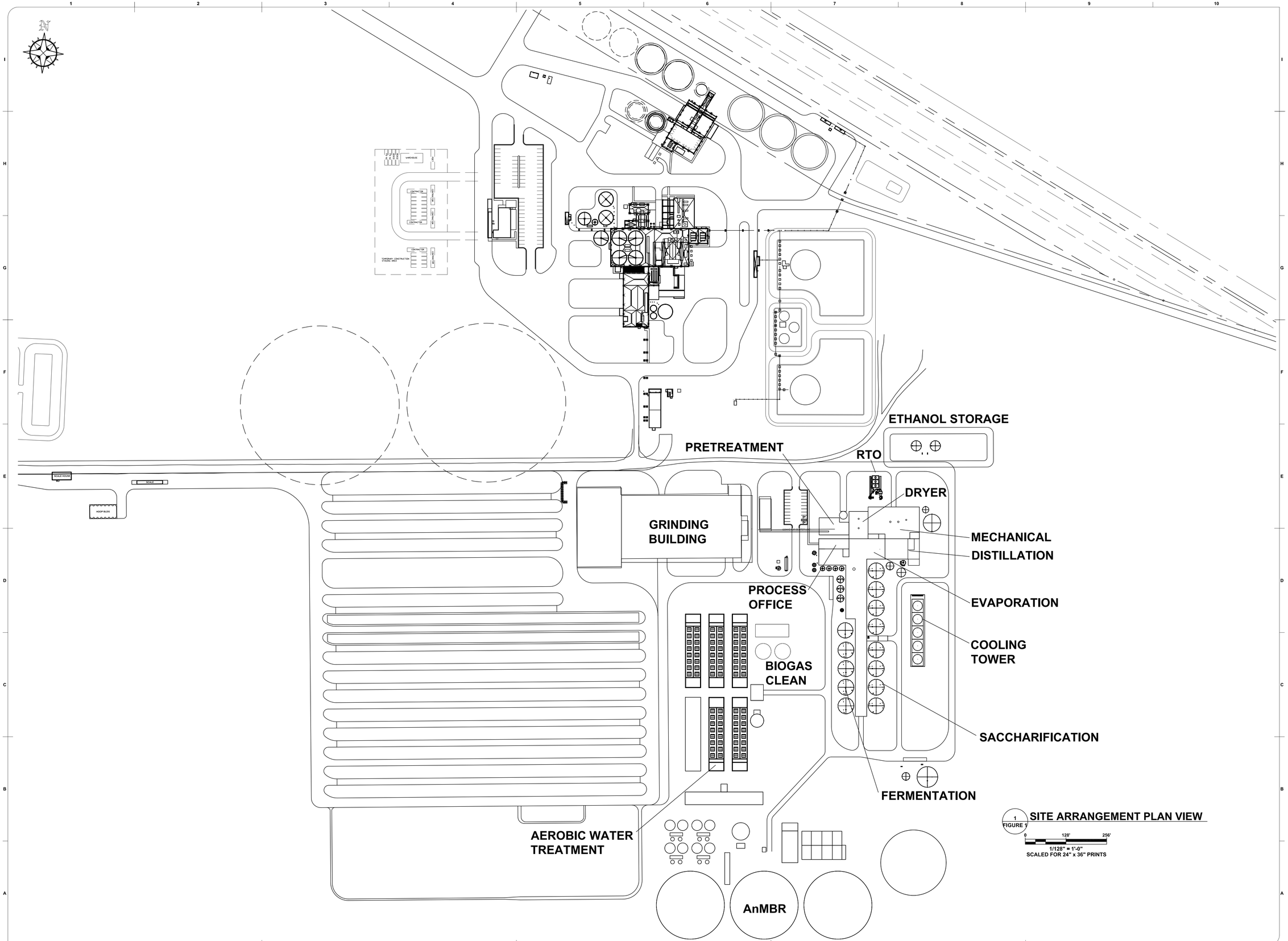
°F	Degrees Fahrenheit
µg/m^3	microgram per cubic meter
AGP	Ag Processing, Inc.
AnMBR	Anaerobic membrane bioreactor
AST(s)	Above Ground Storage Tank(s)
BMPs	Best Management Practices
biomass	corn cobs, husks and high-cut material from the corn plant
BDT	Bone Dry Ton
bu/yr	Bushels per Year
CCM	Corn Cob Mix
CFR	Code of Federal Regulations
Cfs	Cubic Feet per Second
CO	Carbon Monoxide
CO_2	Carbon Dioxide
Combined Biorefinery	The combination of the Existing Plant and Project LIBERTY
DDGS	Dried Distillers Grains with Solubles
District	Emmetsburg Municipal Utilities District
DOE	U.S. Department of Energy
EA	Environmental Assessment
EPAct 2005	Energy Policy Act
Existing Plant	The Emmetsburg existing corn-to-ethanol production plant
ft^2	Square Feet
FERC	Federal Energy Regulatory Commission
FOA	Funding Opportunity Announcement
G	Gravity
GHG	Greenhouse Gas
Gpd	gallons per day
Gpm	Gallons per Minute
GRAS	Generally Recognized as Safe
HAP(s)	Hazardous Air Pollutant(s)
ICP	Integrated Contingency Plan
ID	Identification
Inc.	Incorporated

Kw	Kilowatt
lbs	Pounds
LLC	Limited Liability Corporation
MOU	Memorandum of Understanding
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
$NaSO_4$	Sodium Sulfate
NGA	Natural Gas Act
NEPA	National Environmental Policy Act
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
NWI	National Wetland Inventory
OSHA	Occupational Safety and Health Administration
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
SA	Supplement Analysis
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
TK	Tank
Trona	Soda Ash
$\mu g/m^3$	Microgram per Cubic Meter
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WET	Whole Effluent Toxicity

Appendix A

Project LIBERTY
Supplement Analysis Figures



1 SITE ARRANGEMENT PLAN VIEW
FIGURE 1

0 128' 256'

1/128" = 1'-0"
SCALED FOR 24" x 36" PRINTS

POET design & construction
4615 N. Lewis Avenue
Sioux Falls, SD 57104
P/ 605.965.3575
F/ 605.965.2303
poet.com

REV.	DATE	DESCRIPTION	BY
2	07-21-11	UPDATED LAYOUT	DLO
1	06-14-11	UPDATED LAYOUT	AMS

Project Information:
PROJECT LIBERTY
EMMETSBURG, IA

Project: LIB
Date: 11-01-10
Drawn By: AMS
Checked By:

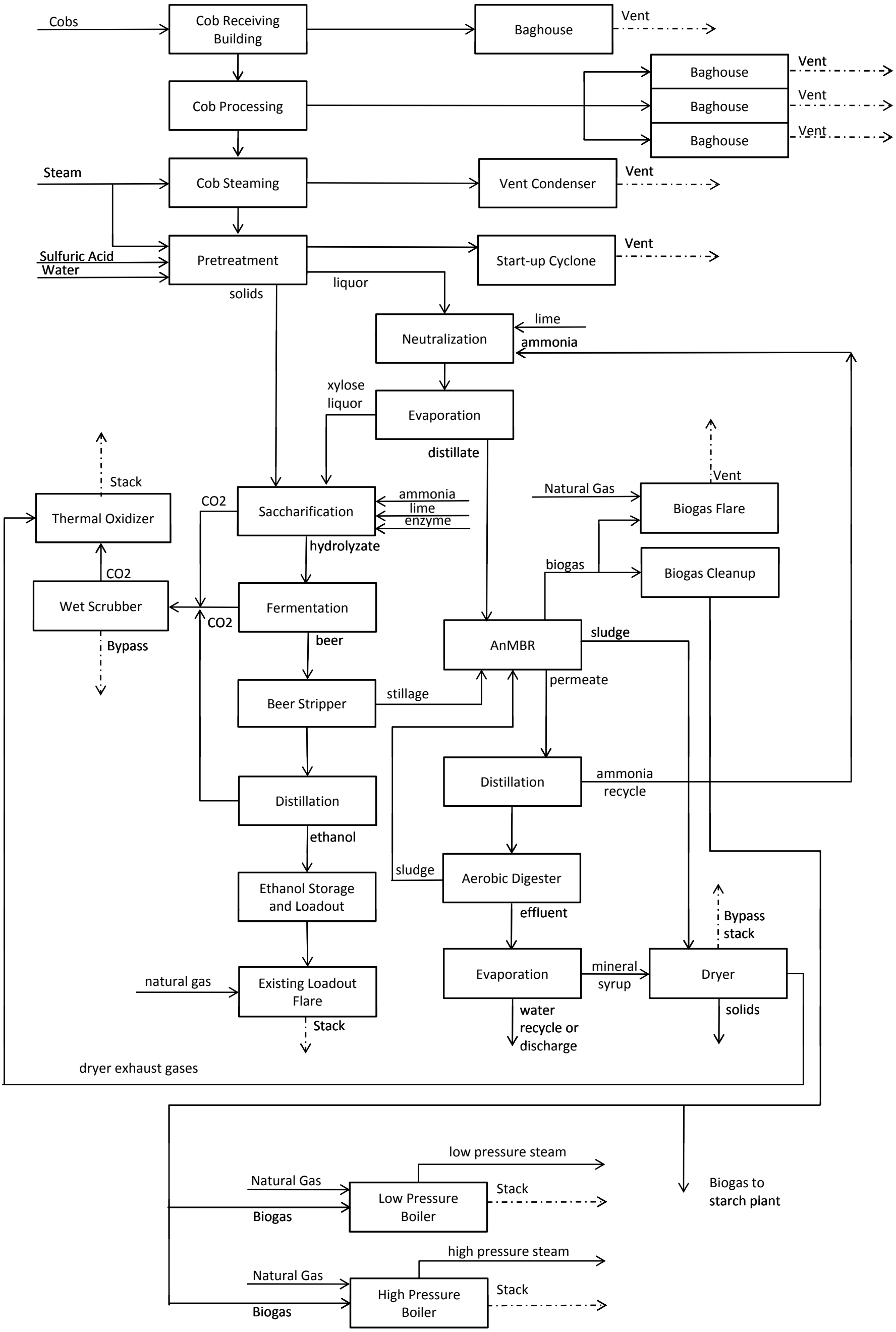
Sheet Title:
GENERAL LAYOUT DRAWING
OVERALL PLAN VIEW

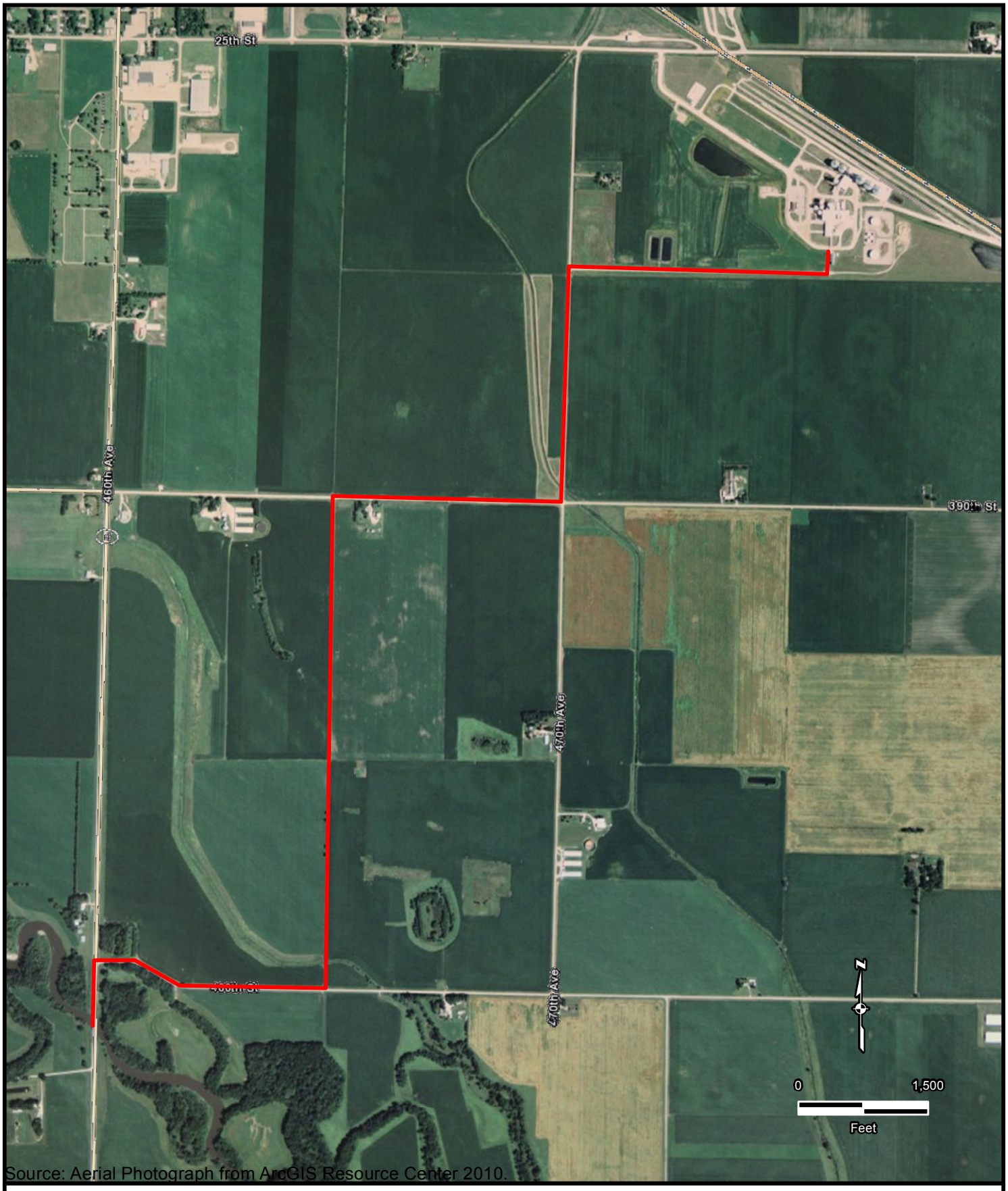
FIGURE 1

Plot Date: August 3, 2011 Plot Time: 7:18:29 AM File Name: X:\Biorefineries\LIB - Liberty_Models\LIB-00 General Site Layout.dwg Layout: FIGURE 1 By: Stiff, Antje

Figure 2

POET Project LIBERTY
Process Block Flow Diagram
6/24/2011





Source: Aerial Photograph from ArcGIS Resource Center 2010.

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WATER DISCHARGE PIPELINE ROUTE POET PROJECT LIBERTY EMMETSBURG, IA

Drawn:	KLM	6/24/2011
Approved:	CW	6/24/2011
Scale:	1" = 1500'	
PROJECT NUMBER	60217412	
FIGURE NUMBER	3	