Statement of Basis

Permit to Construct No. P-2017.0035
Project ID 61903

Southfield Dairy Biorefinery
Wendell, Idaho

Facility ID 047-00039

Final

November 17, 2017
Tom Burnham
Permit Writer

The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.et seq, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

AAC	acceptable ambient concentrations
AACC	acceptable ambient concentrations for carcinogens
acfm	actual cubic feet per minute
ASTM	American Society for Testing and Materials
BMP	best management practices
Btu	British thermal units
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CAS No.	Chemical Abstracts Service registry number
CEMS	continuous emission monitoring systems
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CI	compression ignition
CMS	continuous monitoring systems
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent emissions
COMS	continuous opacity monitoring systems
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	screening emission levels
EPA	U.S. Environmental Protection Agency
FEC	Facility Emissions Cap
GHG	greenhouse gases
gr	grains (1 lb = 7,000 grains)
HAP	hazardous air pollutants
hp	horsepower
hr/yr	hours per consecutive 12 calendar month period
ICE	internal combustion engines
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometers
lb/hr	pounds per hour
m	meters
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
MMscf	million standard cubic feet
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
O&M	operation and maintenance
O_2	oxygen
OEM	original equipment manufacturer
PAH	polyaromatic hydrocarbons
PC	permit condition
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

POM	polycyclic organic matter
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
PW	process weight rate
RICE	reciprocating internal combustion engines
RNG	Renewable Natural Gas
Rules	*Rules for the Control of Air Pollution in Idaho*
scf	standard cubic feet
SIP	State Implementation Plan
SM	synthetic minor
SM80	synthetic minor facility with emissions greater than or equal to 80% of a major source threshold
SO_2	sulfur dioxide
SO_x	sulfur oxides
T/yr	tons per consecutive 12 calendar month period
TAP	toxic air pollutants
VOC	volatile organic compounds
$\mu g/m^3$	micrograms per cubic meter

FACILITY INFORMATION

Description

The Southfield Dairy BioRefinery is a Renewable Natural Gas (RNG) production facility 3.5 miles southwest of Wendell, Idaho in the "Magic Valley" of Gooding County. The facility will accept cow manure and other agricultural waste materials from surrounding agricultural operations and produce pipeline-quality RNG as well as beneficial solid and liquid byproducts. Facility equipment will include a series of biogas digesters, a biogas processing system, two natural gas-fired boilers, an emergency flare, and three reciprocating internal combustion engine (RICE) gensets.

Permitting History

This is the initial PTC for a new facility thus there is no permitting history.

Application Scope

This permit is the initial PTC for this facility.

The applicant has proposed to construct and operate a dairy and agricultural waste digester methane production facility.

Application Chronology

June 5, 2017	DEQ received an application.
June 9, 2017	DEQ received an application fee.
June 12 – June 27, 2017	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
June 22, 2017	DEQ determined that the application was incomplete.
July 5, 2017	DEQ received supplemental information from the applicant.
August 2, 2017	DEQ determined that the application was complete.
August 30, 2017	DEQ made available the draft permit and statement of basis for peer and regional office review.
September 29, 2017	DEQ made available the draft permit and statement of basis for applicant review.
November 14, 2017	DEQ received the permit processing fee.
November 17, 2017	DEQ issued the final permit and statement of basis.

TECHNICAL ANALYSIS

Emissions Units and Control Equipment

Table 1 EMISSIONS UNIT AND CONTROL EQUIPMENT INFORMATION

Source ID No.	Sources	Control Equipment	Emission Point ID No.
EU7A	Desulfurization: Manufacturer: DMT Clear Gas Solutions Model: SulfurexBR Capacity: 6300 scfm total for both units Exhaust: 125 scfm, < 5 ppm H_2S	None	Exhaust 7A: Exit flow rate: 125 scfm Exit temperature: 85-105 °F
EU7B	Desulfurization: Manufacturer: DMT Clear Gas Solutions Model: SulfurexBR Capacity: 6300 scfm total for both units Exhaust: 125 scfm, < 5 ppm H_2S	None	Exhaust 7B: Exit flow rate: 125 scfm Exit temperature: 85-105°F
EU8	Methane Separation: Manufacturer: DMT Clear Gas Solutions Model: CarbonexMS Capacity: 3,689 scfm produced biomethane gas Exhaust: 2,611 scfm	None	Exhaust 8: Exit flow rate: 2,611 scfm Exit temperature: 84°F (29 °C)
EU1	Plant Boiler 1 Manufacturer: Cleaver-Brooks Model: FLX700-800 Manufacture Date: 2017 Heat input rating: 6.39 MMBtu/hr Fuel: Natural Gas	None	Exhaust 1: Exit height: 46 ft (14 m) Exit diameter: 1.0 ft (0.30 m) Exit flow rate: 2734 scfm Exit temperature: 440°F (227 °C)
EU2	Plant Boiler 2 Manufacturer: Cleaver-Brooks Model: FLX700-800 Manufacture Date: 2017 Heat input rating: 6.39 MMBtu/hr Fuel: Natural Gas	None	Exhaust 2: Exit height: 46 ft (14 m) Exit diameter: 1.0 ft (0.30 m) Exit flow rate: 2734 scfm Exit temperature: 440°F (227 °C)
EU3	Generator Engine 1 Manufacturer: GE Model: JMS 420 GS-N.L Rating: 1,966 bhp at elevation Peak Load: 1429 kW at elevation Fuel: Natural Gas	Oxidation Catalyst: Exhaust Temperatures: 550° F, minimum, at inlet 1350° F, maximum, at outlet	Exhaust 3: Exit height: 46 ft (14 m) Exit diameter: 1.5 ft (0.5 m) Exit flow rate: 3,813 acfm Exit temperature: 248 °F (120 °C)
EU4	Generator Engine 2 Manufacturer: GE Model: JMS 420 GS-N.L Rating: 1,966 bhp at elevation Peak Load: 1429 kW at elevation Fuel: Natural Gas	Oxidation Catalyst: Exhaust Temperatures: 550° F, minimum, at inlet 1350° F, maximum, at outlet	Exhaust 4: Exit height: 46 ft (14 m) Exit diameter: 1.5 ft (0.5 m) Exit flow rate: 3,813 acfm Exit temperature: 248 °F (120 °C)
EU5	Generator Engine 3 Manufacturer: GE Model: JMS 420 GS-N.L Rating: 1,966 bhp at elevation Peak Load: 1429 kW at elevation Fuel: Natural Gas	Oxidation Catalyst: Exhaust Temperatures: 550° F, minimum, at inlet 1350° F, maximum, at outlet	Exhaust 5: Exit height: 46 ft (14 m) Exit diameter:1.5 ft (0.5 m) Exit flow rate: 3,813 acfm Exit temperature: 248 °F (120 °C)
EU6	Enclosed Safety Flare Manufacturer: ZEECO Model: BEF 13-50 Fuel: Raw and Off-spec gas	None	Exhaust 6: Exit height: 50 ft (15.24 m) Exit diameter: 13 ft (3.96 m) Exit flow rate: 253 scfm Exit temperature: 1400 °F (760 °C)

Emissions Inventories

Potential to Emit

IDAPA 58.01.01 defines Potential to Emit as the maximum capacity of a facility or stationary source to emit an air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the facility or source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is state or federally enforceable. Secondary emissions do not count in determining the potential to emit of a facility or stationary source.

Using this definition of Potential to Emit an emission inventory was developed for the boilers, engines, and flare operations at the methane production facility (see Appendix A) associated with this proposed project. Emissions estimates of criteria pollutant, GHG, HAP PTE were based on emission factors from AP-42, operation of 8,760 hours per year, and process information specific to the facility for this proposed project. The flare was included for an estimated 5% of the produced gas being off-spec requiring combustion through the flare plus the pilot running at all times, using AP-42 for natural gas. Emergency releases of flared raw gas were not included. By operational design, only two engines will be running at any given time, so only two running at all times were included in the PTE, and permit conditions assure this operation.

Uncontrolled Potential to Emit

Using the definition of Potential to Emit, uncontrolled Potential to Emit is then defined as the maximum capacity of a facility or stationary source to emit an air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the facility or source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored or processed, shall **not** be treated as part of its design **since** the limitation or the effect it would have on emissions **is not** state or federally enforceable.

The uncontrolled Potential to Emit is used to determine if a facility is a "Synthetic Minor" source of emissions. Synthetic Minor sources are facilities that have an uncontrolled Potential to Emit for regulated air pollutants or HAP above the applicable Major Source threshold without permit limits.

The following table presents the uncontrolled Potential to Emit for regulated air pollutants as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations and the assumptions used to determine emissions for each emissions unit. For this methane production operation uncontrolled Potential to Emit is based upon a worst-case for operation of the facility of 8760 hr/yr.

Table 2 UNCONTROLLED POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$	SO_2	NO_X	CO	VOC	CO_2e
	T/yr	T/yr	T/yr	T/yr	T/yr	T/yr
Biogas Processing Exhaust	0.00	0.00	0.00	0.00	0.00	77,457
Plant Boiler 1	0.350	0.022	1.20	1.24	0.543	3,684
Plant Boiler 2	0.350	0.022	1.20	1.24	0.543	3,684
Generator Engine 1	0.531	0.031	19.0	38.0	13.3	6,218
Generator Engine 2	0.531	0.031	19.0	38.0	13.3	6,218
Generator Engine 3	0.531	0.031	19.0	38.0	13.3	6,218
Safety Flare	0.006	0.0009	0.047	0.215	0.004	91
Total	**2.30**	**0.14**	**59.45**	**116.70**	**40.99**	**103570.00**

The following table presents the uncontrolled Potential to Emit for HAP pollutants as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations and the assumptions used to determine emissions for each emissions unit. For this methane production operation uncontrolled Potential to Emit is based upon a worst-case for operation of the facility of 8760 hr/yr. Then, the worst-case maximum HAP Potential to Emit was determined for this methane production operation.

Table 1 UNCONTROLLED POTENTIAL TO EMIT FOR HAZARDOUS AIR POLLUTANTS

Hazardous Air Pollutants	PTE (T/yr)
1,1-Dichloroethane	2.51E-03
1,1,2,2-Tetrachloroethane	4.25E-03
1,1,2-Trichloroethane	3.38E-03
1,2-Dichloroethane	2.51E-03
1,2-Dichloropropane	2.86E-03
1,3-Butadiene	2.84E-02
1,3-Dichloropropene	2.81E-03
1,4-Dichlorobenzene (para-)	7.33E-05
2,2,4-Trimethylpentane	2.66E-02
2-Methylnaphthalene	3.53E-03
3-Methylcholanthrene	1.10E-07
7,12-Dimethylbenz(a)anthracene	9.77E-07
Acenaphthene	1.33E-04
Acenaphthylene	5.88E-04
Acetaldehyde	8.89E-01
Acrolein	5.46E-01
Anthracene	1.47E-07
Arsenic	1.22E-05
Benzene	4.69E-02
Benzo(a)anthracene	1.10E-07
Benzo(a)pyrene	7.33E-08
Benzo(b)fluoranthene	1.78E-05
Benzo(e)pyrene	4.41E-05
Benzo(g,h,i)perylene	4.41E-05
Benzo(k)fluoranthene	1.10E-07
Beryllium	7.33E-07
Biphenyl	2.25E-02
Cadmium	6.71E-05
Carbon Tetrachloride	3.90E-03
Chlorobenzene	3.23E-03
Chloroethane	1.99E-04
Chloroform	3.03E-03
Chromium	8.55E-05
Chrysene	7.38E-05
Cobalt	5.13E-06
Dibenzo(a,h)anthracene	7.33E-08
Ethylbenzene	4.22E-03
Ethylene Dibromide	4.71E-03
Fluoranthene	1.18E-04
Fluorene	6.03E-04
Formaldehyde	5.62
Hexane	2.28E-01
Indenol(1,2,3-cd)pyrene	1.10E-07
Manganese	2.32E-05
Mercury	1.59E-05
Methanol	2.66E-01
Methylene Chloride	2.13E-03
Naphthalene	7.94E-03
Nickel	1.28E-04
Phenanthrene	1.11E-03
Phenol	2.55E-03
Pyrene	1.45E-04
Selenium	1.47E-06
Styrene	2.51E-03
Tetrachloroethane	2.64E-04
Toluene	4.36E-02
Vinyl Chloride	1.58E-03
Xylene	1.96E-02
Total	**7.79**

Pre-Project Potential to Emit

Pre-project Potential to Emit is used to establish the change in emissions at a facility as a result of this project.

This is a new facility. Therefore, pre-project emissions are set to zero for all criteria pollutants.

Post Project Potential to Emit

Post project Potential to Emit is used to establish the change in emissions at a facility and to determine the facility's classification as a result of this project. Post project Potential to Emit includes all permit limits resulting from this project.

The following table presents the post project Potential to Emit for criteria and GHG pollutants from all emissions units at the facility as determined by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 4 POST PROJECT POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$		SO_2		NO_X		CO		VOC		CO_2e
	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	lb/hr[a]	T/yr[b]	T/yr[b]
Biogas Processing Exhaust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	77,457
Plant Boiler 1	0.080	0.350	0.005	0.022	0.273	1.20	0.282	1.24	0.124	0.543	3,684
Plant Boiler 2	0.080	0.350	0.005	0.022	0.273	1.20	0.282	1.24	0.124	0.543	3,684
Generator Engine 1	0.121	0.531	0.007	0.031	4.33	19.0	8.67	38.0	3.03	13.3	6,218
Generator Engine 2	0.121	0.531	0.007	0.031	4.33	19.0	8.67	38.0	3.03	13.3	6,218
Generator Engine 3[c]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Safety Flare	0.116	0.006	0.0182	0.0009	0.948	0.047	4.32	0.215	0.084	0.004	91
Post Project Totals	**0.52**	**1.77**	**0.04**	**0.11**	**10.15**	**40.45**	**22.22**	**78.70**	**6.39**	**27.69**	**97,352**

a) Controlled average emission rate in pounds per hour is a daily average, based on the proposed daily operating schedule and daily limits.
b) Controlled average emission rate in tons per year is an annual average, based on the proposed annual operating schedule and annual limits.
c) One generator engine to be held in reserve at all time assured by federally enforceable permit condition requested by applicant.

Change in Potential to Emit

The change in facility-wide potential to emit is used to determine if a public comment period may be required and to determine the processing fee per IDAPA 58.01.01.225. The following table presents the facility-wide change in the potential to emit for criteria pollutants.

Table 5 CHANGES IN POTENTIAL TO EMIT FOR REGULATED AIR POLLUTANTS

Source	$PM_{10}/PM_{2.5}$		SO_2		NO_X		CO		VOC		CO_2e
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	T/yr
Pre-Project Potential to Emit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Post Project Potential to Emit	0.52	1.77	0.04	0.11	9.21	40.45	22.22	78.70	6.39	27.69	97,352
Changes in Potential to Emit	**0.52**	**1.77**	**0.04**	**0.11**	**9.21**	**40.45**	**22.22**	**78.70**	**6.39**	**27.69**	**97,352**

Non-Carcinogenic TAP Emissions

A summary of the estimated PTE for emissions increase of non-carcinogenic toxic air pollutants (TAP) is provided in the following table.

Project non-carcinogenic TAP emissions are presented in the following table:

Table 6 POST PROJECT POTENTIAL TO EMIT FOR NON-CARCINOGENIC TOXIC AIR POLLUTANTS

Non-Carcinogenic Toxic Air Pollutants	Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Non-Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
1,2-Dichlorobenzene (ortho-)	2.42E-06	20	No
1,4-Dichlorobenzene (para-)	2.42E-06	30	No
Barium	7.02E-05	0.033	No
Chromium	2.83E-06	0.033	No
Cobalt	1.70E-07	0.0033	No
Copper (fume)	1.36E-05	0.013	No
Cyclopentane	5.51E-03	114.667	No
Hexane	3.64E-03	12	No
Hydrogen Sulfide	3.74E-01	0.933	No
Manganese	7.68E-07	0.067	No
Methylcyclohexane	2.98E-02	107	No
Molybdenum (soluble compounds)	1.76E-05	0.333	No
Naphthalene	1.23E-06	3.33	No
Nonane	2.67E-03	70	No
Octane	8.52E-03	93.3	No
Pentane	8.65E-02	118	No
Selenium	4.85E-08	0.013	No
Toluene	6.87E-06	25	No
Trimethyl benzene	1.73E-03	8.2	No
Zinc	4.63E-04	0.667	No

None of the PTEs for non-carcinogenic TAP exceeded the respective Screening Levels as a result of this project. Therefore, modeling is not required for any non-carcinogenic TAP because none of the 24-hour average non-carcinogenic screening ELs identified in IDAPA 58.01.01.585 were exceeded.

Carcinogenic TAP Emissions

A summary of the estimated PTE for emissions increase of carcinogenic toxic air pollutants (TAP) is provided in the following table.

Table 7 POST PROJECT POTENTIAL TO EMIT FOR CARCINOGENIC TOXIC AIR POLLUTANTS

Carcinogenic Toxic Air Pollutants	Project Annual Average Emissions Rates for Units at the Facility (lb/hr)	Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Arsenic	3.45E-08	1.50E-06	No
Benzene	3.62E-07	8.00E-04	No
Beryllium	2.07E-09	2.80E-05	No
Cadmium	1.90E-07	3.70E-06	No
Formaldehyde	1.29E-05	5.10E-04	No
Nickel	3.62E-07	2.70E-05	No
2-Methylnaphthalene	4.14E-09	9.10E-05	No
3-Methylcholanthrene	3.10E-10	9.10E-05	No
7,12-Dimethylbenz(a)anthracene	2.76E-09	9.10E-05	No
Acenaphthene	3.10E-10	9.10E-05	No
Anthracene	4.14E-10	9.10E-05	No

Benzo(g,h,i)perylene	2.07E-10	9.10E-05	No
Fluoranthene	5.17E-10	9.10E-05	No
Fluorene	4.83E-10	9.10E-05	No
POM[(a)]	1.97E-09	2.00E-06	No

a) Polycyclic Organic Matter (POM) is considered as one TAP comprised of: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, chrysene, indeno(1,2,3-cd)pyrene, benzo(a)pyrene. The total is compared to benzo(a)pyrene.

None of the PTEs for carcinogenic TAP exceeded the respective Screening Levels as a result of this project. Therefore, modeling is not required for any carcinogenic TAP because none of the annual average carcinogenic screening ELs identified in IDAPA 58.01.01.586 were exceeded.

Post Project HAP Emissions

HAP emissions will be less than those presented Table 3 Uncontrolled Potential to Emit for Hazardous Air Pollutants due to one engine being off-line at all times.

Ambient Air Quality Impact Analyses

As presented in the tables above, the estimated emission rates of SO_2, VOC, HAP, and TAP from this project were below applicable screening emission levels (EL) and published DEQ modeling thresholds established in IDAPA 58.01.01.585-586 and in the State of Idaho Air Quality Modeling Guideline[1]. Refer to the Emissions Inventories section for additional information concerning the emission inventories.

As presented in the Modeling Memo in Appendix B, the estimated emission rates of PM_{10}, $PM_{2.5}$, NO_x and CO from this project exceeded the published DEQ modeling thresholds. Refer to the Emissions Inventories section for additional information concerning the emission inventories. The applicant has demonstrated pre-construction compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard.

An ambient air quality impact analyses document has been crafted by DEQ based on a review of the modeling analysis submitted in the application. That document is part of the final permit package for this permitting action (see Appendix B).

REGULATORY ANALYSIS

Attainment Designation (40 CFR 81.313)

The facility is located in Gooding County, which is designated as attainment or unclassifiable for $PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, and Ozone. Refer to 40 CFR 81.313 for additional information.

Facility Classification

The AIRS/AFS facility classification codes are as follows:

For THAPs (Total Hazardous Air Pollutants) Only:

A = Use when any one HAP has actual or potential emissions $\geq$ 10 T/yr or if the aggregate of all HAPS (Total HAPs) has actual or potential emissions $\geq$ 25 T/yr.

SM80 = Use if a synthetic minor (potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable limitations) and the permit sets limits $\geq$ 8 T/yr of a single HAP or $\geq$ 20 T/yr of THAP.

SM = Use if a synthetic minor (potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable limitations) and the potential HAP emissions are

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1 Criteria pollutant thresholds in Table 2, State of Idaho Guideline for Performing Air Quality Impact Analyses, Doc ID AQ-011, September 2013.

limited to < 8 T/yr of a single HAP and/or < 20 T/yr of THAP.

B = Use when the potential to emit without permit restrictions is below the 10 and 25 T/yr major source threshold

UNK = Class is unknown

For All Other Pollutants:

A = Actual or potential emissions of a pollutant are ≥ 100 T/yr.

SM80 = Use if a synthetic minor for the applicable pollutant (potential emissions fall below 100 T/yr if and only if the source complies with federally enforceable limitations) and potential emissions of the pollutant are ≥ 80 T/yr.

SM = Use if a synthetic minor for the applicable pollutant (potential emissions fall below 100 T/yr if and only if the source complies with federally enforceable limitations) and potential emissions of the pollutant are < 80 T/yr.

B = Actual and potential emissions are < 100 T/yr without permit restrictions.

UNK = Class is unknown.

Table 2 REGULATED AIR POLLUTANT FACILITY CLASSIFICATION

Pollutant	Uncontrolled PTE (T/yr)	Permitted PTE (T/yr)	Major Source Thresholds (T/yr)	AIRS/AFS Classification
PM	2.3	1.77	**100**	B
PM_{10}	2.3	1.77	**100**	B
$PM_{2.5}$	2.3	1.77	**100**	B
SO_2	0.14	0.11	**100**	B
NO_X	59.45	40.45	**100**	B
CO	116.7	78.7	**100**	SM
VOC	40.99	27.69	**100**	B
HAP (single)	5.62	<5.62	**10**	B
HAP (total)	7.79	<7.79	**25**	B
Pb	<100	<100	**100**	B

Permit to Construct (IDAPA 58.01.01.201)

IDAPA 58.01.01.201 .... Permit to Construct Required

The permittee has requested that a PTC be issued to the facility for the proposed new emissions. Therefore, a permit to construct is required to be issued in accordance with IDAPA 58.01.01.220. This permitting action was processed in accordance with the procedures of IDAPA 58.01.01.200-228.

Tier II Operating Permit (IDAPA 58.01.01.401)

IDAPA 58.01.01.401 .... Tier II Operating Permit

The application was submitted for a permit to construct (refer to the Permit to Construct section), and an optional Tier II operating permit has not been requested. Therefore, the procedures of IDAPA 58.01.01.400–410 were not applicable to this permitting action.

Visible Emissions (IDAPA 58.01.01.625)

IDAPA 58.01.01.625 .... Visible Emissions

The sources of PM emissions at this facility are subject to the State of Idaho visible emissions standard of 20% opacity. This requirement is assured by Permit Condition 3.3.

Title V Classification (IDAPA 58.01.01.300, 40 CFR Part 70)

IDAPA 58.01.01.301 .... Requirement to Obtain Tier I Operating Permit

Post project facility-wide emissions from this facility do not have a potential to emit greater than 100 tons per year for PM_{10}, SO_2, NO_X, CO, VOC or 10 tons per year for any one HAP or 25 tons per year for all HAP combined as demonstrated previously in the Emissions Inventories Section of this analysis. Therefore, the facility is not a Tier I source in accordance with IDAPA 58.01.01.006 and the requirements of IDAPA 58.01.01.301 do not apply.

PSD Classification (40 CFR 52.21)

40 CFR 52.21 .... Prevention of Significant Deterioration of Air Quality

The facility is not a major stationary source as defined in 40 CFR 52.21(b)(1), nor is it undergoing any physical change at a stationary source not otherwise qualifying under paragraph 40 CFR 52.21(b)(1) as a major stationary source, that would constitute a major stationary source by itself as defined in 40 CFR 52. Therefore in accordance with 40 CFR 52.21(a)(2), PSD requirements are not applicable to this permitting action. The facility is not a designated facility as defined in 40 CFR 52.21(b)(1)(i)(a), and does not have facility-wide emissions of any criteria pollutant that exceed 250 T/yr.

NSPS Applicability (40 CFR 60)

Because the facility has boilers, gas compression equipment, and three spark-ignited IC engines the following is an NSPS applicability analysis for the proposed equipment:

Because the facility has boilers it could be, but is not is not subject to the requirements of 40 CFR 60 Subpart Dc because the boilers are less than 10 MMBtu/hr.

Because the facility operates three spark-ignited IC engines, it is subject to 40 CFR 60 Subpart JJJJ—Standards of Performance for Stationary Spark Ignition Internal Combustion Engines and 40 CFR 60 Subpart A—General Provisions applied by the applicant as follows:

WHAT THIS SUBPART COVERS

§60.4230 Am I subject to this subpart?

(a) The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator.

(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);

The provisions of this subpart are applicable to the Bioenergy engines as of July 1, 2007 because the construction for the engine was commenced after June 12, 2006 and the engines are lean burn engines with maximum engine power greater than 1,350 HP.

(c) If you are an owner or operator of an area source subject to this subpart, you are exempt from the obligation to obtain a permit under 40 CFR part 70 or 40 CFR part 71, provided you are not required to obtain a permit under 40 CFR 70.3(a) or 40 CFR 71.3(a) for a reason other than your status as an area source under this subpart. Notwithstanding the previous sentence, you must continue to comply with the provisions of this subpart as applicable.

Bioenergy is an area source and is exempt from the obligation to obtain a permit under 40 CFR part 70 or part 71.

EMISSION STANDARDS FOR MANUFACTURERS

§60.4231 What emission standards must I meet if I am a manufacturer of stationary SI internal combustion engines or equipment containing such engines?

Bioenergy is not a manufacturer of stationary SI ICE.

EMISSION STANDARDS FOR OWNERS AND OPERATORS

(§60.4233 What emission standards must I meet if I am an owner or operator of a stationary SI internal combustion engine?

e) Owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 75 KW (100 HP) (except gasoline and rich burn engines that use LPG) must comply with the emission standards in Table 1 to this subpart for their stationary SI ICE. For owners and operators of stationary SI ICE with a maximum engine power greater than or equal to 100 HP (except gasoline and rich burn engines that use LPG) manufactured prior to January 1, 2011 that were certified to the certification emission standards in 40 CFR part 1048 applicable to engines that are not severe duty engines, if such stationary SI ICE was certified to a carbon monoxide (CO) standard above the standard in Table 1 to this subpart, then the owners and operators may meet the CO certification (not field testing) standard for which the engine was certified.

Bioenergy must comply with the emission standards in Table 1 to this subpart. The engines were manufactured after January 1, 2011 so the engines must meet all applicable emission standards in Table 1 to this subpart.

Table 1 to Subpart JJJJ of Part 60—NO_x, CO, and VOC Emission Standards for Stationary Non-Emergency SI Engines ≥100 HP (Except Gasoline and Rich Burn LPG), Stationary SI Landfill/Digester Gas Engines, and Stationary Emergency Engines >25 HP

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards[a]					
			g/HP-hr			ppmvd at 15% O_2		
			NO_x	CO	VOC[d]	NO_x	CO	VOC[d]
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500≤HP<1,350)	*HP≥500*	*7/1/2010*	*1.0*	*2.0*	*0.7*	*82*	*270*	*60*

§60.4234 How long must I meet the emission standards if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE must operate and maintain stationary SI ICE that achieve the emission standards as required in §60.4233 over the entire life of the engine.

The Bioenergy engines will be operated and maintained to meet the emission standards of Table 1 over the entire life of the engines.

OTHER REQUIREMENTS FOR OWNERS AND OPERATORS

§60.4236 What is the deadline for importing or installing stationary SI ICE produced in previous model years?

(b) After July 1, 2009, owners and operators may not install stationary SI ICE with a maximum engine power of greater than or equal to 500 HP that do not meet the applicable requirements in §60.4233, except that

lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP that do not meet the applicable requirements in §60.4233 may not be installed after January 1, 2010.

Bioenergy will comply with the requirements of §60.4233(e) upon installation of the proposed engines.

COMPLIANCE REQUIREMENTS FOR MANUFACTURERS

Bioenergy is not a manufacturer of stationary SI ICE.

COMPLIANCE REQUIREMENTS FOR OWNERS AND OPERATORS

§60.4243 What are my compliance requirements if I am an owner or operator of a stationary SI internal combustion engine?

(b) If you are an owner or operator of a stationary SI internal combustion engine and must comply with the emission standards specified in §60.4233(d) or (e), you must demonstrate compliance according to one of the methods specified in paragraphs (b)(1) and (2) of this section.

The Bioenergy engines will demonstrate compliance with §60.4233(e) according to the methods specified in paragraph (b)(2) of this section.

(2) Purchasing a non-certified engine and demonstrating compliance with the emission standards specified in §60.4233(d) or (e) and according to the requirements specified in §60.4244, as applicable, and according to paragraphs (b)(2)(i) and (ii) of this section.

The Bioenergy engines will demonstrate compliance with §60.4233(e) according to the requirements specified in §60.4244 and the methods specified in paragraph (b)(2)(ii) of this section.

(ii) If you are an owner or operator of a stationary SI internal combustion engine greater than 500 HP, you must keep a maintenance plan and records of conducted maintenance and must, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. In addition, you must conduct an initial performance test and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance.

Bioenergy will keep a maintenance plan and records of maintenance for the engines and will maintain and operate the engines in a manner consistent with good air pollution control practice for minimizing emissions. Bioenergy will conduct an initial performance test and will conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first.

TESTING REQUIREMENTS FOR OWNERS AND OPERATORS

§60.4244 What test methods and other procedures must I use if I am an owner or operator of a stationary SI internal combustion engine?

Owners and operators of stationary SI ICE who conduct performance tests must follow the procedures in paragraphs (a) through (f) of this section.

(a) Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in §60.8 and under the specific conditions that are specified by Table 2 to this subpart.

Bioenergy will test the engines within 10 percent of 100 percent peak or the highest achievable load and according to 40 CFR §60.8 and Table 2 to this subpart.

(b) You may not conduct performance tests during periods of startup, shutdown, or malfunction, as specified in §60.8(c). If your stationary SI internal combustion engine is non-operational, you do not need to startup the engine solely to conduct a performance test; however, you must conduct the performance test immediately upon startup of the engine.

Bioenergy will not conduct tests during periods of startup, shutdown, or malfunction. If an engine is non-operational and due for a performance test, Bioenergy will conduct a performance test immediately upon startup and once the engine achieves steady-state operation.

(c) You must conduct three separate test runs for each performance test required in this section, as specified in §60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour.

Bioenergy will conduct three separate one-hour performance tests, each within 10 percent of 100 percent peak or the highest achievable load.

(d) To determine compliance with the NO_x mass per unit output emission limitation, convert the concentration of NO_x in the engine exhaust using Equation 1 of this section:

$$ER = \frac{C_d \times 1.912 \times 10^{-3} \times Q \times T}{HP - hr} \quad \text{(Eq. 1)}$$

Where:

ER = Emission rate of NO_x in g/HP-hr.

C_d = Measured NO_x concentration in parts per million by volume (ppmv).

1.912×10^{-3} = Conversion constant for ppm NO_x to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meter per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, horsepower-hour (HP-hr).

Bioenergy will calculate the NO_X mass emission rate using Equation 1 of this section.

(e) To determine compliance with the CO mass per unit output emission limitation, convert the concentration of CO in the engine exhaust using Equation 2 of this section:

$$ER = \frac{C_d \times 1.164 \times 10^{-3} \times Q \times T}{HP - hr} \quad \text{(Eq. 2)}$$

Where:

ER = Emission rate of CO in g/HP-hr.

C_d = Measured CO concentration in ppmv.

1.164×10^{-3} = Conversion constant for ppm CO to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

Bioenergy will calculate the CO mass emission rate using Equation 2 of this section.

(f) For purposes of this subpart, when calculating emissions of VOC, emissions of formaldehyde should not be included. To determine compliance with the VOC mass per unit output emission limitation, convert the concentration of VOC in the engine exhaust using Equation 3 of this section:

$$ER = \frac{C_d \times 1.833 \times 10^{-3} \times Q \times T}{HP - hr} \quad \text{(Eq. 3)}$$

Where:

ER = Emission rate of VOC in g/HP-hr.

C_d = VOC concentration measured as propane in ppmv.

1.833×10^{-3} = Conversion constant for ppm VOC measured as propane, to grams per standard cubic meter at 20 degrees Celsius.

Q = Stack gas volumetric flow rate, in standard cubic meters per hour, dry basis.

T = Time of test run, in hours.

HP-hr = Brake work of the engine, in HP-hr.

Bioenergy will calculate the VOC mass emission rate using Equation 3 of this section if the engines are tested according to Method 25A.

(g) If the owner/operator chooses to measure VOC emissions using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A, then it has the option of correcting the measured VOC emissions to account for the potential differences in measured values between these methods and Method 25A. The results from Method 18 and Method 320 can be corrected for response factor differences using Equations 4 and 5 of this section. The corrected VOC concentration can then be placed on a propane basis using Equation 6 of this section.

$$RF_i = \frac{C_{Mi}}{C_{Ai}} \quad \text{(Eq. 4)}$$

Where:

RF_i = Response factor of compound i when measured with EPA Method 25A.

C_{Mi} = Measured concentration of compound i in ppmv as carbon.

C_{Ai} = True concentration of compound i in ppmv as carbon.

$$C_{icorr} = RF_i \times C_{imeas} \quad \text{(Eq. 5)}$$

Where:

C_{icorr} = Concentration of compound i corrected to the value that would have been measured by EPA Method 25A, ppmv as carbon.

C_{imeas} = Concentration of compound i measured by EPA Method 320, ppmv as carbon.

$$C_{Peq} = 0.6098 \times C_{icorr} \quad \text{(Eq. 6)}$$

Where:

C_{Peq} = Concentration of compound i in mg of propane equivalent per DSCM.

Bioenergy will calculate the VOC mass emission rate using the equations of this section if the engines are tested using either Method 18 of 40 CFR part 60, appendix A, or Method 320 of 40 CFR part 63, appendix A.

NOTIFICATION, REPORTS, AND RECORDS FOR OWNERS AND OPERATORS

§60.4245 What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary SI internal combustion engine?

Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements.

(a) Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.

(1) All notifications submitted to comply with this subpart and all documentation supporting any notification.

(2) Maintenance conducted on the engine.

(3) If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable.

(4) If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

Bioenergy will keep records of all compliance notifications and supporting documentation, maintenance conducted on the engines, and documentation that shows the engines meet the emission standards as required by this section.

§60.4245 What are my notification, reporting, and recordkeeping requirements if I am an owner or operator of a stationary SI internal combustion engine?

Owners or operators of stationary SI ICE must meet the following notification, reporting and recordkeeping requirements.

(a) Owners and operators of all stationary SI ICE must keep records of the information in paragraphs (a)(1) through (4) of this section.

(1) All notifications submitted to comply with this subpart and all documentation supporting any notification.

(2) Maintenance conducted on the engine.

(3) If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable.

(4) If the stationary SI internal combustion engine is not a certified engine or is a certified engine operating in a non-certified manner and subject to §60.4243(a)(2), documentation that the engine meets the emission standards.

Bioenergy will keep records of all compliance notifications and supporting documentation, maintenance conducted on the engines, and documentation that shows the engines meet the emission standards as required by this section.

(c) Owners and operators of stationary SI ICE greater than or equal to 500 HP that have not been certified by an engine manufacturer to meet the emission standards in §60.4231 must submit an initial notification as required in §60.7(a)(1). The notification must include the information in paragraphs (c)(1) through (5) of this section.

(1) Name and address of the owner or operator;

(2) The address of the affected source;

(3) Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;

(4) Emission control equipment; and

(5) Fuel used.

Bioenergy submits this initial notification information required by this section and §60.7(a)(1) – notification must be postmarked no later than 30 days after the date construction is commenced – as part of this completed application package. (However, 60.7(a)(1) does not apply to the engines, as they are mass-produced facilities which are purchased in completed form; nonetheless, the notification information is supplied as part of the Bioenergy project application).

(d) Owners and operators of stationary SI ICE that are subject to performance testing must submit a copy of each performance test as conducted in §60.4244 within 60 days after the test has been completed. Performance test reports using EPA Method 18, EPA Method 320, or ASTM D6348-03 (incorporated by reference—see 40 CFR 60.17) to measure VOC require reporting of all QA/QC data. For Method 18, report results from sections 8.4 and 11.1.1.4; for Method 320, report results from sections 8.6.2, 9.0, and 13.0; and for ASTM D6348-03 report results of all QA/QC procedures in Annexes 1-7.

Bioenergy will submit performance test reports within 60 days after the test has been completed. If an approved test method other than Method 25A is used to test for VOC, Bioenergy will include the additional information in the test report as required by this section.

GENERAL PROVISIONS

§60.4246 What parts of the General Provisions apply to me?

Table 3 to this subpart shows which parts of the General Provisions in §§60.1 through 60.19 apply to you.

Bioenergy will comply with the applicable General Provisions shown in Table 3 to this subpart.

NESHAP Applicability (40 CFR 61)

The facility is not subject to any NESHAP requirements in 40 CFR 61.

MACT Applicability (40 CFR 63)

Because the facility has boilers it could be, but is not is not subject to the requirements of 40 CFR 63 Subpart JJJJJ—National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources because the boilers are natural gas-fired.

Because the facility operates three spark-ignited IC engines it is subject to 40 CFR 63 Subpart ZZZZ-National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, but none of the conditions apply because it is subject to NSPS.

Permit Conditions Review

This section describes the permit conditions for this initial permit or only those permit conditions that have been added, revised, modified or deleted as a result of this permitting action.

Initial Permit Condition 1.1 – Scope and regulated sources

This is the initial PTC for a dairy and agricultural waste digester methane production facility.

Initial Permit Conditions 2.1 through 2.9

The digester produces raw biogas and the biogas processing system desulfurizes the biogas and separates the methane for sale and distribution as Renewable Natural Gas (RNG). Emissions are limited by IDAPA 58.01.01.775-776 for odors and PC 2.4 limits H_2S in any exhaust stream to 5ppm to assure compliance with IDAPA 58.01.01.585 for this TAP. This is additionally assured by PC 2.5 limiting throughput to levels presented in the application and PC 2.6 requiring an O&M manual to ensure operations are occurring in accordance with manufacturing specifications. The remaining permit conditions make this section enforceable through monitoring of odor complaints, H_2S, and RNG flowrate. The biogas processing system does not emit any criteria pollutants.

Initial Permit Conditions 3.1 through 3.6

The two natural gas fired boilers do not have controls. For these sources, as well as others at the facility, the opacity Rule IDAPA 58.01.01.625 is included. The boiler emissions are regulated by exclusively combusting natural gas. Criteria pollutants are regulated by this requirement and the small amount estimated by AP-42 factors under normal operating conditions does not warrant further emission limits.

Initial Permit Conditions 4.1 through 4.14

The three natural gas generators will be operated on purchased pipeline natural gas. Each generator engine is equipped with an oxidation catalyst that operates at 550° F at inlet and 1350° F at outlet. PC 4.3 establishes criteria pollutant emission limits. Based on AP-42 factors, the amounts of PM_{10} and SO_2 are so small that a limit is unnecessary. PC 4.4 allows only two of the three engines to be running at a given time to keep CO emission from being over 100 T/yr, therefore establishing and maintaining the facility as SM. Permit conditions 4.5 and 4.6 regulate the engines by the combustion gas quality and catalyst temperatures. PC 4.7 requires monitoring of these operating requirements. Permit conditions 4.8 through 4.14 incorporate the remainder of the 40 CFR 60 Subpart JJJJ requirements as applied by the applicant.

Initial Permit Conditions 5.1 through 5.6

The enclosed safety flare is used for intermittent combustion of intermittent off-spec gas. These permit conditions require the combustion of any off-spec or raw biogas. A slip stream of five percent was presented in the EI and supported by certified statements from the applicant and equipment manufacturer to occur no more than 20 times a year at 30 minutes per incident resulting in the limits in Permit Condition 5.5. Raw gas combustion would constitute an emergency situation and was not included in the emissions inventory. Since this section represents breakdown and emergency situations, criteria pollutants are not regulated. The flare is required to have a pilot flame present at all times, and an alarm for pilot light or flare flame out. In case of an alarm the flare or pilot light is to be relit as expeditiously as possible. All flaring is required to be monitored and recorded.

PUBLIC REVIEW

Public Comment Opportunity

An opportunity for public comment period on the application was provided in accordance with IDAPA 58.01.01.209.01.c or IDAPA 58.01.01.404.01.c. During this time there was not a request for a public comment period on DEQ's proposed action. Refer to the chronology for public comment opportunity dates.

APPENDIX A – EMISSIONS INVENTORIES

BioEnergy Capital Corporation
The BioRefinery at Southfield Dairy
Design Values Summary

Digesters system -- Sealed, enclosed reaction vessels; negligible air emissions

982,000	gal/day

Gas Processing System

6,300	scfm, system design raw biogas throughput capacity
3,689	scfm, system design biomethane production capacity
2,611	scfm, maximum CO_2 removal system design exhaust flow rate
250	scfm, maximum desulfurization system design exhaust flow rate

Facility boilers -- Natural gas fired

6.39	MMBtu/hr; per-boiler design heat input capacity
2	Number of boilers at source

Electrical generator engines - Natural gas fired

12.133	MMBtu/hr; per-engine design heat input capacity (Manufacturer Spec - Full Load)
1,966	bhp; per-engine power rating
2	Number of simultaneously operting engines. A third engine will be held in reserve. An enforceable limit is being requested to allow no more than two engines to operate simultaneously.

Miscelaneous design values

917	Btu/scf, site-specific natural gas fuel heating value
8,760	Maximum operating hours per year

Note:
Numerical values in blue are calculated. Values in purple refer to a single other cell.

BioEnergy Capital Corporation
The BioRefinery at Southfield Dairy
Regulated Pollutant Emissions Summary

FACILITY-WIDE POTENTIAL TO EMIT FOR NSR REGULATED POLLUTANTS (tons/year)

Nbr	Description	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Pb	CO2e[(a)]
Point Sources										
EU1 Boiler Stack 1		0.350	0.350	0.350	1.20	0.022	1.24	0.543	1.53E-05	3,684
EU2 Boiler Stack 2		0.350	0.350	0.350	1.20	0.022	1.24	0.543	1.53E-05	3,684
EU3 RICE Generator Stack 1		0.531	0.531	0.531	19.0	0.031	38.0	13.3	--	6,218
EU4 RICE Generator Stack 2		0.531	0.531	0.531	19.0	0.031	38.0	13.3	--	6,218
EU5 RICE Generator Stack 3 Reserve Unit[b]		--	--	--	--	--	--	--	--	--
EU6 Enclosed Flare		5.74E-03	5.74E-03	5.74E-03	0.047	9.06E-04	0.215	4.15E-03	3.78E-07	91.1
EU7 Biogas Processing		--	--	--	--	--	--	--	--	105,654
	Subtotals:	1.77	1.77	1.77	40.4	0.107	78.6	27.7	3.09E-05	125,550
Fugitive Sources										
EU8 Piping Components		--	--	--	--	--	--	2.08	--	1,182
	Total Emissions:	**1.77**	**1.77**	**1.77**	**40.4**	**0.107**	**78.6**	**29.7**	**3.09E-05**	**126,732**

Notes:
(a) Non-biogenic emissions
(b) BioEnergy requests an enforceable limit that restricts operation to two engines at any given time.
General -- BioEnergy is not prooposing any add-on emissions controls. Consequently, reported emission rates are both controled and uncontrolled rates.

BioEnergy Capital Corporation
The BioRefinery at Southfield Dairy
Regulated Pollutant Emissions Summary

FACILITY-WIDE POTENTIAL TO EMIT FOR NSR REGULATED POLLUTANTS (lb/hr)

Description	TSP	PM_{10}	$PM_{2.5}$	NO_x	SO_2	CO	VOC	Pb
Point Sources								
EU1 Boiler Stack 1	0.080	0.080	0.080	0.273	0.005	0.282	0.124	3.48E-06
EU2 Boiler Stack 2	0.080	0.080	0.080	0.273	0.005	0.282	0.124	3.48E-06
EU3 RICE Generator Stack 1	0.121	0.121	0.121	4.33	0.007	8.67	3.03	--
EU4 RICE Generator Stack 2	0.121	0.121	0.121	4.33	0.007	8.67	3.03	--
EU5 RICE Generator Stack 3 Reserve Unit[b]	--	--	--	--	--	--	--	--
EU6 Enclosed Flare	0.116	0.116	0.116	0.948	1.82E-02	4.32	0.084	7.60E-06
EU7 Biogas Processing	--	--	--	--	--	--	--	--
Fugitive Sources								
EU8 Piping Components	--	--	--	--	--	--	0.5	--
Total Emissions:	0.518	0.518	0.518	10.2	0.043	22.2	6.87	1.46E-05

Notes:
(a) BioEnergy requests an enforceable limit that restricts operation to two engines at any given time.
General -- BioEnergy is not prooposing any add-on emissions controls. Consequently, reported emission rates are both controled and uncontrolled rates.

CRITERIA POLLUTANT PTE MODELING EMISSION RATES

Source Description	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)	$PM_{2.5}$ANN (lb/hr)[a]	NO_2 (lb/hr)	NO_2ANN (lb/hr)[a]	CO (lb/hr)
EU1 Boiler Stack 1	0.080	0.080	0.080	0.273	0.273	0.282
EU2 Boiler Stack 2	0.080	0.080	0.080	0.273	0.273	0.282
EU3 RICE Generator Stack 1	0.121	0.121	0.121	4.33	4.33	8.67
EU4 RICE Generator Stack 2	0.121	0.121	0.121	4.33	4.33	8.67
EU5 RICE Generator Stack 3 Reserve Unit[b]	--	--	--	--	--	--
EU6 Enclosed Flare	0.116	0.116	1.31E-03	0.948	1.07E-02	4.32

(a) PM_{10}ANN, $PM_{2.5}$ANN, and NO_2ANN emissions represent modeled annual emissions. All other rates represent hourly emissions.
(b) RICE Generator Stack 3 represents the reserve RICE Genset Unit.

FACILITY-WIDE POTENTIAL TO EMIT COMPARED TO DEQ LEVEL I THRESHOLDS

Pollutant	BioEnergy Source Emissions	Model Thresholds Level I	Units	Modeling Required?
PM_{10}	0.52	0.22	lb/hr	Yes
$PM_{2.5}$	1.77	0.35	tpy	Yes
	0.52	0.054	lb/hr	Yes
NO_X	40.4	1.2	tpy	Yes
	10.2	0.2	lb/hr	Yes
SO_2	0.11	1.2	tpy	No
	0.04	0.21	lb/hr	No
CO	22	15	lb/hr	Yes
Pb	0.011	14	lb/month	No

General -- Level I Thresholds determine modeling applicability for the proposed facility. Thresholds values are listed in Table 2 of the IDEQ Modeling Guidance

HAP POTENTIAL TO EMIT EMISSIONS SUMMARY

CAS Nbr.	Pollutant	Emission Rates (lb/hr)	Emission Rates (tpy)	Notes
75343	1,1-Dichloroethane	5.73E-04	2.51E-03	
79345	1,1,2,2-Tetrachloroethane	9.71E-04	4.25E-03	
79005	1,1,2-Trichloroethane	7.72E-04	3.38E-03	
107062	1,2-Dichloroethane	5.73E-04	2.51E-03	
78875	1,2-Dichloropropane	6.53E-04	2.86E-03	
106990	1,3-Butadiene	6.48E-03	2.84E-02	
542756	1,3-Dichloropropene	6.41E-04	2.81E-03	
106467	1,4-Dichlorobenzene (para-)	1.91E-05	7.33E-05	a
540841	2,2,4-Trimethylpentane	6.07E-03	2.66E-02	
91576	2-Methylnaphthalene	8.06E-04	3.53E-03	b
56495	3-Methylcholanthrene	2.54E-08	1.10E-07	b
57977	7,12-Dimethylbenz(a)anthracene	2.26E-07	9.77E-07	b
83329	Acenaphthene	3.04E-05	1.33E-04	b
208969	Acenaphthylene	1.34E-04	5.88E-04	
75070	Acetaldehyde	2.03E-01	8.89E-01	
107028	Acrolein	1.25E-01	5.46E-01	
120127	Anthracene	3.39E-08	1.47E-07	b
7440382	Arsenic	2.82E-06	1.22E-05	
71432	Benzene	1.07E-02	4.69E-02	
56553	Benzo(a)anthracene	2.54E-08	1.10E-07	
50328	Benzo(a)pyrene	1.69E-08	7.33E-08	b
205992	Benzo(b)fluoranthene	4.05E-06	1.78E-05	b
192972	Benzo(e)pyrene	1.01E-05	4.41E-05	
191242	Benzo(g,h,i)perylene	1.01E-05	4.41E-05	b
205823	Benzo(k)fluoranthene	2.54E-08	1.10E-07	b
7440417	Beryllium	1.69E-07	7.33E-07	
92524	Biphenyl	5.14E-03	2.25E-02	
7440439	Cadmium	1.55E-05	6.71E-05	
56235	Carbon Tetrachloride	8.91E-04	3.90E-03	
108907	Chlorobenzene	7.38E-04	3.23E-03	
75003	Chloroethane	4.54E-05	1.99E-04	
67663	Chloroform	6.92E-04	3.03E-03	
7440473	Chromium	2.23E-05	8.55E-05	
218019	Chrysene	1.68E-05	7.38E-05	b
7440484	Cobalt	1.34E-06	5.13E-06	
53703	Dibenzo(a,h)anthracene	1.69E-08	7.33E-08	b
100414	Ethylbenzene	9.63E-04	4.22E-03	
106934	Ethylene Dibromide	1.07E-03	4.71E-03	
206440	Fluoranthene	2.70E-05	1.18E-04	b
86737	Fluorene	1.38E-04	6.03E-04	b
50000	Formaldehyde	1.28	5.62	
110543	Hexane	5.57E-02	2.28E-01	
193395	Indenol(1,2,3-cd)pyrene	2.54E-08	1.10E-07	b
7439965	Manganese	6.06E-06	2.32E-05	
7439976	Mercury	3.67E-06	1.59E-05	
67561	Methanol	6.07E-02	2.66E-01	

CAS Nbr.	Pollutant	Emission Rates (lb/hr)	Emission Rates (tpy)	Notes
75092	Methylene Chloride	4.85E-04	2.13E-03	
91203	Naphthalene	1.82E-03	7.94E-03	b
7440020	Nickel	2.96E-05	1.28E-04	
85018	Phenanthrene	2.53E-04	1.11E-03	b
108952	Phenol	5.82E-04	2.55E-03	
129000	Pyrene	3.31E-05	1.45E-04	b
7782492	Selenium	3.83E-07	1.47E-06	
100425	Styrene	5.73E-04	2.51E-03	
25322207	Tetrachloroethane	6.02E-05	2.64E-04	
108883	Toluene	9.95E-03	4.36E-02	
75014	Vinyl Chloride	3.62E-04	1.58E-03	
1330207	Xylene	4.46E-03	1.96E-02	
		Total HAP Emissions (ton/yr)	7.79	
		Max Single HAP Emission (ton/yr)	5.62	Formaldehyde

Notes:

(a) AP-42 provides an emission factor for total Dichlorobenze which comprise of three chemical compounds: ortho-, meta-, and para-dichlorobenzene. The total factor will be used for each individual compound. Clean Air Act Section 112(b) provides a limit for ortho-Dichlorobenzene.

(b) HAP because it is Polycyclic Organic Matter (POM) and/or Polycyclic Aromatic Hydrocarbon (PAH). POM is a HAP as defined by Section 112(b) of the Clean Air Act. PAH is a subset of POM.

PROJECT NON-CARCINOGENIC TAP EMISSIONS SUMMARY POTENTIAL TO EMIT[a]

CAS Nbr.	Pollutant	Emission Rates (lb/hr)	Screening Emission Level[b] (lb/hr)	Exceeds Screening Level?	IDAPA 58.01.01 Section	(Non) - Carcinogenic	Notes
95501	1,2-Dichlorobenzene (ortho-)	2.42E-06	20	No	585	Non-Carcinogenic	c
106467	1,4-Dichlorobenzene (para-)	2.42E-06	30	No	585	Non-Carcinogenic	c,g
7440393	Barium	7.02E-05	0.033	No	585	Non-Carcinogenic	
7440473	Chromium	2.83E-06	0.033	No	585	Non-Carcinogenic	g
7440484	Cobalt	1.70E-07	0.0033	No	585	Non-Carcinogenic	g
7440508a	Copper (fume)	1.36E-05	0.013	No	585	Non-Carcinogenic	
287923	Cyclopentane	5.51E-03	114.667	No	585	Non-Carcinogenic	
110543	Hexane	3.64E-03	12	No	585	Non-Carcinogenic	g
7783064	Hydrogen Sulfide	6.63E-03	0.933	No	585	Non-Carcinogenic	
7439965	Manganese	7.68E-07	0.067	No	585	Non-Carcinogenic	g
108872	Methylcyclohexane	2.98E-02	107	No	585	Non-Carcinogenic	
7439987a	Molybdenum (soluble compounds)	1.76E-05	0.333	No	585	Non-Carcinogenic	
91203	Naphthalene	1.23E-06	3.33	No	585	Non-Carcinogenic	g
111842	Nonane	2.67E-03	70	No	585	Non-Carcinogenic	
111659	Octane	8.52E-03	93.3	No	585	Non-Carcinogenic	
109660	Pentane	8.65E-02	118	No	585	Non-Carcinogenic	
7782492	Selenium	4.85E-08	0.013	No	585	Non-Carcinogenic	g
108883	Toluene	6.87E-06	25	No	585	Non-Carcinogenic	g
25551137	Trimethyl benzene	1.73E-03	8.2	No	585	Non-Carcinogenic	d,f
7440666	Zinc	4.63E-04	0.667	No	585	Non-Carcinogenic	
7440382	Arsenic	3.45E-08	1.50E-06	No	586	Carcinogenic	g
71432	Benzene	3.62E-07	8.00E-04	No	586	Carcinogenic	g
7440417	Beryllium	2.07E-09	2.80E-05	No	586	Carcinogenic	g
7440439	Cadmium	1.90E-07	3.70E-06	No	586	Carcinogenic	g
50000	Formaldehyde	1.29E-05	5.10E-04	No	586	Carcinogenic	g
7440020	Nickel	3.62E-07	2.70E-05	No	586	Carcinogenic	g
Polyaromatic Hydrocarbons (except 7-PAH group)		--	--	---	586	Carcinogenic	e,g
91576	2-Methylnaphthalene	4.14E-09	9.10E-05	No	586	Carcinogenic	e,g
56495	3-Methylcholanthrene	3.10E-10	9.10E-05	No	586	Carcinogenic	e,g
57977	7,12-Dimethylbenz(a)anthracene	2.76E-09	9.10E-05	No	586	Carcinogenic	e,g
83329	Acenaphthene	3.10E-10	9.10E-05	No	586	Carcinogenic	e,g
120127	Anthracene	4.14E-10	9.10E-05	No	586	Carcinogenic	e,g
191242	Benzo(g,h,i)perylene	2.07E-10	9.10E-05	No	586	Carcinogenic	e,g
206440	Fluoranthene	5.17E-10	9.10E-05	No	586	Carcinogenic	e,g
86737	Fluorene	4.83E-10	9.10E-05	No	586	Carcinogenic	e,g
Polycyclic Organic Matter or 7-PAH group Sum of the following:		1.97E-09	2.00E-06	No	586	Carcinogenic	f,g
56553	Benzo(a)anthracene	3.10E-10	--	---			f,g
205992	Benzo(b)fluoranthene	3.10E-10	--	---			f,g
205823	Benzo(k)fluoranthene	3.10E-10	--	---			f,g
53703	Dibenzo(a,h)anthracene	2.07E-10	--	---			f,g
218019	Chrysene	3.10E-10	--	---			f,g
193395	Indenol(1,2,3-cd)pyrene	3.10E-10	--	---			f,g
50328	Benzo(a)pyrene	2.07E-10	--	---			f,g

Notes:

(a) Potential emission rate is based on combined 24-hour avereage emissions for the project.
(b) Emission rate screening levels per IDAPA 58.01.01.585.
(c) AP-42 provides an emission factor for total Dichlorobenze which comprise of three chemical compounds: ortho-, meta-, and para-
(d) Trimethyl benzene TAP for mixed and individual isomers. This project accounts for 1,2,3-Trimethylbenzene, 1,2,4-Trimethylbenzene, 1,3,5-
(e) Polyaromatic Hydrocarbons are considered TAPs (excluding the 7-PAH) group per IDAPA 58.0101.586
(f) An October 8, 2008 memorandum produced by Carl Brown of the Idaho DEQ states that the Polycyclic Organic Matter (POM) group should be considered one TAP with an equivalent potency to benzo(a)pyrene. Additional PAHs should be analyzed independently when evaluating carcinogenic risk.
(g) Pollutants from only Flare source. Boilers and RICE may emit these TAPS/HAPS but are exempt under IDAPA 58.01.01.210.20 because they are regulated by NESHAP and are accounted for in HAPS summary.
(h) Hg standard in lb/year for compliance with IDAPA 58.01.01.215 standard of 25 lb/year.

BioEnergy Capital Corporation
Southfield Dairy BioRefinery
EU4-5- Boilers

Design Parameters

6.390 MMBtu/hr; per-boiler design heat input capacity
917 Btu/scf, site-specific natural gas fuel heating value

Constants and Conversion Factors

2,000 lb/ton
8760 hrs/yr; maximum annual operating hours
8,710 dscf/MMBtu; natural gas "F factor," 40 CFR Part 75, Appendix F

Global Warming Potentials (GWPs); 40 CFR 98, Subpart A, Table A-1

1 CO_2
25 Methane (CH_4)
298 Nitrous oxide (N_2O)

Emission Rates (per boiler)

Pollutant	Emission Factor	Units	Emissions (lb/hr/boiler)	Emissions (tons/yr/boiler)	Notes
$PM_{10}/PM_{2.5}$-Total	--	--	0.080	0.350	(a)
$PM_{10}/PM_{2.5}$-Fil	--	--	0.006	0.026	(a)
$PM_{10}/PM_{2.5}$-Con	--	--	0.074	0.324	(a)
NOx	--	--	0.273	1.20	(a)
CO	--	--	0.282	1.24	(a)
VOC	--	--	0.124	0.543	(a)
SO_2	--	--	0.005	0.022	(a)
Pb	0.0005	lb/MMscf	3.48E-06	1.53E-05	(b)
CO_2	120,000	lb/MMscf	836	3,663	(b)
CH_4	2.3	lb/MMscf	0.016	0.070	(b)
N_2O	2.2	lb/MMscf	0.015	0.067	(b)
Total CO_2e	N/A	N/A	841	3,684	(c)

Notes:

(a) Emission factor source: Manufacturer specification (Attachment C-2 Emissions Report). Emission rates for PM_{10} and $PM_{2.5}$ sizes are equal. PM_{10}-Total = total particulate matter; PM_{10}-Filter = filterable particulate matter; PM_{10}-Con = condensible particulate matter.

(b) Emission factor source: AP-42 Table 1.4-2 (07/98) Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion

(c) Carbon dioxide equivalent (CO_2e) emission rate is equal to the sum of the three primary greenhouse gases CO_2, CH_4, and N_2O after multiplying each by its respective global warming potential value.

Boilers Potential Hazardous Air Pollutant Emissions (each boiler)

CAS Nbr.	Pollutant	Emission Factor (lb/MMscf)	Emission Rates (lb/hr)	Notes
91576	2-Methylnaphthalene	2.40E-05	1.67E-07	b
56495	3-Methylcholanthrene	1.80E-06	1.25E-08	b
57977	7,12-Dimethylbenz(a)anthracene	1.60E-05	1.11E-07	b
83329	Acenaphthene	1.80E-06	1.25E-08	b
120127	Anthracene	2.40E-06	1.67E-08	b
7440382	Arsenic	2.00E-04	1.39E-06	
71432	Benzene	2.10E-03	1.46E-05	
56553	Benzo(a)anthracene	1.80E-06	1.25E-08	b
50328	Benzo(a)pyrene	1.20E-06	8.36E-09	b
205992	Benzo(b)fluoranthene	1.80E-06	1.25E-08	b
191242	Benzo(g,h,i)perylene	1.20E-06	8.36E-09	b
205823	Benzo(k)fluoranthene	1.80E-06	1.25E-08	b
7440417	Beryllium	1.20E-05	8.36E-08	
7440439	Cadmium	1.10E-03	7.67E-06	
7440473	Chromium	1.40E-03	9.76E-06	
218019	Chrysene	1.80E-06	1.25E-08	b
7440484	Cobalt	8.40E-05	5.85E-07	
53703	Dibenzo(a,h)anthracene	1.20E-06	8.36E-09	b
106467	1,4-Dichlorobenzene (para-)	1.20E-03	8.36E-06	a
206440	Fluoranthene	3.00E-06	2.09E-08	b
86737	Fluorene	2.80E-06	1.95E-08	b
50000	Formaldehyde	7.50E-02	5.23E-04	
110543	Hexane	1.80	1.25E-02	
193395	Indenol(1,2,3-cd)pyrene	1.80E-06	1.25E-08	b
7439965	Manganese	3.80E-04	2.65E-06	
7439976	Mercury	2.60E-04	1.81E-06	
91203	Naphthalene	6.10E-04	4.25E-06	b
7440020	Nickel	2.10E-03	1.46E-05	
85018	Phenanathrene	1.70E-05	1.18E-07	b
129000	Pyrene	5.00E-06	3.48E-08	b
7782492	Selenium	2.40E-05	1.67E-07	
108883	Toluene	3.40E-03	2.37E-05	

Boilers Potential Toxic (non-HAP) Air Pollutant Emissions (each boiler)

CAS Nbr.	Pollutant	Emission Factor (lb/MMscf)	Emission Rates (lb/hr)	Notes
95501	1,2-Dichlorobenzene (ortho-)	1.20E-03	8.36E-06	a
7440393	Barium	4.40E-03	3.07E-05	
7440508a	Copper (fume)	8.50E-04	5.92E-06	
7439987a	Molybdenum (soluble compounds)	1.10E-03	7.67E-06	
109660	Pentane	2.60	1.81E-02	
7440666	Zinc	2.90E-02	2.02E-04	

Notes:

General: Boiler HAP emissions are exempt from applicability to NESHAP JJJJJJ and are therefore exempt from demonstrating preconstruction compliance with toxic standards per IDAP 58.01.01.210 (reference IDAPA 58.01.01.210.20)

General: HAP and TAP Emission factor source: AP-42 Table 1.4-3 (07/98) Natural Gas Combustion

(a) AP-42 provides an emission factor for total Dichlorobenze which comprise of three chemical compounds: ortho-, meta-, and para-dichlorobenzene. The total factor will be used for each individual compound. IDAPA 58.0101.585 provides emission limits for ortho- and para- compounds. Clean Air Act Section 112(b) provides a limit for the ortho-Dichlorobenzene.

(b) Polycyclic Organic Matter (POM) and/or Polycyclic Aromatic Hydrocarbon (PAH), a subset of POM

BioEnergy Capital Corporation
Southfield Dairy BioRefinery
EU3-5 - RICE Powered Generators

Design Parameters

12.133 MMBtu/hr; Heat input capacity for each RICE; manufacturer's specification
1,966 bhp; Power rating for each RICE; manufacturer's specification
8,760 hrs/yr; Maximum operating hours

Constants and Conversion Factors

2.20 lb/kg
2,000 lb/ton
1,000 g/kg

Global Warming Potentials (GWPs); 40 CFR 98, Subpart A, Table A-1

1 CO_2
25 Methane (CH_4)
298 Nitrous oxide (N_2O)

Potential Emissions (each engine)

Pollutant	Emission Factor	Units	Emission Rate (lb/hr/engine)	Emission Rate (ton/yr/engine)	Notes
$PM_{10}/PM_{2.5}$-Total	9.99E-03	lb/MMBtu	0.121	0.531	a
$PM_{10}/PM_{2.5}$-Fil	7.71E-05	lb/MMBtu	--	--	a
$PM_{10}/PM_{2.5}$-Con	9.91E-03	lb/MMBtu	--	--	a
NOx	1.0	g/HP-hr	4.33	19.0	b
CO	2.0	g/HP-hr	8.67	38.0	b
VOC	0.7	g/HP-hr	3.03	13.3	b
SO_2	5.88E-04	lb/MMBtu	7.13E-03	0.031	a
Pb	--	--	--	--	f
CO_2	53.0	kg/MMBtu	1,418	6,212	c
CH_4	1.00E-03	kg/MMBtu	0.0267	0.12	d
N_2O	1.00E-04	kg/MMBtu	2.67E-03	0.012	d
CO_2e	N/A	N/A	1,420	6,218	e

Notes:

(a) AP-42 Chapter 3.2, 7/00, Natural Gas-fired Reciprocating Engines; Table 3.2-2, Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines. Total particulate matter (PM-T) includes filterable and condensable fractions. PM_{10} and $PM_{2.5}$ emission rates are all assumed to be equal.

(b) Emission standards from Table 1 to 40 CFR 60 Subpart JJJJ

(c) Table C-1, Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel. 40 CFR 98.3 Subpart C - General Stationary Fuel Combustion Sources

(d) Table C-2, Default CH_4 and N_2O Emission Factors for Various Types of Fuel. 40 CFR 98.3 Subpart C - General Stationary Fuel Combustion Sources

(e) Carbon dioxide equivalent (CO_2e) emission rate is equal to the sum of the three primary greenhouse gases CO_2, CH_4, and N_2O after multiplying each by its respective global warming potential value.

(f) AP-42 does not report an emission factor for lead from natural gas-fired reciprocating engines. Such emissions are expected to be negligible.

RICE Potential Hazardous Air Pollutant Emissions (each engine)

CAS Nbr.	Pollutant	Emission Factor (lb/MMBtu)	Emission Rates (lb/hr)	Notes
75343	1,1-Dichloroethane	2.36E-05	2.86E-04	
79345	1,1,2,2-Tetrachloroethane	4.00E-05	4.85E-04	
79005	1,1,2-Trichloroethane	3.18E-05	3.86E-04	
107062	1,2-Dichloroethane	2.36E-05	2.86E-04	
78875	1,2-Dichloropropane	2.69E-05	3.26E-04	
106990	1,3-Butadiene	2.67E-04	3.24E-03	
542756	1,3-Dichloropropene	2.64E-05	3.20E-04	
540841	2,2,4-Trimethylpentane	2.50E-04	3.03E-03	
91576	2-Methylnaphthalene	3.32E-05	4.03E-04	b
833210	Acenaphthene	1.25E-06	1.52E-05	b
208969	Acenaphthylene	5.53E-06	6.71E-05	b
75070	Acetaldehyde	8.36E-03	1.01E-01	
107028	Acrolein	5.14E-03	6.24E-02	
71432	Benzene	4.40E-04	5.34E-03	
205992	Benzo(b)fluoranthene	1.66E-07	2.01E-06	b
192972	Benzo(e)pyrene	4.15E-07	5.04E-06	b
191242	Benzo(g,h,i)perylene	4.14E-07	5.02E-06	b
92524	Biphenyl	2.12E-04	2.57E-03	
56235	Carbon Tetrachloride	3.67E-05	4.45E-04	
108907	Chlorobenzene	3.04E-05	3.69E-04	
75003	Chloroethane	1.87E-06	2.27E-05	
67663	Chloroform	2.85E-05	3.46E-04	
218019	Chrysene[b]	6.93E-07	8.41E-06	b
100414	Ethylbenzene	3.97E-05	4.82E-04	
106934	Ethylene Dibromide	4.43E-05	5.37E-04	
206440	Fluoranthene	1.11E-06	1.35E-05	b
86738	Fluorene	5.67E-06	6.88E-05	b
50000	Formaldehyde	5.28E-02	6.41E-01	
110543	Hexane	1.11E-03	1.35E-02	
67561	Methanol	2.50E-03	3.03E-02	
75092	Methylene Chloride	2.00E-05	2.43E-04	
91203	Naphthalene	7.44E-05	9.03E-04	
85019	Phenanthrene	1.04E-05	1.26E-04	b
108952	Phenol	2.40E-05	2.91E-04	
129001	Pyrene	1.36E-06	1.65E-05	b
100425	Styrene	2.36E-05	2.86E-04	
25322207	Tetrachloroethane	2.48E-06	3.01E-05	
108883	Toluene	4.08E-04	4.95E-03	
75014	Vinyl Chloride	1.49E-05	1.81E-04	
1330207	Xylene	1.84E-04	2.23E-03	

RICE Potential Toxic (non-HAP) Air Pollutant Emissions (each engine)

CAS Nbr.	Pollutant	Emission Factor (lb/MMBtu)	Emission Rates (lb/hr)	Notes
25551137	1,2,3-Trimethylbenzene	2.30E-05	2.79E-04	a
25551137	1,2,4-Trimethylbenzene	1.43E-05	1.74E-04	a
25551137	1,3,5-Trimethylbenzene	3.38E-05	4.10E-04	a
287923	Cyclopentane	2.27E-04	2.75E-03	
108872	Methylcyclohexane	1.23E-03	1.49E-02	
111842	Nonane	1.10E-04	1.33E-03	
111659	Octane	3.51E-04	4.26E-03	
109660	Pentane	2.60E-03	3.15E-02	

Notes:

General: Engine HAP emissions will be subject to NESHAP ZZZZ and will therefore be exempt from demonstrating preconstruction compliance with toxic standards per IDAP 58.01.01.210 (reference IDAPA 58.01.01.210.20)

General: HAP and TAP Emission factor source: AP-42 Chapter 3.2, 7/00, Natural Gas-fired Reciprocating Engines; Table 3.2-2, Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines

(a) Trimethyl benzene TAP accounts for mixed and individual isomers. 1,2,3-Trimethylbenzene, 1,2,4-Trimethylbenzene, and 1,3,5-Trimethylbenzene are added in the TAPs Summary and compared to trimethyl benzene TAP EL.

(b) Polycyclic Organic Matter (POM) and/or Polycyclic Aromatic Hydrocarbon (PAH), a subset of POM

BioEnergy Capital Corporation
Southfield Dairy BioRefinery
EU4 - Off-Spec and Pilot Flare Emissions

Design Parameters

917 Btu/scf, site-specific natural gas fuel heating value
5,020 scfm; maximum gas processing system throughput rate[f]
2.3 scfm; nominal flare pilot natural gas feed rate
5% fraction of off-spec gas sent to flare

Constants and Conversion Factors

2,000 lb/ton
20 hrs/yr; maximum annual off-spec gas operating hours
60 Conversion factor, min to hr
1.00E+06 Conversion factor, scf to MMscf, or btu to MMBtu
6.00E-05 Conversion factor, MMscf/hr to scfm, or MMBtu/hr to Btu/min

Global Warming Potentials (GWPs); 40 CFR 98, Subpart A, Table A-1

1 CO_2
25 Methane (CH_4)
298 Nitrous oxide (N_2O)

Calculated Values

251 scfm; **(MIFR-OSG)** 1-hour average off-spec gas flow rate
31.4 scfm; **(24FR-OSG)** effective 24-hour-average off-spec gas flow rate[e]
0.573 scfm; **(AAFR-OSG)** effective annual-average off-spec gas flow rate[e]
253 **scfm; 1-hour-average total gas flow rate**
33.7 **scfm; effective 24-hour-average total gas hourly flow rate**
2.87 **scfm; effective annual-average total gas flow rate**

Emission Rates

Pollutant	Emission Factor	Units	Effective Hourly Emissions (lb/hr)	Effective Annual Emissions (lb/hr)	Effective Annual Emissions (tons/yr)	Notes
PM	7.6	lb/MMscf	0.12	1.31E-03	5.74E-03	(a)
NOx	0.068	lb/MMBtu	0.948	1.07E-02	4.71E-02	(b)
CO	0.31	lb/MMBtu	4.32	4.90E-02	0.215	(b)
VOC	5.5	lb/MMscf	0.08	9.48E-04	4.15E-03	(a)
SO_2	0.6	lb/MMscf	1.82E-02	2.07E-04	9.06E-04	(a)(c)
Pb	0.0005	lb/MMscf	7.60E-06	8.62E-08	3.78E-07	(a)
CO_2	120,000	lb/MMscf	1820	20.69	91	(a)
CH_4	2.3	lb/MMscf	0.03	3.96E-04	1.74E-03	(a)
N_2O	2.2	lb/MMscf	0.03	3.79E-04	1.66E-03	(a)
Total CO_2e	N/A	N/A	1830	20.81	91	(d)

Notes:

(a) Emission factor source: AP-42 Table 1.4-2 (07/98), Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion. Emission rates for all PM sizes are assumed equal.

(b) Emission factor source: AP-42 Chapter 13.5 (12/16), Industrial Flares. NOx is listed in Table 13.5-1, and CO is listed in Table 13.5-2.

(c) SO_2 emission rate is doubled to account for potential off-spec sulfur content which is not expected to exceed 100 percent of natural gas specification.

(d) Carbon dioxide equivalent (CO_2e) emission rate is equal to the sum of individual emission rates for the three primary greenhouse gases CO_2, CH_4, and N_2O after multiplying each by its respective global warming potential value.

(e) According to the gas processing system designer, off-spec conditions will typically require only a half-hour to resolve. The effective 24-hour average off-spec gas flow rate calculation conservatively assumes off-spec conditions could persist for up to three hours per any 24-hour period. The effective annual average off-spec gas flow rate calculation assumes off-spec conditions would occur, on average, up to 40 times per year and last an average of 30 minutes per occurrence (i.e., 20 hours per year).

(f) Although the updated gas processing system will be designed to process more biogas (up to 6,300 scfm), this value remains unchanged because Bioenergy does not expect to flare more gas under non-emergency circumstances than presented in the original application.

Flare Potential Hazardous and Toxic Air Pollutant Emissions

CAS Nbr.	Pollutant	Emission Factor (lb/MMscf)	Emission Rates (lb/hr)	IDAPA Table[a]	Notes
7440382	Arsenic	2.00E-04	3.45E-08	586	
71432	Benzene	2.10E-03	3.62E-07	586	
7440417	Beryllium	1.20E-05	2.07E-09	586	
7440439	Cadmium	1.10E-03	1.90E-07	586	
7440473	Chromium	1.40E-03	2.83E-06	585	
7440484	Cobalt	8.40E-05	1.70E-07	585	
106467	1,4-Dichlorobenzene (para-)	1.20E-03	2.42E-06	585	b
50000	Formaldehyde	7.50E-02	1.29E-05	586	
110543	Hexane	1.80E+00	3.64E-03	585	
7439965	Manganese	3.80E-04	7.68E-07	585	
7439976	Mercury	2.60E-04	4.48E-08	Non-TAP	
91203	Naphthalene	6.10E-04	1.23E-06	585	
7440020	Nickel	2.10E-03	3.62E-07	586	
7782492	Selenium	2.40E-05	4.85E-08	585	
108883	Toluene	3.40E-03	6.87E-06	585	
Polyaromatic Hydrocarbons (except 7-PAH group)			--	--	c
91576	2-Methylnaphthalene	2.40E-05	4.14E-09	586	
56495	3-Methylcholanthrene	1.80E-06	3.10E-10	586	
57977	7,12-Dimethylbenz(a)anthracene	1.60E-05	2.76E-09	586	
83329	Acenaphthene	1.80E-06	3.10E-10	586	
120127	Anthracene	2.40E-06	4.14E-10	586	
191242	Benzo(g,h,i)perylene	1.20E-06	2.07E-10	586	
206440	Fluoranthene	3.00E-06	5.17E-10	586	
86737	Fluorene	2.80E-06	4.83E-10	586	
85018	Phenanathrene	1.70E-05	2.93E-09	Non-TAP	
129000	Pyrene	5.00E-06	8.62E-10	Non-TAP	
Polycyclic Organic Matter or 7-PAH group Sum of the following:			1.97E-09	586	d
56553	Benzo(a)anthracene	1.80E-06	3.10E-10	586	
205992	Benzo(b)fluoranthene	1.80E-06	3.10E-10	586	
205823	Benzo(k)fluoranthene	1.80E-06	3.10E-10	586	
53703	Dibenzo(a,h)anthracene	1.20E-06	2.07E-10	586	
218019	Chrysene	1.80E-06	3.10E-10	586	
193395	Indenol(1,2,3-cd)pyrene	1.80E-06	3.10E-10	586	
50328	Benzo(a)pyrene	1.20E-06	2.07E-10	586	

Flare Potential Toxic (non-HAP) Air Pollutant Emissions

CAS Nbr.	Pollutant	Emission Factor (lb/MMscf)	Emission Rates (lb/hr)	IDAPA Table[a]	Notes
95501	1,2-Dichlorobenzene (ortho-)	1.20E-03	2.42E-06	585	b
7440393	Barium	4.40E-03	8.89E-06	585	
7440508a	Copper (fume)	8.50E-04	1.72E-06	585	
7439987a	Molybdenum (soluble compounds)	1.10E-03	2.22E-06	585	
109660	Pentane	2.6	5.25E-03	585	
7440666	Zinc	2.90E-02	5.86E-05	585	

Notes:

General: Flare HAP emissions are not subject NESHAP standards and therefore are not exempt from demonstrating preconstruction compliance with toxic standards per IDAP 58.01.01.210.20. They will be assessed in the TAPs summary in comparison to DEQ emission screening levels.

General: HAP and TAP Emission factor source: AP-42 Table 1.4-3 (07/98).

(a) Non-carcinogenic pollutants (IDAPA Table 585) emission rates are based on 24-hour average natural gas flow rates for comparison with non-carcinogenic increments in IDAPA 58.01.01.585. Carcinogenic pollutants (IDAPA Table 586) emission rates are based on annual average natural gas flow rates for comparison with carcinogenic increments in IDAPA 58.01.01.586. The spreadsheet uses an "IF" function to apply the correct gas flow rate value based on the IDAPA section in which a particular TAP is listed.

(b) AP-42 provides an emission factor for total Dichlorobenze which comprises three chemical compounds: ortho-, meta-, and para-dichlorobenzene. The total factor will be used for each individual compound. IDAPA 58.0101.585 provides emission limits for ortho- and para- compounds. Clean Air Act Section 112(b) identifies para-Dichlorobenzene ("1,4-Dichlorobenzene(p)") as a HAP.

(c) Polyaromatic Hydrocarbons are considered TAPs (excluding the 7-PAH group) per IDAPA 58.0101.586

(d) An October 8, 2008 memorandum produced by Carl Brown of the Idaho DEQ states that the Polycyclic Organic Matter (POM) group should be considered one TAP with an equivalent potency to benzo(a)pyrene. Additional PAHs should be analyzed independently when evaluating carcinogenic risk.

BioEnergy Capital Corporation
Southfield Dairy BioRefinery
EU6 - Biogas Processing System

Design Parameters

2,611 scfm; Total effluent gas exhaust rate from the CO_2 removal (CarborexMS) system.
250 scfm; Total effluent gas exhaust rate from the desulfurization (SulfurexBR) system.
8,760 hrs/yr; Maximum operating hours

Constants and Conversion Factors

0.0026 lbmol/scf
60 min/hr
2000 lb/ton
0.7302 Ideal gas constant [(ft^3*atm)/(lb-mol*R)] -- *R*
528 °R; standard temperature (68 °F) -- *T*

Global Warming Potentials (GWPs); 40 CFR 98, Subpart A, Table A-1

1 CO_2
25 Methane (CH_4)

Potential Total Greenhouse Gas Emissions

Pollutant	Concentration[(a)] (vol %)	Volumetric Flow Rate (scfm)	Molecular Weight (lb/lb-mol)	Emission Rate (lb/hr)	Emission Rate (tpy)	CO_2e (tpy)
CH_4	4.20%	110	16.0	279	1221	30,525
CO_2	94.2%	2,460	44.0	17,153	75,128	75,128
Total CO_2e	--	--	--	--	--	105,654

Potential Total Toxic Air Pollutant Emissions

Pollutant	Concentration (ppmvd)	Molecular Weight (lb/lb-mol)	Emission Rate (lb/hr)[(b)]	Emission Rate (tpy)
Hydrogen Sulfide, H_2S	5	34.1	0.007	0.029

Notes:

General: Note that H_2S is not a listed HAP but is a listed TAP per IDAPA 58.01.01.585.

(a) Percentage of pollutant in sysem exhaust; design specification

(b) Emission rate (lb/hr) = Cv * Y * MWp / (R * T * 106) where:
Cv = pollutant concentration, ppmvd
Y = exhaust flow rate, dscf/hr
R = ideal gas constant, (ft^3*atm)/(lb-mol*R)
T = standard temprature, °R
MWp = molecular weight of the pollutant, lb/lb-mol

BioEnergy Capital Corporation
Southfield Dairy BioRefinery
EU7 - Piping Component Leaks Fugitive Emissions

Design Values
Gas Composition, mass% (see calculations below)

Raw Biogas (upstream of scrubber)[a]		Treated Biogas (downstream of scrubber)[a]		Stripping Air Outlet	
1.55%	VOC content	1%	VOC content	0.7%	VOC content
30%	CH4 content	93%	CH4 content	0.3%	CH4 content
0.29%	H2S content	0.0008%	H2S content	0.2%	H2S content
66%	CO2 content	5%	CO2 content	39%	CO2 content

8,760 hr/yr, maximum annual operating hours

Constants and Conversion Factors

2000	lb/ton
2.20	lb/kg
25	CH4 Global Warming Potential (GWP)

							BIOGENIC GREENHOUSE GASES					
Gas Component	**Count**	**TOC EF[b] (kg/hr/source)**	**VOC (lb/hr)**	**VOC (ton/yr)**	**H2S (lb/hr)**	**H2S (ton/yr)**	**CH4 (lb/hr)**	**CH4 (ton/yr)**	**CO2 (lb/hr)**	**CO2 (ton/yr)**	**CO2e (lb/hr)**	**CO2e (ton/yr)**
RAW BIOGAS (UPSTREAM OF SCRUBBER)												
Valves	60	4.50E-03	9.22E-03	4.04E-02	1.71E-03	7.51E-03	1.77E-01	7.75E-01	3.96E-01	1.73E+00	4.82E+00	21.11
Pump seals	0	2.40E-03	-	-	-	-	-	-	-	-	-	-
Compressor Seals	20	6.36E-01	4.35E-01	1.90E+00	8.08E-02	3.54E-01	8.34	36.52	1.86E+01	8.16E+01	2.27E+02	994.70
Other[c]	20	8.80E-03	6.01E-03	2.63E-02	1.12E-03	4.89E-03	1.15E-01	5.05E-01	2.58E-01	1.13E+00	3.14E+00	13.76
Connectors	150	2.00E-04	1.02E-03	4.49E-03	1.90E-04	8.34E-04	1.97E-02	8.61E-02	4.40E-02	1.93E-01	5.36E-01	2.35
Flanges	75	3.90E-04	9.99E-04	4.38E-03	1.86E-04	8.13E-04	1.92E-02	8.40E-02	4.29E-02	1.88E-01	5.22E-01	2.29
Open-ended lines	0	2.00E-03	-	-	-	-	-	-	-	-	-	-
TREATED BIOGAS (DOWNSTREAM OF SCRUBBER)												
Valves	40	4.50E-03	5.33E-03	2.33E-02	3.24E-06	1.42E-05	3.71E-01	1.62E+00	2.09E-02	9.16E-02	9.29E+00	40.67
Pump seals	0	2.40E-03	-	-	-	-	-	-	-	-	-	-
Compressor Seals	0	6.36E-01	-	-	-	-	-	-	-	-	-	-
Other[c]	20	8.80E-03	5.21E-03	2.28E-02	3.17E-06	1.39E-05	3.62E-01	1.59E+00	2.04E-02	8.95E-02	9.08E+00	39.77
Connectors	150	2.00E-04	8.88E-04	3.89E-03	5.40E-07	2.36E-06	6.18E-02	2.71E-01	3.48E-03	1.53E-02	1.55E+00	6.76
Flanges	75	3.90E-04	8.66E-04	3.79E-03	5.26E-07	2.31E-06	6.02E-02	2.64E-01	3.40E-03	1.49E-02	1.51E+00	6.61
Open-ended lines	0	2.00E-03	-	-	-	-	-	-	-	-	-	-
STRIPPING AIR OUTLET												
Valves	50	4.50E-03	3.28E-03	1.44E-02	8.64E-04	3.79E-03	1.67E-03	7.32E-03	1.94E-01	8.51E-01	2.36E-01	1.03
Pump seals	0	2.40E-03	-	-	-	-	-	-	-	-	-	-
Compressor Seals	0	6.36E-01	-	-	-	-	-	-	-	-	-	-
Other[c]	20	8.80E-03	5.21E-03	2.28E-02	6.76E-04	2.96E-03	3.62E-01	1.59E+00	2.04E-02	8.95E-02	9.08E+00	39.77
Connectors	150	2.00E-04	8.88E-04	3.89E-03	1.15E-04	5.05E-04	6.18E-02	2.71E-01	3.48E-03	1.53E-02	1.55E+00	6.78
Flanges	75	3.90E-04	8.66E-04	3.79E-03	1.12E-04	4.92E-04	6.02E-02	2.64E-01	3.40E-03	1.49E-02	1.51E+00	6.61
Open-ended lines	0	2.00E-03	-	-	-	-	-	-	-	-	-	-
Total Fugitive Emissions			0.47	2.08	0.09	0.38	10.0	43.8	19.6	86.1	269.9	1182

Notes:

(a) Gas compositions are taken from the Greenlane KAURI Biogas Upgrading System Process Diagram. The design engineers state that the VOC content of manure digester biogas is negligible; however, a conservative estimate of 1 vol% VOC is assumed for the raw biogas stream and 0.5 vol% VOC for the treated biogas and stripping air outlet streams. The percentages listed have been coverted from vol% to mass% to be consistent with the mass flow rate based emission factors.

(b) Total organic compounds (TOC) emission factor (EF). From Table 2-4, Oil and Gas Production Operations Average Emission Factors, of Protocol for Equipment Leak Emissions Estimates (EPA-453/R-95-017), November, 1995. Compressor seal emission factors are from Table 2-2, Refinery Average Emission Factors, from the same reference. All factors are for components in gas service.

(c) The "other" equipment factor is for compressors, diaphragms, drains, dump arms, instruments, meters, PRVs, polished rods, relief valves and vents. The compressor seals are broken out separately for the raw biogas, as that is the only stream fitted with compressors.

Design and Other Input Values

Stream Volume Flow Rates (scfm)

Raw Biogas	Treated Biogas	Stripping Air Outlet
5020	2662	7082

Volume Fractions (Design Values)

Raw Biogas	Treated Biogas	Stripping Air Outlet	
1%	0.5%	0.5%	VOC content
52.77%	97.49%	0.7%	CH4 content
0.24%	0.0004%	0.17%	H2S content
42.89%	2%	29.6%	CO2 content
4.05%		1.0%	H2O
		54.1%	N2
		14.3%	O2

Standard Conditions

14.7	Standard pressure (psia)
527.7	Standard temperature (°R, 68 °F)
10.73	Ideal gas constant [((ft^3)(psia))/((lb-mol)(°R))]
385.3	Standard molar volume (ft^3/lb-mol)

Site Conditions

25.9	Average barometric pressure from modeling input data (in Hg)
12.7	Average barometric pressure from modeling input data (psia)

Molecular Weights (lb/lb-mol)

44	VOC (as propane)
16	CH4
34.086	H2S
44	CO2
18	H2O
28	N2
32	O2

Volume Flow Rate (scfm)	Mass Flow Rate (lb/min)	Mass Fraction (%)	
Raw Biogas (upstream of scrubber)			
50.20	5.73	2%	VOC content (assumes no N2 or O2 in gas and some moisture is VOC)
2649.05	110	30%	CH4 content
12.04	1.07	0.29%	H2S content
2153.08	246	66%	CO2 content
156	7.27	2%	H2O content (adjusted to allow for VOC)
5020.00	369.98	1.00	Totals
Treated Biogas (downstream of scrubber)			
13.6	1.55	1%	VOC content (assumes no N2 or O2 in gas.)
2595.2	108	93.4%	CH4 content
0.011	0.0009	0.0008%	H2S content
53.2	6.08	5%	CO2 content
2662.00	115	1.00	Totals
Stripping Air Outlet			
35.4	4.04	1%	VOC content (assumes some moisture is VOC)
49.6	2.06	0.3%	CH4 content
12.04	1.07	0.17%	H2S content
2096.3	239	39%	CO2 content
3831.4	278	46%	N2
1012.7	84.1	14%	O2
44.6	2.08	0%	H2O content (adjusted to allow for VOC)
7082	611	1.00	Totals

APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSES

MEMORANDUM

DATE: October 10, 2017

TO: Tom Burnham, Permit Writer, Air Program

FROM: Darrin Mehr, Analyst, Air Program

PROJECT: P-2017.0035 PROJ 61903 – Permit to Construct (PTC) Application for Bioenergy Capital Corporation' s Southfield Dairy BioRefinery for the Initial Permit to Construct for the Facility Near Wendell, Idaho

SUBJECT: Demonstration of Compliance with IDAPA 58.01.01.203.02 (NAAQS) and 203.03 (TAPs)

Contents

Acronyms, Units, and Chemical Nomenclature

AAC	Acceptable Ambient Concentration of a Non-Carcinogenic TAP
AACC	Acceptable Ambient Concentration of a Carcinogenic TAP
ACFM	Actual cubic feet per minute
AERMAP	The terrain data preprocessor for AERMOD
AERMET	The meteorological data preprocessor for AERMOD
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
Air Rules	Rule for the Control of Air Pollution in Idaho, per IDAPA 58.01.01. et. al.
Appendix W	40 CFR 51, Appendix W – Guideline on Air Quality Models
ARM	Ambient Ratio Method
bhp	Brake horsepower
Bioenergy	Bioenergy Capital Corporation (permittee)
Bison	Bison Engineering, Inc. (Bioenergy Capital Corporation's modeling and permitting consultant)
BPIP	Building Profile Input Program
BRC	Below Regulatory Concern
Btu/hr	British Thermal Units per hour
Btu/scf	British Thermal Units per standard cubic feet of gaseous fuel
CFR	Code of Federal Regulations
CMAQ	Community Multi-Scale Air Quality Modeling System
CO	Carbon Monoxide
DEQ	Idaho Department of Environmental Quality
ekW	Electrical kilowatts
EL	Emissions Screening Level of a TAP
EPA	United States Environmental Protection Agency
fps	Feet per second
GEP	Good Engineering Practice
Hr(s)	Hour(s)
H_2S	Hydrogen Sulfide
Idaho Air Rules	Rules for the Control of Air Pollution in Idaho, located in the Idaho Administrative Procedures Act 58.01.01
ISCST3	Industrial Source Complex Short Term 3 dispersion model
K	Kelvin
m	Meters
m/s	Meters per second
MMBtu	Million British Thermal Units
MMBtu/hr	Million British Thermal Units per Hour
NAAQS	National Ambient Air Quality Standards
NED	National Elevation Dataset
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NEI	National Emissions Inventory
NWS	National Weather Service
O_3	Ozone
Pb	Lead

PM_{10}	Particulate matter with an aerodynamic particle diameter less than or equal to a nominal 10 micrometers
$PM_{2.5}$	Particulate matter with an aerodynamic particle diameter less than or equal to a nominal 2.5 micrometers
ppb	Parts Per Billion
PRIME	Plume Rise Model Enhancement
PTC	Permit to Construct
PTE	Potential to Emit
scf	Standard cubic feet
scfm	Standard cubic feet per minute
scfh	Standard cubic feet per hour
SDB	Southfield Dairy BioRefinery (Facility Name)
SIL	Significant Impact Level
SO_2	Sulfur Dioxide
TAP	Toxic Air Pollutant
tons/year	Ton(s) per year
T/yr	Tons per year
ULSD	Ultra Low Sulfur Diesel
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VCU	Vapor Control Unit
VOCs	Volatile Organic Compounds
°F	Degrees Fahrenheit
$\mu g/m^3$	Micrograms per cubic meter of air

1.0 Summary

1.1 General Project Summary

On June 5, 2017, Bioenergy Capital Corporation (Bioenergy) submitted an application for a Permit to Construct (PTC) for a proposed greenfield facility to generate natural gas pipeline grade biogas, referred to as "renewable natural gas" (RNG) from anaerobic digesters processing dairy and agricultural waste at a site located three miles southwest of Wendell, Idaho. The facility is referred to as the Southfield Dairy BioRefinery (SDB). Project-specific air quality impact analyses involving atmospheric dispersion modeling of estimated emissions associated with the facility were submitted to DEQ to demonstrate that the facility would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02 and 203.03 [Idaho Air Rules Section 203.02 and 203.03]). Bison Engineering (Bison), Bioenergy's permitting and modeling consultant, submitted analyses and applicable information and data to enable DEQ to evaluate potential impacts to ambient air.

Bison performed project-specific air quality impact analyses to demonstrate compliance with air quality standards for the proposed project. The project consisted of a PTC for the construction of the following emissions units that were specifically included in the ambient impact analyses:

- Two boilers each rated at 6.4 MMBtu/hr heat input fired exclusively on pipeline natural gas.
- Three reciprocating internal combustion engines (RICE) fired on pipeline natural gas which will generate electricity on a continuous basis for normal facility operations. Each engine is rated at 1,966 brake horsepower (bhp) and only two of the three engines will be operational at any time. Each RICE stack will be equipped with a heat recovery economizer.
- One enclosed flare sized for emergency conditions. Planned non-emergency flaring of off-specification treated biogas is an additional operating scenario included in the air impact analyses. Raw biogas is not flared under non-emergency conditions.

Bison performed project-specific air quality impact analyses to demonstrate compliance for facility-wide allowable emissions with air quality standards. The DEQ review summarized by this memorandum addressed only the rules, policies, methods, and data pertaining to the pollutant dispersion modeling analyses used to demonstrate that the estimated emissions associated with operation of the facility will not cause or significantly contribute to a violation of the applicable air quality standards. This review did not evaluate compliance with other rules or analyses that do not pertain to the air impact analyses. This modeling review also did not evaluate the accuracy of emissions estimates. Evaluation of emissions estimates was the responsibility of the permit writer and is addressed in the main body of the DEQ Statement of Basis.

The submitted air quality impact analyses: 1) utilized appropriate methods and models according to established DEQ/EPA rules, policies, guidance, and procedures; 2) was conducted using reasonably accurate or conservative model parameters and input data (review of emissions estimates was addressed by the DEQ permit writer); 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed either a) that estimated potential/allowable emissions are at a level defined as below regulatory concern (BRC) and do not require a NAAQS compliance demonstration, b) that predicted pollutant concentrations from emissions associated with the facility as modeled were below Significant Impact Levels (SILs) or other applicable regulatory thresholds; or c) that predicted pollutant concentrations from applicable emissions associated with the project as modeled, when appropriately combined with co-contributing sources and background concentrations, were below applicable National Ambient Air Quality Standards (NAAQS) at ambient air locations where and when the project has a significant impact; 5) showed that Toxic Air Pollutant (TAP) emissions increases associated with the project that are subject to modeling requirements do not result in increased emissions above applicable screening emission limits and modeling was not required to demonstrate compliance with any TAPs increments. Table 1 presents key assumptions and results to be considered in the development of the permit.

Table 1. KEY CONDITIONS USED IN MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
Biogas Fuel Sulfur Content Assumptions Facility-wide potential annual emissions of SO_2 were limited to a level far below the 4 tons per year BRC modeling threshold based on combusting pipeline-supplied natural gas in all internal combustion (IC) engines and boilers meeting pipeline specification for sulfur content, and all off off-specification biogas flaring was limited to 200% of the sulfur content pipeline specification.	Annual facility-wide potential to emit of SO_2 was limited to 0.11 tons/year. SO_2 SIL and NAAQS ambient impact analyses were not required because potential annual emissions of SO_2 were far below the BRC modeling threshold of 4 tons/year due to the proposed pipeline grade fuel specification in the facility's RICE and boiler emissions units and limited flaring operations of on-site produced biogas.
Non-Emergency Flaring Assumptions and Limitations (model ID FLARE) Ambient impacts due to flaring of off-specification biogas were limited because the analyses were modeled below maximum capacity based on hours of operation and quantities of off-specification biogas flared. This also limited potential to emit for the project. A pipeline-supplied natural gas pilot of 2.3 scfm was assumed to operate at all times for the flare. Flare emissions consist of pilot flame and off-specification biogas. Short-term non-emergency flare operations were modeled at 251 scfm of off-specification biogas flow rate for the 1-hour period, 24-hour average flaring emissions were modeled at 3 hours of non-emergency flaring at the 251 scfm off-specification biogas flow rate in any 24-hour period. Annual average flaring emissions accounted for 20 hours of non-emergency flaring at the 251 scfm flow rate of off-specification biogas. Very limited operations were assumed for off-specification flaring. The limited basis of annual off-specification biogas flaring is demonstrated showing that the quantity of pilot flame gas combusted is four times larger than the quantity of off-specification biogas combusted on the annual basis.	Modeled restrictions in flare operations are critical to NAAQs compliance assurance. If operations are not inherently limited, then the issued permit must include specific restrictions to assure NAAQS compliance. Potential SO_2 emissions were far below the BRC thresholds triggering NAAQS compliance demonstration requirements, primarily based on the annual operation assumption and flaring of 251 scfm of off-specification biogas that had been treated to remove H_2S to 200% of pipeline specification or less. Ambient impacts were minimized from the flare using these assumptions. **Amount of off-specification biogas quantities flared for each averaging period:** 1-hour basis: 15,060 scf, 24-hour basis: 45,180 scf, and, Annual basis: 301,200 scf. **Pilot flame combustion**: 1-hour basis: 138 scf, 24-hour basis: 3,312 scf, and, Annual basis: 1,209,000 scf.
Internal Combustion Engines and Generators (model IDs RICE1, RICE2, and RICE3) Three reciprocating internal combustion engines are proposed, each powering a 1,429 ekW electrical generator and rated at 1,966 bhp mechanical output. Only two of the three engines will be operated simultaneously at any time. The third engine will be idle.	This operating restriction limits ambient impacts for the facility for the both SIL and NAAQS compliance demonstrations, and this must be representative of design capacity or as limited by a permit condition. The two operational RICE emissions units were modeled based on continuous operation at 24 hours per day and 8,760 hours per year. The third remaining RICE unit was included in the modeling as idle with zero emissions.

Table 1. KEY CONDITIONS USED IN MODELING ANALYSES	
Stack Parameters BOILER1 and BOILER2: Each stack was assumed to terminate 46 feet above grade with a diameter of 1.0 feet. Release orientation is vertical and uninterrupted—without a rain cap. RICE1, RICE2, and RICE3 Each stack was assumed to terminate 46 feet above grade with a diameter of 1.5 feet. Release orientation is vertical and uninterrupted—without a rain cap. FLARE: The flare was assumed to be a jacketed – or enclosed flare – with a stack termination 50 feet above grade and 13 feet in diameter.	SIL and NAAQS compliance have not been demonstrated using stack heights less than modeled or with stacks with a larger exit diameter than modeled, or with stacks with impeded exhaust flow. The boilers are located within a structure with a tier height of 40 feet above grade. Two additional structures have tier heights of 50 feet above grade. The stacks for RICE1, RICE2 and RICE3 are located near these structures and are affected by them for building-induced downwash.
Boilers (model IDs BOILER1, BOILER2) The boilers were modeled applying concurrent operation at all times with unrestricted operating hours at full load.	The SIL and NAAQS ambient impact analyses accounted for unlimited operating hours at full capacity for the boilers.

Air impact analyses are required by Idaho Air Rules to be conducted according to methods outlined in 40 CFR 51, Appendix W (Guideline on Air Quality Models). Appendix W requires that facilities be modeled using emissions and operations representative of design capacity or as limited by a federally enforceable permit condition. The submitted information and analyses demonstrated to the satisfaction of the Department, using DEQ/EPA established guidance, policies, and procedures, that operation of the proposed facility or modification will not cause or significantly contribute to a violation of any ambient air quality standard, provided the key conditions in Table 1 are representative of facility design capacity or operations as limited by a federally enforceable permit condition.

1.2 Summary of Submittals and Actions

March 1, 2017: Bison submitted a modeling protocol to DEQ, on behalf of Bioenergy SDB, via email.

March 30, 2017: DEQ issued a modeling protocol approval letter with comments.

June 5, 2017: DEQ received a permit to construct (PTC) application from Bison, on behalf of Bioenergy for the SDB facility.

June 22, 2017: DEQ declared the application incomplete.

July 5, 2017: DEQ received an incompleteness response from Bison and Bioenergy, including revised modeling files.

August 2, 2017: DEQ declared the application complete.

August 15, 2017: Bison submitted a change of design to the primary biomethane gas processing units. An increased biogas throughput resulted in a reduced off specification biogas slip stream percentage from 5% to 4%. No revised modeling was submitted based upon this assumption.

August 22, 2017: DEQ's Project Permit Writer confirmed the changes to the project will result in a reduction in emissions and will not affect modeled emissions rates.

September 29, 2017: The draft permit package including the draft modeling memorandum was issued to Bioenergy for facility draft review and comment.

All three submittals (June 5, July 5, and August 15, 2017) were used to support the final ambient impact analyses and should be included in any public comment package.

2.0 Background Information

2.1 Permit Requirements for Permits to Construct

PTCs are issued to authorize the construction of a new source or modification of an existing source or permit. Idaho Air Rules Section 203.02 requires that emissions from the new source or modification not cause or significantly contribute to a violation of an air quality standard, and Idaho Air Rules Section 203.03 requires that emissions from a new source or modification comply with applicable toxic air pollutant (TAP) increments of Idaho Air Rules Sections 585 and 586.

2.2 Project Location and Area Classification

The facility will be located near Wendell, Idaho, in Gooding County. This area is designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}), and particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers ($PM_{2.5}$).

2.3 Modeling Applicability for Criteria Pollutants

This section describes the evaluation used for this project to determine whether site-specific air impact modeling is required.

2.3.1 Below Regulatory Concern and DEQ Modeling Guideline Level I and II Thresholds

Idaho Air Rules Section 203.02 state that a PTC cannot be issued unless the application demonstrates to the satisfaction of DEQ that the new source or modification will not cause or significantly contribute to a NAAQS violation. Atmospheric dispersion modeling is used to evaluate the potential impact of a proposed project to ambient air and demonstrate NAAQS compliance. However, if the emissions associated with a project are very small, project-specific modeling analyses may not be necessary.

If project-wide potential to emit (PTE) values for criteria pollutants would qualify for a below regulatory concern (BRC) permit exemption as per Idaho Air Rules Section 221 if it were not for potential emissions of one or more criteria pollutants exceeding the BRC threshold of 10% of emissions defined by Idaho Air Rules as significant, then an air impact analysis may not be required for those pollutants. DEQ's regulatory interpretation policy[1] of exemption provisions of Idaho Air Rules Section 221 is that: "A DEQ NAAQS compliance assertion will not be made by the DEQ modeling group for specific criteria pollutants having a project emissions increase below BRC levels, provided the proposed project would have qualified for a Category I Exemption for BRC emissions quantities except for the emissions of another criteria pollutant." The interpretation policy also states that the exemption criteria of uncontrolled PTE not to exceed 100 ton/year (Idaho Air Rules Section 220.01.a.i) is not applicable when evaluating whether a NAAQS impact analyses is required. A permit will be issued limiting PTE below 100 ton/year, thereby negating the need to maintain calculated uncontrolled PTE under 100 ton/year.

Site-specific air impact analyses may not be required for a project, even when the project cannot use the BRC exemption from the NAAQS demonstration requirements. If the emissions increases associated with a project are below modeling applicability thresholds established in the *Idaho Air Modeling Guideline* ("State of Idaho Guideline for Performing Air Quality Impact Analyses[2]," available at http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf), then a project-specific analysis is not required. Modeling applicability emissions thresholds were developed by DEQ based on modeling of a hypothetical source and were designed to reasonably ensure that impacts are below the applicable SIL. DEQ has established two threshold levels: Level 1 thresholds are unconditional thresholds, requiring no DEQ approval for use; Level 2 thresholds are conditional upon DEQ approval, which depends on evaluation of the project and the site, including emissions quantities, stack parameters, number of sources emissions are distributed amongst, distance between the sources and the ambient air boundary, and the presence of sensitive receptors near the ambient air boundary.

As shown below in Table 2, facility-wide emissions of PM_{10}, $PM_{2.5}$, NO_x, and CO exceeded the BRC thresholds, and a NAAQS compliance demonstration was required for these pollutants. SIL and NAAQS compliance demonstrations were not required for SO_2 and lead emissions. See Section 2.3.2 of this memorandum to review DEQ's evaluation process for emissions of VOCs (and NOx) as a trigger for modeling to demonstrate compliance with the ozone ambient standard. This project's initial emissions inventory and modeling applicability evaluation, based on the March 1, 2017, modeling protocol and protocol emissions inventory, was altered based on process design changes submitted via email by Bison Engineering, on behalf of Bioenergy, in an August 15, 2017 permit application revision/addendum. Table 2 reflects the emissions inventory submitted in the August 15, 2017, application revision.

Table 2. CRITERIA POLLUTANT NAAQS COMPLIANCE DEMONSTRATION APPLICABILITY

Criteria Pollutant	Below Regulatory Concern Level (tons/year)	Applicable Facility-Wide Potential Emissions (tons/year)	NAAQS Compliance Exempted per BRC Policy?
PM_{10}[a]	1.5	1.77	No
$PM_{2.5}$[b]	1.0	1.77	No
Carbon Monoxide (CO)	10.0	78.6	No
Sulfur Dioxide (SO_2)	4.0	0.11	Yes
Nitrogen Oxides (NOx)	4.0	40.4	No
Lead (Pb)	0.06	3.1E-05	Yes
Ozone as VOCs or NOx	4.0	29.7 tons/year as VOC	No[c]

a. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
c. See Section 2.3.2 of this memorandum to review DEQ's evaluation of modeling applicability for the ozone ambient standard.

2.3.2 Ozone Modeling Applicability

Ozone (O_3) differs from other criteria pollutants in that it is not typically emitted directly into the atmosphere. O_3 is formed in the atmosphere through reactions of VOCs, NO_x, and sunlight. Atmospheric dispersion models used in stationary source air permitting analyses (see Section 3.3.3) cannot be used to estimate O_3 impacts resulting from VOC and NOx emissions from an industrial facility. O_3 concentrations resulting from area-wide emissions are predicted by using more complex airshed models such as the Community Multi-Scale Air Quality (CMAQ) modeling system. Use of the CMAQ model is very resource intensive and DEQ asserts that performing a CMAQ analysis for a particular permit application is not typically a reasonable or necessary requirement for air quality permitting.

Addressing secondary formation of O_3 has been somewhat addressed in EPA regulation and policy. As stated in a letter from Gina McCarthy of EPA to Robert Ukeiley, acting on behalf of the Sierra Club (letter from Gina McCarthy, Assistant Administrator, United States Environmental Protection Agency, to Robert Ukeiley, January 4, 2012):

> *. . . footnote 1 to sections 51.166(I)(5)(I) of the EPA's regulations says the following: "No de minimis air quality level is provided for ozone. However, any net emission increase of 100 tons per year or more of volatile organic compounds or nitrogen oxides subject to PSD would be required to perform an ambient impact analysis, including the gathering of air quality data."*
>
> *The EPA believes it unlikely a source emitting below these levels would contribute to such a violation of the 8-hour ozone NAAQS, but consultation with an EPA Regional Office should still be conducted in accordance with section 5.2.1.c. of Appendix W when reviewing an application for sources with emissions of these ozone precursors below 100 TPY."*

Allowable emissions estimates of VOCs at 29.7 tons/year and NOx at 40.4 tons/year are well below the 100 tons/year threshold, and DEQ determined it was not appropriate or necessary to require a quantitative source specific O_3 impact analysis.

2.3.3 Secondary Particulate Formation Modeling Applicability

The impact from secondary particulate formation resulting from emissions of NOx, SO_2, and/or VOCs was assumed by DEQ to be negligible on the basis of the magnitude of emissions and the short distance from emissions sources to modeled receptors where maximum PM_{10} and $PM_{2.5}$ impacts would be anticipated.

2.4 Significant and Cumulative NAAQS Impact Analyses

If maximum modeled pollutant impacts to ambient air from emissions sources associated with a new facility or the emissions increase associated with a modification exceed the SILs of Idaho Air Rules Section 006 (referred to as a significant contribution in Idaho Air Rules) or as incorporated by reference as per Idaho Air Rules Section 107.03.b, then a cumulative NAAQS impact analysis is necessary to demonstrate compliance with NAAQS and Idaho Air Rules Section 203.02. A cumulative NAAQS impact analysis may also be required for permit revisions driven by compliance/enforcement actions, any correction of emissions limits or other operational parameters that may affect pollutant impacts to ambient air, or other cases where DEQ believes NAAQS may be threatened by the emissions associated with the facility or proposed project.

A cumulative NAAQS impact analysis for attainment area pollutants involves assessing ambient impacts, according to established DEQ/EPA guidance, policies, and procedures, from applicable facility-wide emissions and emissions from any nearby co-contributing sources. A DEQ-approved background concentration value is then added to the modeled result that is appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting pollutant concentrations in ambient air are then compared to the NAAQS listed in Table 3. Table 3 also lists SILs and specifies the modeled design value that must be used for comparison to the

NAAQS. NAAQS compliance is evaluated on a receptor-by-receptor basis.

Table 3. APPLICABLE REGULATORY LIMITS				
Pollutant	**Averaging Period**	**Significant Impact Levels[a] ($\mu g/m^3$)[b]**	**Regulatory Limit[c] ($\mu g/m^3$)**	**Modeled Design Value Used[d]**
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd highest[n]
Sulfur Dioxide (SO_2)	1-hour	3 ppb[o] (7.8 $\mu g/m^3$)	75 ppb[p] (196 $\mu g/m^3$)	Mean of maximum 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
Nitrogen Dioxide (NO_2)	1-hour	4 ppb (7.5 $\mu g/m^3$)	100 ppb[s] (188 $\mu g/m^3$)	Mean of maximum 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st highest[n]
Ozone (O_3)	8-hour	40 TPY VOC[v]	70 ppb[w]	Not typically modeled

a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
b. Micrograms per cubic meter.
c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
f. Not to be exceeded more than once per year on average over 3 years.
g. Concentration at any modeled receptor when using five years of meteorological data.
h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
k. 3-year mean of annual concentration.
l. 5-year mean of annual averages at the modeled receptor.
m. Not to be exceeded more than once per year.
n. Concentration at any modeled receptor.
o. Interim SIL established by EPA policy memorandum.
p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
r. Not to be exceeded in any calendar year.
s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
u. 3-month rolling average.
v. An annual emissions rate of 40 ton/year of VOCs is considered significant for O_3.
w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

If the cumulative NAAQS impact analysis shows a violation of the standard, the permit cannot be issued if the proposed project or facility has a significant contribution (exceeding the SIL) to the modeled violation. This evaluation is made specific to both time and space. The facility or project does not have a significant contribution to a violation if impacts are below the SIL at all specific receptors showing violations during the time periods when modeled violations occurred.

Compliance with Idaho Air Rules Section 203.02 is demonstrated if: a) specific applicable criteria pollutant emissions increases are at a level defined as Below Regulatory Concern (BRC), using the criteria established by DEQ regulatory interpretation[1]; or b) all modeled impacts of the SIL analysis are below the applicable SIL or other level determined to be inconsequential to NAAQS compliance; or c) modeled design values of the cumulative NAAQS impact analysis (modeling applicable emissions from the facility and co-contributing sources, and adding a background concentration) are less than applicable NAAQS at receptors where impacts from the proposed facility/modification exceeded the SIL or other identified level of consequence; or d) if the cumulative NAAQS analysis showed NAAQS violations, the impact of proposed facility/modification to any modeled violation was inconsequential (typically assumed to be less than the established SIL) for that specific receptor and for the specific modeled time when the violation occurred.

2.5 Toxic Air Pollutant Analyses

Emissions of toxic substances are generally addressed by Idaho Air Rules Section 161:

> *Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation.*

Permitting requirements for toxic air pollutants (TAPs) from new or modified sources are specifically addressed by Idaho Air Rules Section 203.03 and require the applicant to demonstrate to the satisfaction of DEQ the following:

> *Using the methods provided in Section 210, the emissions of toxic air pollutants from the stationary source or modification would not injure or unreasonably affect human or animal life or vegetation as required by Section 161. Compliance with all applicable toxic air pollutant carcinogenic increments and toxic air pollutant non-carcinogenic increments will also demonstrate preconstruction compliance with Section 161 with regards to the pollutants listed in Sections 585 and 586.*

Per Section 210, if the total project-wide emissions increase of any TAP associated with a new source or modification exceeds screening emission levels (ELs) of Idaho Air Rules Section 585 or 586, then the ambient impact of the emissions increase must be estimated. If ambient impacts are less than applicable Acceptable Ambient Concentrations (AACs) for non-carcinogens of Idaho Air Rules Section 585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of Idaho Air Rules Section 586, then compliance with TAP requirements has been demonstrated.

Idaho Air Rules Section 210.20 states that if TAP emissions from a specific source are regulated by the Department or EPA under 40 CFR 60, 61, or 63, then a TAP impact analysis under Section 210 is not required for that TAP. The DEQ permit writer evaluates the applicability of specific TAPs to the Section 210.20 exclusion. TAPs modeling was not triggered for this project.

3.0 Analytical Methods and Data

This section describes the methods and data used in analyses to demonstrate compliance with applicable air quality impact requirements.

3.1 Overview of Analysis

Bison performed project-specific air impact analyses that were determined by DEQ to be reasonably representative of the facility, using established DEQ policies, guidance, and procedures. Results of the submitted analyses, in combination with DEQ's analyses, demonstrated compliance with applicable air quality standards to DEQ's satisfaction, provided the facility is operated as described in the submitted application and in this memorandum.

Table 4 provides a brief description of parameters used in the modeling analyses.

Table 4. MODELING PARAMETERS		
Parameter	**Description/Values**	**Documentation/Addition Description**
General Facility Location	Near Wendell, Idaho	The area is an attainment or unclassified area for all criteria pollutants.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 16216r.
Meteorological Data	Jerome	2008-2012—See Section 3.3 of this memorandum. Surface data from the Jerome airport and upper air data from Boise, Idaho.
Terrain	Considered	Receptor, building, and emissions source stack base elevations were determined using USGS 1 arc second National Elevation Dataset (NED) files based on the NAD83 datum. The facility is located within Zone 11.
Building Downwash	Considered	Plume downwash was considered for the structures associated with the facility and numerous nearby structures.
Receptor Grid	**Criteria Air Pollutants**	
	Grid 1	20-meter spacing along the ambient air boundary.
	Grid 2	50-meter spacing in a grid extending roughly 1,000 meters radially from the ambient air boundary.
	Grid 3	100-meter spacing in a rectangular grid extending roughly 2,000 meters radially from Grid 2.
	Grid 4	500-meter spacing in rectangular grid extending roughly 1,500 meters at a minimum radially from Grid 3.
	Grid 5	1,000-meter spacing in a rectangular grid extending roughly 14,000 meters at a minimum radially from Grid 4.
	Hot Spot Grid	10-meters maximum spacing along ambient air boundary outward to a distance of 100 meters along the southwestern corner of the facility. (Only used for 24-hour $PM_{2.5}$ NAAQS impacts)

3.1.1 Modeling Protocol

A modeling protocol was submitted to DEQ on March 2, 2017. On March 30, 2017, DEQ issued a conditional modeling protocol approval letter to Bison for the Bioenergy project. Project-specific modeling was conducted using data and methods described in the modeling protocol and the *Idaho Air Modeling Guideline*[2].

3.1.2 Model Selection

Idaho Air Rules Section 202.02 requires that estimates of air pollutant concentrations in ambient air be based on air quality models specified in 40 CFR 51, Appendix W (Guideline on Air Quality Models). The refined, steady state, multiple-source, Gaussian dispersion model AERMOD was promulgated as the replacement model for ISCST3 in December 2005. AERMOD retains the single straight line trajectory of ISCST3, but includes more advanced algorithms to assess turbulent mixing processes in the planetary boundary layer for both convective and stable stratified layers.

Bison used AERMOD version 16216r to evaluate pollutant impacts to ambient air from the facility, which is the current version of AERMOD.

NO_2 1-hour impacts can be assessed using a tiered approach to account for $NO/NO_2/O_3$ chemistry.

Tier 1 assumes full conversion of NO to NO_2. Tier 2 Ambient Ratio Method (ARM) assumes a 0.80 default ambient ratio of NO_2/NOx. Tier 2 ARM2[3] was recently developed and replaces the previous ARM. Recent EPA guidance[4] on compliance methods for NO_2 states the following for ARM2:

> "This method is based on an evaluation of the ratios of NO_2/NO_x from the EPA's Air Quality System (AQS) record of ambient air quality data. The ARM2 development report (API, 2013) specifies that ARM2 was developed by binning all the AQS data into bins of 10 ppb increments for NO_x values less than 200 ppb and into bins of 20 ppb for NO_x in the range of 200-600 ppb. From each bin, the 98th percentile NO_2/NO_x ratio was determined and finally, a sixth-order polynomial regression was generated based on the 98th percentile ratios from each bin to obtain the ARM2 equation, which is used to compute a NO_2/NO_x ratio based on the total NO_x levels."

Tier 3 methods account for more refined assessment of the NO to NO_2 conversion, using a supplemental modeling program with AERMOD to better account for $NO/NO_2/O_3$ atmospheric chemistry. Either the Plume Volume Molar Ratio Method (PVMRM) or the Ozone Limiting Method (OLM) can be specified within the AERMOD input file for the Tier 3 approach. EPA guidance (Memorandum: from Tyler Fox, Leader, Air Quality Modeling Group, C439-01, Office of Air Quality Planning and Standards, USEPA; to Regional Air Division Directors. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard.* March 01, 2011) has not indicated a preference for one option over the other (PVMRM vs OLM) for particular applications.

The Tier 2 ARM2 and Tier 3 PVMRM and OLM methods are now regulatory options following the publication of final changes to EPA's Guideline on Air Quality Models on January 17, 2017. Bison used the Tier 2 ARM2 method with regulatory default minimum and maximum ARM values of 0.5 and 0.9, respectively.

The Beta algorithms for treatment of point sources with horizontal release orientation or equipped with a rain cap that impedes the vertical momentum of exhaust plumes were adopted as guideline techniques with the revisions to Appendix W (Guideline on Air Quality Models). The Appendix W final rule was signed by the Administrator on December 2016, and published in the January 17, 2017 in the Federal Register. This method eliminates momentum-induced plume rise while still accounting for thermal buoyancy induced plume rise. This method was not applied to any stacks for this project.

3.2 Background Concentrations

A background concentration tool was used to establish ambient background concentrations for this project. A beta version of the background concentration tool was developed by the Northwest International Air Quality Environmental Science and Technology Consortium (NW AIRQUEST) and provided through Washington State University (located at http://lar.wsu.edu/nw-AIRQUEST/lookup.html). The tool uses regional scale modeling of pollutants in Washington, Oregon, and Idaho, with modeling results adjusted according to available monitoring data. The background concentration is added to the design value for each pollutant and averaging period. Table 5 lists the background concentrations approved by DEQ in the March 30, 2017 conditional modeling protocol approval letter.

Table 5. DEQ-RECOMMENDED AMBIENT BACKGROUND CONCENTRATIONS		
Pollutant	**Averaging Period**	**Background Concentration ($\mu g/m^3$)[a, b]**
PM_{10}[f]	24-hour	53[c]
$PM_{2.5}$[g]	24-hour	29
	Annual	9.2
Ozone[d]	Annualized value	66 ppb[e]
NO_2[h]	1-hour	16 (8.7 ppb)
	Annual	3.2 (1.7 ppb)
CO[i]	1-hour	1,538 (1,343 ppb)
	8-hour	899 (621 ppb)

a. Micrograms per cubic meter, except where noted otherwise.
b. Northwest AirQuest ambient background lookup tool. See http://lar.wsu.edu/nw-airquest/lookup.html, except where noted otherwise.
c. Without extreme values.
d. Ozone for use in 1-hour nitrogen dioxide modeling using Tier 3 Ozone Limiting Method or Tier 3 Plume Volume Molar Ratio Method.
e. Parts per billion by volume.
f. Particulate matter with an aerodynamic diameter of 10 microns.
g. Particulate matter with an aerodynamic diameter of 2.5 microns.
h. Nitrogen dioxide.
i. Carbon monoxide.

3.3 Meteorological Data

DEQ provided Bison with an AERMOD-ready meteorological dataset for use in the modeling analyses. The dataset was generated from monitored data collected from 2008-2011 at the Jerome County airport (FAA airport code KJER) for surface and Automated Surface Observing System (ASOS) data and upper air data from the National Weather Service (NWS) Station site (site ID 72681-24131). Surface characteristics were determined by DEQ staff using AERSURFACE version 13016. AERMINUTE version 11325 was used to process ASOS wind data for use in AERMET. AERMET Version 12345 was used to process surface and upper air data and to generate a model-ready meteorological data input file. DEQ determined these data were representative for the proposed facility's location and approved use of this dataset for the project.

Figure 1 presents the surface data wind rose for the meteorological dataset, which provides information on wind direction, wind speed, and frequency. Figure 2 presents a histogram of the surface wind speed frequency.

Figure 1. Jerome Surface Met Data Wind Rose 2008-2012

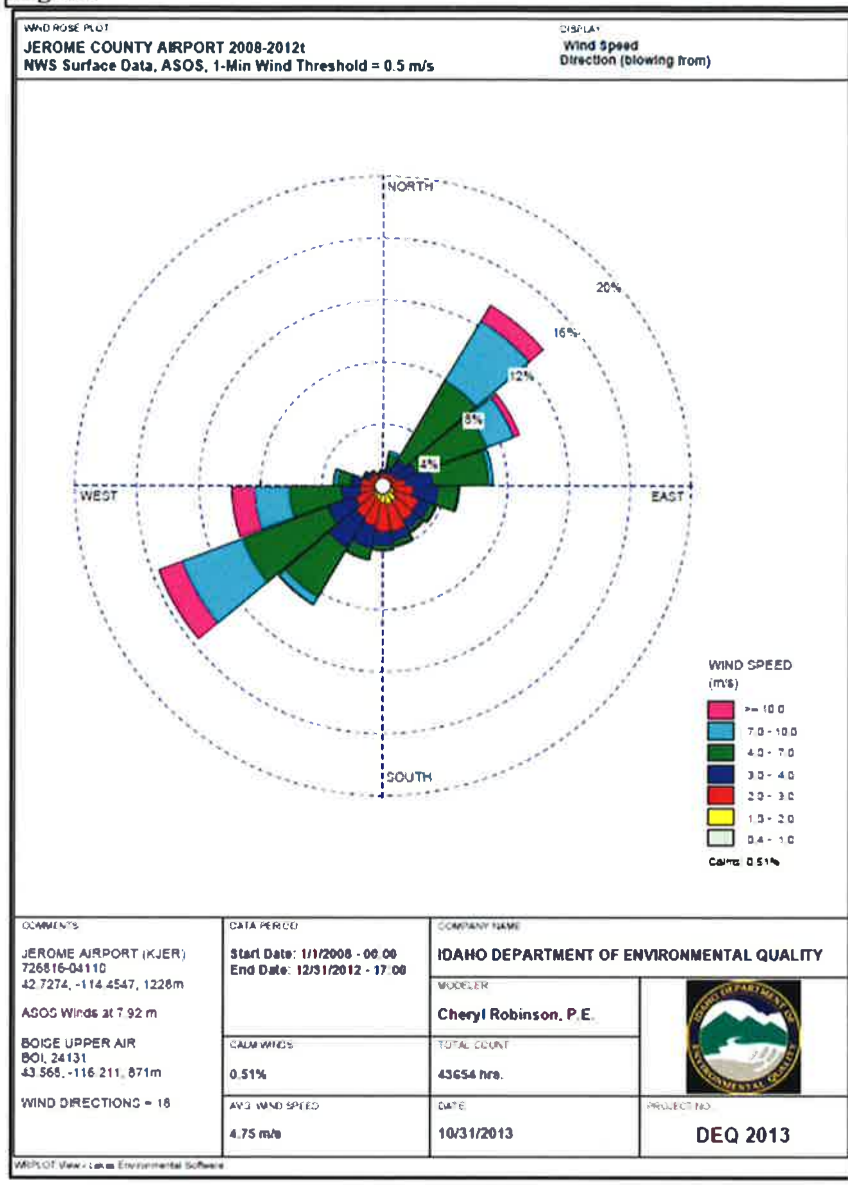
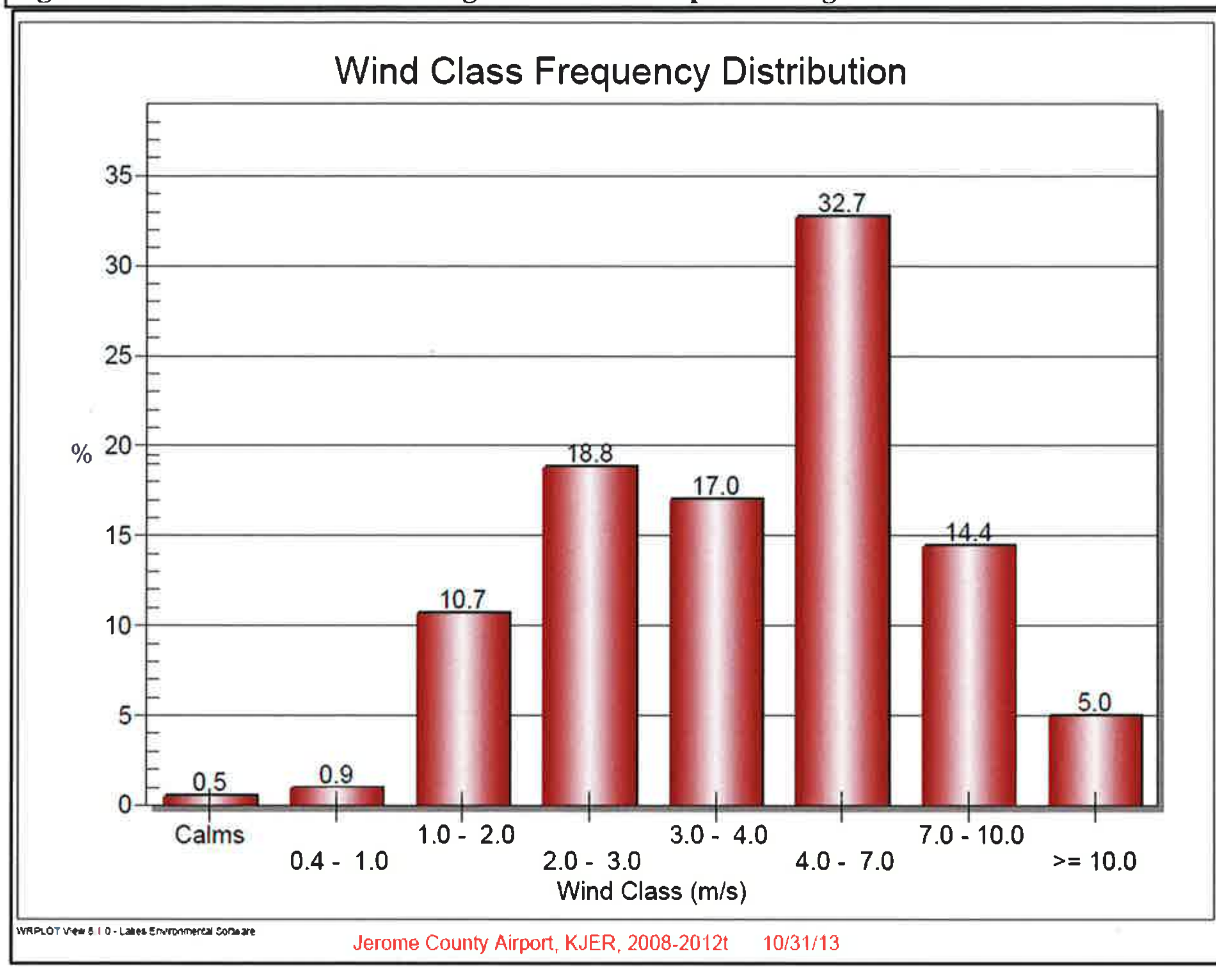


Figure 2. Jerome Surface Meteorological Data Wind Speed Histogram 2008-2012



3.4 Terrain Effects

Bison used a National Elevation Dataset (NED) file, in "tif" format and in the NAD83 datum, to calculate elevations of receptors. A 1 arc second file provided 30-meter resolution of elevation data. The terrain preprocessor AERMAP version 11103 was used to extract the elevations from the NED file and assign them to receptors in the modeling domain in a format usable by AERMOD. AERMAP also determined the hill-height scale for each receptor. The hill-height scale is an elevation value based on the surrounding terrain which has the greatest effect on that individual receptor. AERMOD uses those heights to evaluate whether the emissions plume has sufficient energy to travel up and over the terrain or if the plume will travel around the terrain.

3.5 Building Downwash Effects on Modeled Impacts

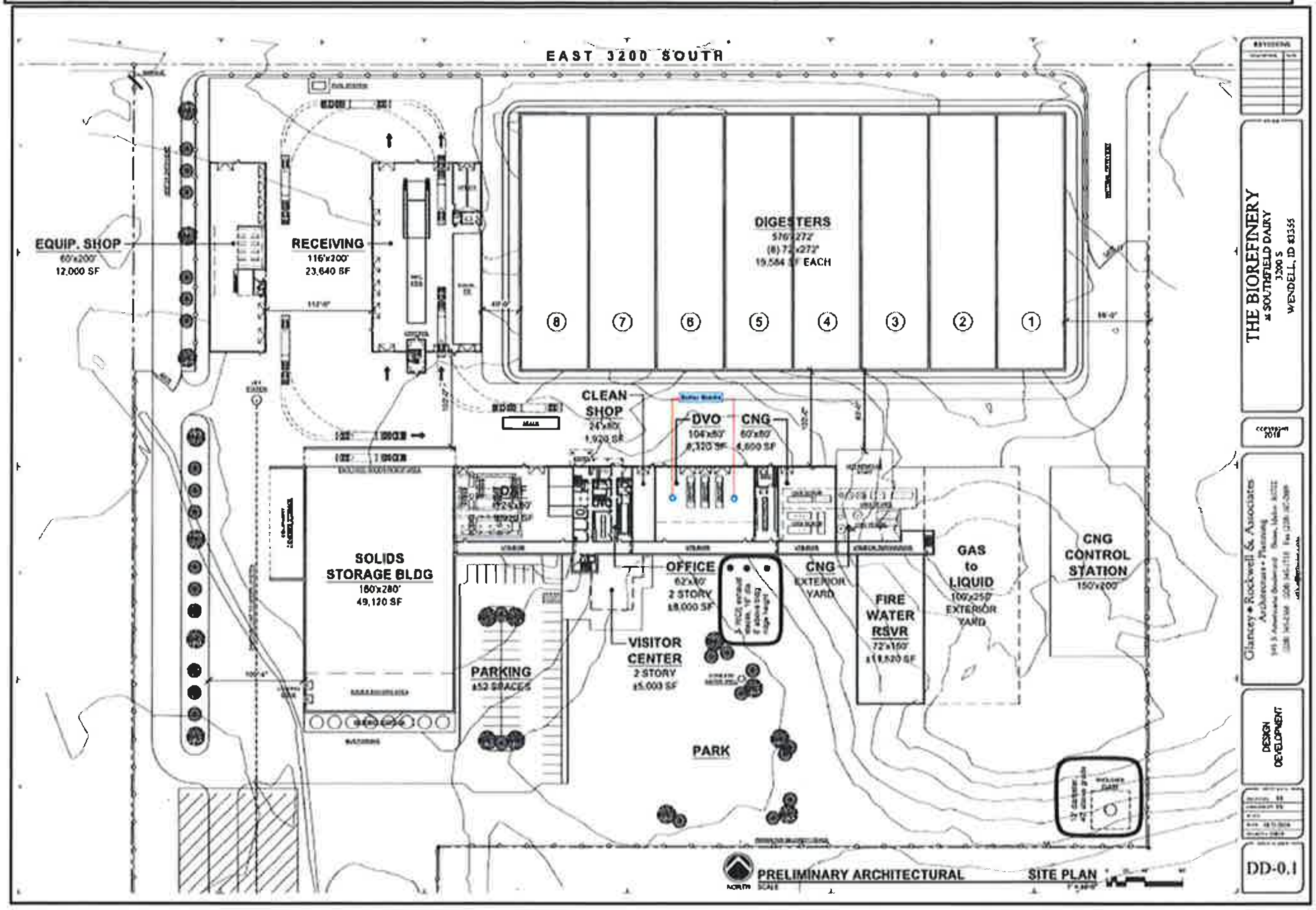
Potential downwash effects on the emissions plume were accounted for in the model by using building dimensions and locations as described by Bison. The Building Profile Input Program for the PRIME downwash algorithm (BPIP-PRIME) was used to calculate direction-specific dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and release parameters for input to AERMOD. Modeled structure base elevations and stack base elevations matched, thereby assuring that downwash is appropriately handled in the model, and they appeared to be based on terrain data for the site, as verified by a comparison of the ambient air boundary receptor elevations. Base elevations of stacks not located within the confines of a structure also appeared to have been determined using the terrain elevation data. The IC engine stacks (RICE1, RICE2, and RICE3) and the enclosed flare (FLARE) stack base elevations followed this approach. Building heights, stack release heights, and base elevations of the structures and stacks were assumed by DEQ to be representative for the project. The project is a greenfield facility and has not been constructed at this time. DEQ concluded that the building downwash was appropriately evaluated.

3.6 Facility Layout

Figure 2 of the submitted project modeling report depicted the facility layout. DEQ exported the model setup to Google Earth, and the graphic is presented below in Figure 3. Note that this export did not include the engine RICE3. The three engine stacks will be located immediately next to one another as shown in Figure 4 below, which is a copy of the permit application's facility design diagram presented in Appendix E of the application. The modeling setup appeared to accurately reflect the layout presented in the design schematic.

Figure 3. Export of Modeling Setup of Bioenergy Facility to Google Earth

Figure 4. Bioenergy Southfield Dairy BioRefinery Planned Layout



3.7 Ambient Air Boundary

The ambient air boundary used for this project was established along a fence line. The application stated that the entire perimeter of the facility will be fenced. DEQ review concluded that the ambient air boundary employed in the final air impact analyses precluded public access based on the methods described in the modeling report according to the criteria described in DEQ's *Modeling Guideline*[2]. Bison appropriately addressed air pollutant impacts to areas considered to be ambient air, provided all areas not treated as ambient air are fenced to prohibit public access.

3.8 Receptor Network

Table 4 describes the receptor network used in the submitted modeling analyses. The receptor grids used in the model provided good resolution of the maximum design concentrations for the project and provided extensive coverage to evaluate ambient impacts. The full receptor grid was used for NAAQS analyses in the initial June 5, 2017, application.

The July 5, 2017, incompleteness response used a reduced receptor grid extending at a minimum of just under 1,000 meters from the ambient air boundary in all directions. The 10-meter resolution hot spot grid was used only for the 24-hour average $PM_{2.5}$ NAAQS analyses due to the low margin of compliance with the allowable NAAQS for the total facility-wide impacts and a high ambient background concentration. The June 5, 2017, modeling demonstration showed that the highest project ambient impacts were located near the facility within the region of the limited receptor coverage used in the July 5, 2017, incompleteness response NAAQS modeling.

DEQ determined that the receptor network was effective in reasonably assuring compliance with applicable air quality standards at all ambient air locations. The complete extent of the receptor grid is depicted below in Figure 5. The refined grid is shown in Figure 6.

Figure 5. Full Receptor Grid Coverage for SIL and Initial NAAQS Modeling

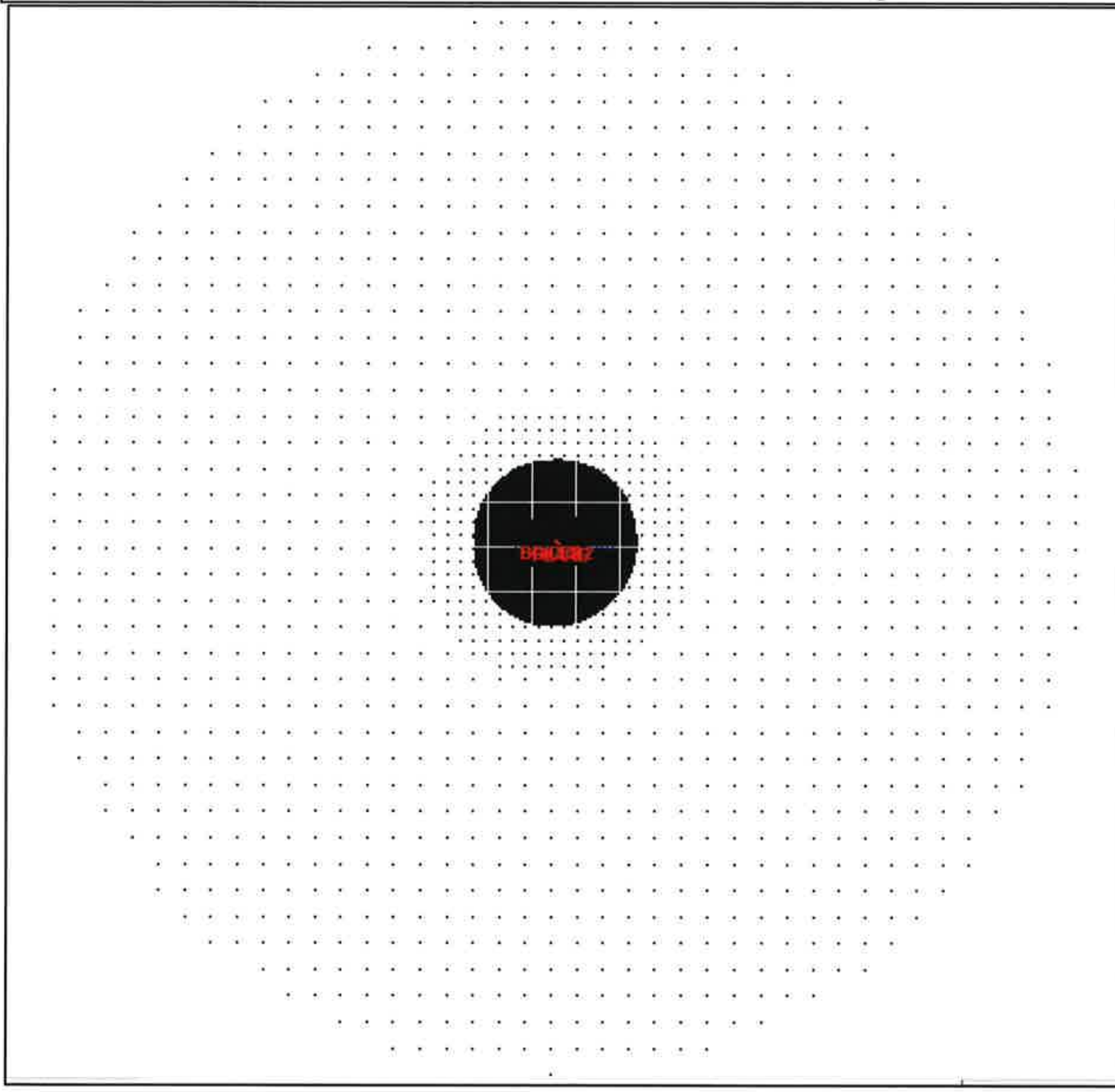
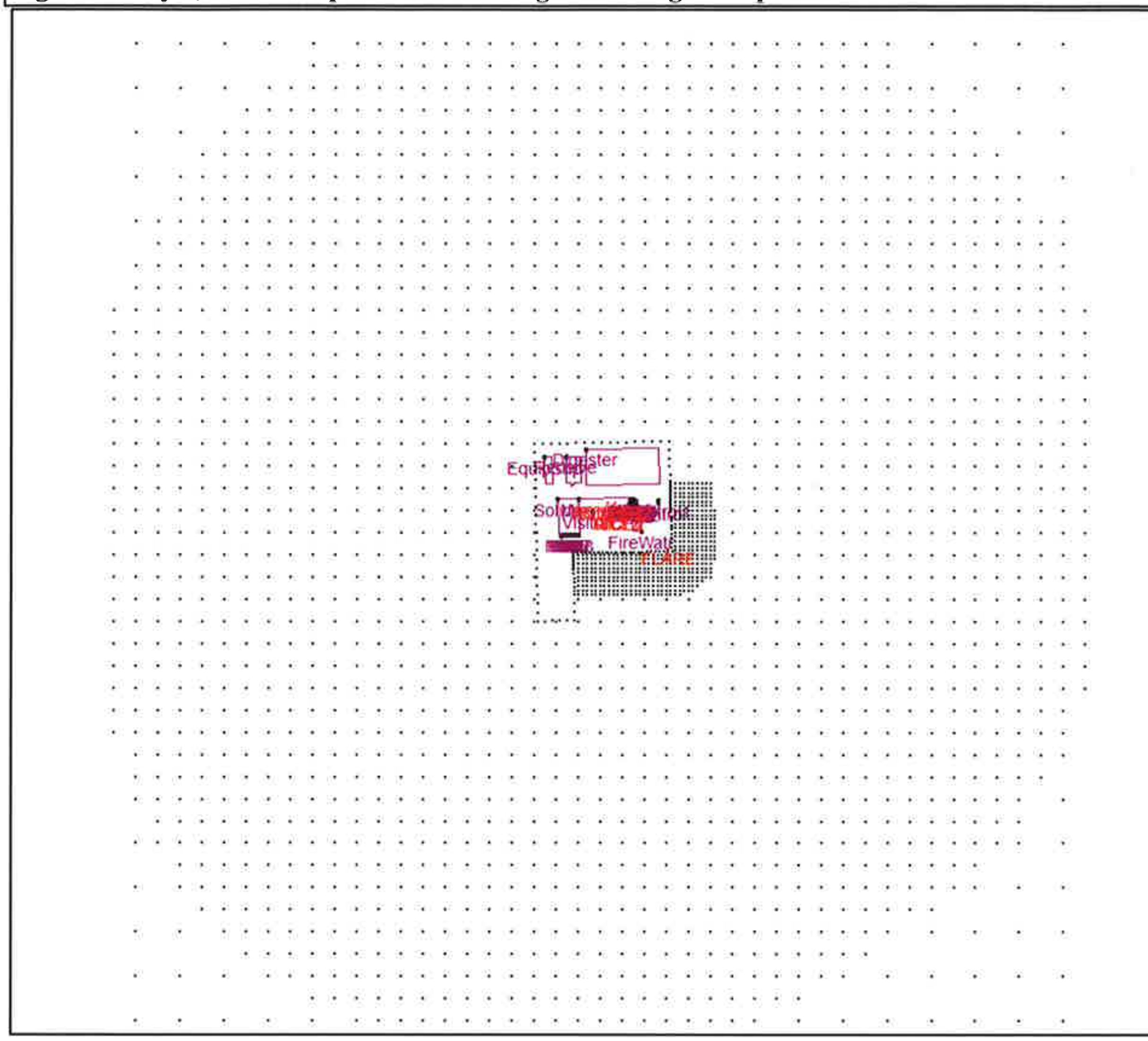


Figure 6. July 5, 2017 Receptor Grid Coverage Including Hot Spot Grid



3.9 Emission Rates

Review and approval of estimated emissions is the responsibility of the DEQ permit writer, and the representativeness and accuracy of emissions estimates is not addressed in this modeling review memorandum. DEQ air impact analyses review included verification that the potential emissions rates provided in the emissions inventory were properly used in the model. The rates listed must represent the maximum allowable rate as averaged over the specified period.

Emissions rates used for the Bioenergy SDB facility in the dispersion modeling analyses, as listed in this memorandum, should be reviewed by the DEQ permit writer and compared with those in the final emissions inventory. All modeled criteria air pollutant emissions rates must be equal to or greater than the facility's potential emissions calculated in the PTC emissions inventory or proposed permit allowable emissions rates.

3.9.1 Criteria Pollutant Emissions Rates for Significant Impact Level and Cumulative Analyses

Significant impact level (SIL) analyses were submitted as part of the ambient impact analyses. SIL and cumulative impact analyses emission rates were identical. SIL analyses were conducted for PM_{10}, $PM_{2.5}$, NOx, and CO emissions for short-term and annual average SILs. Cumulative NAAQS analyses were conducted for $PM_{2.5}$ and NO_x emissions to demonstrate compliance with short-term and annual average NAAQS.

Table 6 lists criteria pollutant continuous (24 hours per day) emissions rates used to evaluate SIL and NAAQS compliance for standards with averaging periods of 24 hours or less, except where noted. Only two of the three internal combustion engines (model IDs RICE1, RICE2, and RICE3) are operational at any time. The third internal combustion engine remains idle on standby for periods until rotated into normal operations or to serve as backup due to maintenance or emergency operation of either of the other two internal combustion engines. Table 7 lists criteria pollutant continuous (8,760 hours/year) emissions rates used to evaluate NAAQS compliance for standards with an annual averaging period. These modeled rates must be equal or greater than permit allowable facility-wide emissions for the listed averaging period.

Table 6. BIOENERGY'S SHORT-TERM CRITERIA POLLUTANT EMISSIONS RATES

Emissions Point	Description	PM_{10}[a] (lb/hr)[e]	$PM_{2.5}$[b] (lb/hr)	NO_x[c] (lb/hr)	CO[d] (lb/hr)
BOILER1	Boiler Stack 1	0.08	0.08	0.273	0.282
BOILER2	Boiler Stack 2	0.08	0.08	0.273	0.282
RICE1[f]	RICE Generator Stack 1[f]	0.121	0.121	4.334	8.67
RICE2[f]	RICE Generator Stack 2[f]	0.121	0.121	4.334	8.67
RICE3[f]	RICE Generator Stack 3[f]	0.121	0.121	4.334	8.67
FLARE	Enclosed Flare	0.116	0.116	0.948	4.32

a. Particulate matter with a mean aerodynamic diameter of 10 microns or less.
b. Particulate matter with a mean aerodynamic diameter of 2.5 microns or less.
c. Nitrogen oxides.
d. Carbon monoxide.
e. Pounds per hour.
f. Two out of the three internal combustion engines (RICE1, RICE2, or RICE3) operates at any time.

Table 7. BIOENERGY'S ANNUAL CRITERIA POLLUTANT EMISSIONS RATES

Emissions Point	Description	$PM_{2.5}$[a] (lb/hr)[b]	NO_x[c] (lb/hr)
BOILER1	Boiler Stack 1	0.08	0.27
BOILER2	Boiler Stack 2	0.08	0.27
RICE1	RICE Generator Stack 1	0.12[d]	4.33
RICE2	RICE Generator Stack 2	0.12[d]	4.33
RICE3	RICE Generator Stack 3	0.12[d]	Not Modeled[e]
FLARE	Enclosed Flare	0.0013	0.011

a. Particulate matter with a mean aerodynamic diameter of 2.5 or less.
b. Pounds per hour.
c. Nitrogen oxides.
d. Two out of the three internal combustion engines (RICE1, RICE2, or RICE3) operates at any time. The third engine is idled.
e. Bison did not evaluate RICE3 for annual NO_2 NAAQS compliance—only RICE1 and RICE2. DEQ approves this approach based on the large margin of compliance with the NAAQS and the appropriate modeling of two engines operating concurrently as requested for an operation limitation in the permit.

3.9.2 Toxic Air Pollutant Emissions

The increase in emissions from the proposed project are required to demonstrate compliance with the toxic air pollutant (TAP) increments, with an ambient impact analyses required for any TAP having a requested potential emission rate that exceeds the screening emissions level (EL) specified by Idaho Air Rules Section 585 or 586. Review of the TAPs emissions inventory is the responsibility of the permit writer/project manager. Many of the TAPs emissions from the two proposed boilers and the three proposed reciprocating internal combustion engines were exempt from Idaho Air Rules for TAPs because they are also federal HAPs sources regulated by federal emission standards. The remaining TAPs emissions from sources not qualifying for this exemption had potential emissions rates below the Section 585 and 586 screening emission levels (ELs).

3.10 Emission Release Parameters

Table 8 lists emissions release parameters used in the air impact modeling analyses for the Bioenergy SDB facility.

Table 8. BIOENERGY'S POINT SOURCE EMISSIONS RELEASE PARAMETERS

Release Point	Description	UTM Coordinates, NAD83, Zone 11[a]		Stack Base Elevation (m)	Stack Height (m)	Modeled Diameter (m)	Stack Gas Temp (K)[c]	Stack Flow Velocity (m/s)[d]	Stack Release Type
		Easting (m)[b]	Northing (m)						
BOILER1	Boiler Stack 1	683,680.35	4,734,170.81	1,010.41 (3,315 ft)[e]	14.02 (46 ft)	0.30 (1 ft)	499.82 (248°F)[f]	17.69 (58.0 fps)[g]	Default[h]
BOILER2	Boiler Stack 2	683,697.76	4,734,171.4	1,010.41 (3,315 ft)	14.02 (46 ft)	0.30 (1 ft)	499.82 (440°F)	17.69 (58.0 fps)	Default
RICE1	RICE Generator Stack 1	683,697.56	4,734,148.19	1,011.02 (3,317.0 ft)	14.02 (46 ft)	0.46 (1.5 ft)	393.15 (248°F)	16.97 (55.7 fps)	Default
RICE2	RICE Generator Stack 2	683,708.67	4,734,148.19	1,011.02 (3,317.0 ft)	14.02 (46 ft)	0.46 (1.5 ft)	393.15 (248°F)	16.97 (55.7 fps)	Default
RICE3	RICE Generator Stack 3	683,702.57	4,734,148.19	1,011.02 (3,317.0 ft)	14.02 (46 ft)	0.46 (1.5 ft)	393.15 (248°F)	16.97 (55.7 fps)	Default
FLARE	Enclosed Flare	683,817.51	4,734,068.28	1,013.76 (3,326.0 ft)	15.24 (50 ft)	3.96 (13 ft)	1033.15 (1,400°F)	0.46 (1.5 fps)	Default

a. Universal Transverse Mercator, North American Datum 1983, Zone 11.
b. Meters.
c. Kelvin.
d. Meters per second.
e. Feet.
f. Degrees Fahrenheit.
g. Feet per second.
h. Default release represents a vertical orientation with an uninterrupted release point.

DEQ's permitting policies and guidance require that each permit application have stand-alone documentation to support the appropriateness of release parameters used in the air impact analyses. The Bioenergy modeling report submitted to DEQ provided justification and documentation of assumptions and data supporting key release parameters used to model these point sources.

Natural Gas-Fired Internal Combustion Engines (RICE1, RICE2, and RICE3)
The three engines are identical in design and stack specifications except for stack location. Each engine stack was modeled with a release height of 46 feet above grade and an exit diameter of 1.5 feet with a vertical and uninterrupted release. Supporting documentation for a vendor or contractor was not

provided in the application for these parameters. It is assumed the stacks will be constructed to these specifications.

The exit temperature was specified in a project process flow diagram indicting that a heat exchanger on each of the RICE stacks will recover heat from the exhaust stream and drop the exit temperature from 792°F to 248°F. A design exhaust flow rate at 100% load of 228,700 scfh, wet basis was provide on the General Electric manufacturer specification sheet. DEQ adjusted this to units of ACFM using the 792°F exit temperature prior to the heat exchanger, corrected for actual emission unit elevation of 3,317 feet above sea level with a pressure drop of 0.10 inches mercury per 100 feet and obtained a flow rate of 10,170 ACFM. Correcting the flow rate to the exit temperature of 248°F following the heat exchanger produced a flow rate value of 5,750 ACFM. This value compared favorably with Bison's modeled flow rate of 5,902 ACFM.

Boilers (BOILER1, BOILER2)
Official design drawings or specifications supporting the modeled boiler stack release heights of 46 feet each and exit diameters of 1.0 feet each were not provided with the application. DEQ assumes the stacks will be constructed as modeled.

Exit temperature and exhaust volumetric flow rate at 100% load were provided in a vendor specification sheet for a Cleaver Brooks boiler with a Profire Model LNVG080 burner. The modeled volumetric flow rate of 2,734.5 ACFM and the modeled exit temperature of 440°F matched the specifications sheet information.

Flare
DEQ requested that Bison model release parameters for the flare that represent actual operating conditions using the application's assumptions for flaring the limited off-specification biogas stream. This flare is an enclosed or jacketed flare which acts very similarly to a standard exhaust stack rather than an open flare. DEQ requested that Bison model the flare as a standard emissions unit stack rather than using EPA's pseudo point source guidance methods for open flares, which in part apply standard assumptions of a 20 m/s exit velocity value and an exit temperature of 1831°F.

Zeeco is listed in the application as the intended flare manufacturer and the final modeling analyses used the design parameters listed in the Zeeco specification sheet documentation, which included a stack diameter of 13 feet and a stack termination height of 50 feet above grade. Bison confirmed that the flare will be located on a pad that will provide a base elevation that supports the modeling input of 3,326 feet above sea level and DEQ concluded the modeling is set up appropriately with regard to the flare base elevation and the surrounding discrete receptors located in ambient air.

The permit application contained a Zeeco specification sheet listing the physical design parameters and an operating temperature range of 1400 – 1600°F. This unit is designed to flare up to 5,020 scfm of biogas. DEQ requested that Bison substantiate whether the enclosed flare will maintain the 1,400°F exhaust temperature at the point of release to the atmosphere (50 feet above grade) during actual operating levels when 251 scfm of off-specification biogas. Exit exhaust temperature is an important parameter because a higher temperature and correspondingly higher volumetric flow increases the exhaust plume's thermal buoyancy and resulting plume rise (Bison correctly used the exhaust temperature to calculate the flow rate at the point of release). Increased flow also increases the momentum flux and results in increased plume rise.

Bison responded in the July 5, 2017, incompleteness response submittal stating the exhaust will exit the flare near its operating temperature. The email from a senior engineer at Zeeco, the flare manufacturer, stated "I want to confirm the operating temperature of the enclosed flare will be in the 1400 – 1600 F range. This means the heat plume exiting the stack will be at the same temperature."

Bison calculated the exhaust flow applied in the modeling using an EPA F-Factor for natural gas, dry basis, of 8,710 standard cubic feet per million Btu heat input, corrected for facility elevation and release temperature. F-Factors are ratios of combustion gas byproduct volumes for heat inputs of specific fuels, and F-Factors are provided in EPA Reference Method 19, Table 19-2.

Acceptance of the release parameters is justified based on the limited operation of the emissions unit under the limited conditions that qualify for inclusion in the ambient impact analyses. Off specification flaring was limited to:

- Periods generally lasting 30 minutes for each off-specification flaring occurrence, but evaluated for a full hour.
- Up to 3 hours in a 24-hour period.
- An annual frequency anticipated to occur no more than 40 times per year, with total operation of no more than 20 hours per year.

Also, under the operating assumptions used in the impact analyses, the internal combustion engines for the generator sets provide the majority of the ambient impacts at the design concentration. DEQ considered the flare release parameters important to adequately verify that impacts due to the flare's non-emergency operations were not a concern for the design concentrations.

DEQ concludes that the release parameters used in the modeling analyses were adequately supported and were appropriate for this project.

4.0 Results for Air Impact Analyses

The Tier 2 Ambient Ratio Method 2 (Tier 2 ARM2) method was used for the 1-hour average NO_2 SIL and NAAQS analyses, using the conservative default value of 0.5 for the minimum ambient ratio (ARM2_MIN) value.

4.1 Results for Significant Impact Analyses

Table 9 provides results for the 24-hour and annual $PM_{2.5}$, 24-hour PM_{10}, annual and 1-hour NO_2, and 1-hour and 8-hour CO significant impacts level analyses (SIL) analyses. Emissions increases of other criteria pollutants resulting from the proposed project (or facility-wide emissions levels) were below applicable DEQ BRC exemption thresholds that are used to determine applicability of pollutant specific NAAQS compliance demonstrations. Cumulative NAAQS impact analyses were needed for 24-hour and annual average $PM_{2.5}$ and 1-hour and annual average NO_2 because the applicable SILs were exceeded.

Table 9. RESULTS FOR SIGNIFICANT IMPACT ANALYSES				
Pollutant	Averaging Period	Modeled Design Value Concentration (μg/m³)[a]	SIL[b] (μg/m³)	Percent of SIL
$PM_{2.5}$[c]	24-hour	3.04[g]	1.2	253%
	Annual	0.55[h]	0.3	183%
PM_{10}[d]	24-hour	3.99[i]	5.0	80%
NO_2[e]	1-hour	185[j]	7.5	2467%
	Annual	17.7[k]	1.0	1770%
CO[f]	1-hour	828.3[l]	2,000	41%
	8-hour	288.5[m]	500	58%

a. Micrograms per cubic meter.
b. Significant impact level.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
d. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
e. Nitrogen dioxide.
f. Carbon monoxide
g. Modeled design value is the maximum 5-year mean of highest 24-hour values from each year of a 5-year meteorological dataset.
h. Modeled design value is the maximum 5-year mean of annual average values from each year of a 5-year meteorological dataset.
i. Modeled design value is the maximum of highest 24-hour values from a 5-year meteorological dataset, or the maximum of 24-hour value from five individual years of meteorological data.
j. Modeled design value is the maximum 5-year mean of maximum 1st highest daily 1-hour maximum impacts for each year of a 5-year meteorological dataset. The SIL compliance design value was calculated using Tier 2 ARM2 with default parameters.
k. Modeled design value is the maximum annual impact of the individual years of a 5-year meteorological dataset. Complete conversion of NO_x to NO_2 was assumed.
l. Modeled design value is the maximum 1-hour average impact of any of 5 individual years of meteorological data.
m. Modeled design value is the maximum 8-hour average impact of any of 5 individual years of meteorological data.

4.2 Results for Cumulative NAAQS Impact Analyses

The results for the cumulative impact analyses are listed in Table 10. Ambient impacts for the facility were below the applicable NAAQS.

Table 10. RESULTS FOR CUMULATIVE IMPACT ANALYSES						
Pollutant	Averaging Period	Modeled Design Value Concentration (μg/m³)[a]	Background Concentration (μg/m³)	Total Ambient Impact (μg/m³)	NAAQS[b] (μg/m³)	Percent of NAAQS
$PM_{2.5}$[c]	24-hour	2.5[e, i]	29	31.5	35	90%
	Annual	0.55[f]	9.2	9.75	12	81%
NO_2[d]	1-hour	141.0[g, i]	16	157	188	84%
	Annual	17.7[h]	3.2	20.9	100	21%

a. Micrograms per cubic meter.
b. National ambient air quality standards.
c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
d. Nitrogen dioxide.
e. Modeled design value is the maximum 5-year mean of 8th highest 24-hour values from each year of a 5-year meteorological dataset.
f. Modeled design value is the maximum 5-year mean of annual average values from each year of a 5-year meteorological dataset.
g. Modeled design value is the maximum 5-year mean of 8th highest daily 1-hour maximum impacts for each year of a 5-year meteorological dataset.
h. Modeled design value is the maximum annual impact of the individual years of a 5-year meteorological dataset.
i. Maximum impact occurs for RICE2 and RICE3 as operational, with RICE1 idle. Tier 2 ARM2 with regulatory default ambient NO_2 to NOx ratios was used.

4.3 Results for Toxic Air Pollutant Impact Analyses

TAPs ambient impact modeling was not required for this project. Emissions of all applicable TAPs were compared to the specific ELs. Based on the emission rates presented in the project's final emission estimate spreadsheet received on August 15, 2017, all TAPs emissions were less than the ELs. A final determination of the acceptability of the TAPs emissions rates was conducted by the project's permit writer.

5.0 Conclusions

The ambient air impact analyses demonstrated to DEQ's satisfaction that emissions from the Bioenergy SBD facility will not cause or significantly contribute to a violation of any NAAQS and will not exceed allowable TAP increments.

References

1. *Policy on NAAQS Compliance Demonstration Requirements of IDAPA 58.01.01.203.02 and 01.403.02.* Idaho Department of Environmental Quality Policy Memorandum. Tiffany Floyd, Administrator, Air Quality Division, June 10, 2014.

2. *State of Idaho Guideline for Performing Air Quality Impact Analyses.* Idaho Department of Environmental Quality. September 2013. State of Idaho DEQ Air Doc. ID AQ-011. Available at http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf.

3. *Ambient Ratio Method Version 2(ARM2) for use with AERMOD for 1-hr NO_2 Modeling Development and Evaluation Report,* Prepared for American Petroleum Institute, 1220 L Street NW, Washington, DC 20005, by M. Podrez, RTP Environmental Associates, Inc., 2031 Broadway, Suite 2, Boulder, Colorado 80302, September 20, 2013.

4. *Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO_2 National Ambient Air Quality Standard,* R. Chris Owen and Roger Brode, Environmental Protection Agency, Office of Air Quality Planning and Standards, September 30, 2014.

APPENDIX C – FACILITY DRAFT COMMENTS

The following comments were received from the facility on October 5, 2017:

Facility Comment: Condition 1.1-Revise the facility description to clarify and more accurately describe. We suggest: "This is the initial permit to construct (PTC) for a facility that will digest dairy manure and other agricultural wastes to produce Renewable Natural Gas (RNG) and beneficial solid and liquid byproducts."

DEQ Response: This has been changed as requested.

Facility Comment: Table 1.1-Correct the CarbonexMS design capacity from 3,389 scfm to 3,689 scfm, specify that the engine catalyst systems should operate with the exhaust temperature above 550°F at the inlet and below 1,350°F at the outlet, and replace 'None' with 'N/A' in the Control Equipment column for the safety flare. The flare's purpose is to control emissions.

DEQ Response: This has been changed as requested.

Facility Comment: Condition 2.5-The permit application was based on a design production capacity of 5,020 scfm. At maximum continuous operation, this value equates to 7.23 MMscf/day. This value should replace the draft permit value of 4.9 MMBtu/day.

DEQ Response: This has been changed as requested.

Facility Comment: Condition 2.6-To clarify and remove redundancy, we suggest combining the last sentence of the first paragraph and the first sentence of the last paragraph as follows: "Unless DEQ approves alternatives, the manual shall include the manufacturer's recommended minimum and maximum values for each of the following operating parameters:"

DEQ Response: This has been changed as requested.

Facility Comment: Condition 2.8-We request that DEQ provide an option to prepare and follow a monitoring plan, with DEQ's approval, that would allow Bioenergy to reduce monitoring frequency provided we demonstrate a consistent record of compliance. The plan could also include provisions to increase monitoring frequency should operating experience warrant it. We suggest the following text to clarify the first paragraph of this condition and to include an alternative monitoring plan option:

"Within 60 days of the initial startup of the BPS the permittee shall measure and record H2S emissions from the desulfurization units at least twice daily and calculate average daily measurement values to determine compliance with Condition 2.4. The permittee may revise this monitoring frequency to a frequency approved by DEQ."

The remainder of this condition is somewhat confusing. In particular, it inappropriately refers in three places to H2S emission rate rather than concentration; the permit limits H2S concentration (Condition 2.4), not emission rate. We suggest the entire condition be revised as follows:

"Within 60 days of the initial startup of the BPS the permittee shall measure and record H2S emissions from the desulfurization units at least twice daily and calculate average daily measurement values to determine compliance with Condition 2.4. The permittee may revise this monitoring frequency to a frequency approved by DEQ.

Records of this information shall be maintained on site and be made available to DEQ representatives upon request and in accordance with the Recordkeeping General Provision.

The permittee may use a hydrogen sulfide CEM or a hand-held hydrogen sulfide monitor to determine H2S concentration in the BPS exhaust gas. In either case, the permittee must prepare and follow a documented monitoring procedure that DEQ has approved.

If a CEM is used to demonstrate continuous compliance with Condition 2.4, the permittee shall create and obtain DEQ approval for a CEM quality manual which shall address:

- Installation specifications
- Calibration procedures (i.e., zero and span checks)

A monitoring procedure for a hand-held monitor shall address:

- Sampling procedures including details regarding monitoring ports
- Calibration procedures
- Details of how the H2S concentrations will be calculated in units of ppm if the hand-held monitor does not automatically generate readings in ppm.

A hand-held device shall have a certified accuracy of plus or minus 3% and shall be calibrated, maintained, and replaced in accordance with manufacturer specifications. The permittee shall maintain on-site documentation of the manufacturer's specifications for the hand-held monitor including documentation of the accuracy of the device and calibration and replacement recommendations."

DEQ Response: This has been changed as requested.

Facility Comment: Condition 3.4-The boiler fuel feed rate limit is presumably designed to limit potential boiler emission rates to those that were reported in the application and that were calculated based on this parameter. Fuel feed rate was used only to calculate potential emissions of lead, GHGs, and TAPs. Potential emission rates reported for criteria pollutants other than lead were maximum rates specified by the boiler manufacturer.

Because the potential emission rates of the primary pollutants of concern were not directly derived based on fuel flow rate, and considering the relatively low potential emission rates from the boilers for all regulated pollutants, we suggest replacing the fuel flow rate limit with a requirement that Bioenergy install and operate boilers with a combined heat input capacity of no more than 12.8 MMBtu/hr.

DEQ Response: This has been changed to "...shall combust pipeline quality natural gas exclusively." No monitoring will be required.

Facility Comment: Condition 4.2-Please specify that the maximum exhaust temperature at the outlet of the catalyst system should be 1,350°F.

DEQ Response: This has been changed as requested.

Facility Comment: Condition 4.5-Similar to the discussion above for Condition 3.4, we suggest replacing the engine fuel flow rate limit with a requirement that Bioenergy operate at any given time engines with a combined power rating of no more than 3,932 bhp (twice the individual power ratings of the proposed engines). PTEs for the primary engine pollutants of concern—NOx and CO—were calculated for this application based on the applicable NSPS Subpart JJJJ power-based emission rate limits.

DEQ Response: This has been changed to "...shall combust pipeline quality natural gas exclusively." Limits are still based on NSPS subpart JJJJ.

Facility Comment: Condition 4.6-Please specify that the maximum exhaust temperature at the outlet of the catalyst system should be 1,350°F.

DEQ Response: This has been changed as requested.

Facility Comment: Condition 4.7-Please remove "and quality" with respect to engine fuel monitoring. Fuel quality is not specified, nor should it be since the engines will be powered with natural gas supplied by the local utility.

DEQ Response: This has been changed as requested.

Facility Comment: Conditions 5.5 and 5.6-These conditions are largely redundant and would be clearer if combined into one that specifies data to be monitored (as in 5.5.) and the length of time records are to be kept (as in 5.6).

DEQ Response: This has been changed as requested.

Facility Comment: Condition 5.6-Please change "venting" to "flaring." The flare is included in the facility's design to avoid venting of process gases.

DEQ Response: This has been changed as requested.

APPENDIX D – PROCESSING FEE

PTC Processing Fee Calculation Worksheet

Instructions:
Fill in the following information and answer the following questions with a Y or N. Enter the emissions increases and decreases for each pollutant in the table.

Company: **Southfield Dairy Biorefinery**
Address: **1090 Saffex Rose Ave**
City: **Henderson**
State: **NV**
Zip Code: **89052**
Facility Contact: **William Beck**
Title: **President**
AIRS No.: **047-00039**

N Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N

Y Did this permit require engineering analysis? Y/N

N Is this a PSD permit Y/N (IDAPA 58.01.01.205.04)

Emissions Inventory			
Pollutant	Annual Emissions Increase (T/yr)	Annual Emissions Reduction (T/yr)	Annual Emissions Change (T/yr)
NO_X	40.5	0	40.5
SO_2	0.1	0	0.1
CO	78.7	0	78.7
PM10	0.0	0	0.0
VOC	27.7	0	27.7
TAPS/HAPS	5.6	0	5.6
Total:			**152.6**
Fee Due	**$ 7,500.00**		

Comments: