Statement of Basis

Final

DF-AP #1, LLC
Big Sky West Dairy

Gooding, Idaho
Facility ID No. 047-00022
Permit to Construct Operating Permit No. P-2010.0015

July 30, 2010
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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
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
biogas	any gas fuel derived from the decay of organic matter, as the mixture of methane and carbon dioxide produced by the bacterial decomposition of sewage, manure, garbage, or plant crop
Btu	British thermal units
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CI	compression ignition
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EL	screening emission levels
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
gr	grain (1 lb = 7,000 grains)
H_2S	hydrogen sulfide gas
HAP	hazardous air pollutants
hp	horsepower
hr/yr	hours per year
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
lb/qtr	pound per quarter
m	meters
MACT	Maximum Achievable Control Technology
MMBtu	million British thermal units
MMscf	million standard cubic feet
NAAQS	National Ambient Air Quality Standard
NAICS	North American Industry Classification System
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
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit
Rules	Rules for the Control of Air Pollution in Idaho
scf	standard cubic feet
SI	spark ignited

SIC	Standard Industrial Classification
SO_2	sulfur dioxide
SO_X	sulfur oxides
T/yr	tons per consecutive 12-calendar month period
TAP	toxic air pollutants
UTM	Universal Transverse Mercator
VOC	volatile organic compounds
$\mu g/m^3$	micrograms per cubic meter

FACILITY INFORMATION

Description

DF-AP #1, LLC operates an anaerobic digester at the Big Sky West Dairy in Gooding. The digester is designed to produce biogas from on-site dairy cattle manure. Manure from the dairy will be pumped into the anaerobic digester where the naturally occurring digestion process will result in the production of biogas. Biogas will be collected from the anaerobic digester and used as fuel in two reciprocating IC engines used to power electrical generators. The generators will produce electricity that will be sold to the local utility. During emergencies and routine maintenance the IC engines are taken offline and the excess biogas will be combusted in a flare at the facility. Heat produced from the IC engines will be used to maintain the operating temperature in the digester and as process heat for the dairy.

The facility includes a manure digester, two reciprocating IC engines powering electrical generators, and a flare which will all be operated by DF-AP #1, LLC. Big Sky West Dairy will operate the existing dairy and manage the solids and wastewater generated by the process. Air emissions from the system are released through the two stacks associated with the IC engines and the stack for the flare.

Permitting History

The following information was derived from a review of the permit files available to DEQ. Permit status is noted as active and in effect (A) or superseded (S).

August 31, 2007	P-2007.0096, Initial PTC for a dairy anaerobic digester and two IC engines (A, but will become S upon issuance of this permit)

Application Scope

This PTC is for a modification at an existing minor facility. The applicant has proposed to replace one of the two biogas-fired IC engines at the facility. As a result of this project, both engines at the facility will be identical thus saving the necessity of having spare parts for two different IC engines at the facility.

Application Chronology

February 8, 2010	DEQ received an application and an application fee.
February 16 – March 3, 2010	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
March 8, 2010	DEQ determined that the application was incomplete.
April 6, 2010	DEQ received supplemental information from the applicant.
April 26, 2010	DEQ determined that the application was complete.
June 8, 2010	DEQ made available the draft permit and statement of basis for peer and regional office review.
June 14, 2010	DEQ made available the draft permit and statement of basis for applicant review.
July 20, 2010	DEQ received the permit processing fee.
July 30, 2010	DEQ issued the final permit and statement of basis.

TECHNICAL ANALYSIS

Emissions Units and Control Devices

Table 1 EMISSIONS UNIT AND CONTROL DEVICE INFORMATION

ID No.	Source Description	Control Equipment Description	Emissions Point ID No. and Description
Anaerobic Digester	Capacity: 3.2 million gallon Throughput: 145,455 gallons per day Biogas production: 584,880 cubic feet per day	Internal Combustion Engines (IC Engines No. 1 and 2) and the Flare	N/A
IC-1	IC Engine No. 1 Manufacturer: Guascor Model: SFGLD 560 Rated Power: 1,057 bhp Fuel: Biogas Ignition Type: Spark	Lean-burn Combustion	Engine 1 Exhaust Stack
IC-2	IC Engine No. 2 Manufacturer: Guascor Model: SFGLD 560 Rated Power: 1,057 bhp Fuel: Biogas Ignition Type: Spark	Lean-burn Combustion	Engine 2 Exhaust Stack
Flare	Flare Manufacturer: Andgar Model: 10" Rated Heat Input: 25 MMBtu/hr Fuel: Biogas	N/A	Flare Stack

Emissions Inventories

During the application completeness determination for this project, DEQ determined that the emissions inventory provided in the application did not account for condensable PM_{10} emissions (this was also done for previous air permitting project P-2007.0096). Instead, the emissions factor for filterable PM_{10} from AP-42, Table 3.2-2 was used for estimating emissions from the IC engines. Worst-case maximum PM_{10} emissions from the IC engines include both filterable and condensable PM_{10}. In addition, emissions from the flare were not accounted in emissions inventory provided in the application (this was also done for previous air permitting project P-2007.0096). Therefore, a revised emission inventory that accounts for total (filterable and condensable) PM_{10} emissions from the IC engines as well as accounting for emissions from the flare was developed by the Applicant at DEQ request. Emissions estimates for the IC engines and the flare were based on 8,760 operational hours per year.

Pre-Project Potential to Emit

The following table presents the pre-project potential to emit for all criteria pollutants from all emissions units at the facility/for the one unit being modified as submitted by the Applicant and verified by DEQ staff.

Table 2 PRE-PROJECT POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		SO_2		NO_X		CO		VOC		Lead	
	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]	lb/hr	T/yr
Point Sources												
Guascor 480 (IC Engine No. 1)	0.00047	0.0020	6.51	28.51	7.91	34.64	3.96	17.34	1.98	8.67	0	0
Guascor 560 (IC Engine No. 2)	0.00054	0.0023			2.33	10.20	5.12	22.42	2.33	10.20	0	0
Pre-Project Totals	**0.00101**	**0.0043**	**6.51**	**28.51**	**10.24**	**44.84**	**9.08**	**39.76**	**4.31**	**18.87**	**0.00**	**0.00**

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.

Post Project Potential to Emit

The following table presents the post project potential to emit for criteria pollutants from all emissions units at the facility as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 3 POST PROJECT POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS

Emissions Unit	PM_{10}		SO_2		NO_X		CO		VOC		Lead	
	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]	lb/hr[a]	T/yr[b]
Point Sources												
Guascor 560 (IC Engine No. 1)[c]	0.07	0.30	4.10	17.96	2.33	10.20	5.12	22.43	2.33	10.20	0	0
Guascor 560 (IC Engine No. 2)[c]	0.07	0.30	4.10	17.96	2.33	10.20	5.12	22.43	2.33	10.20	0	0
Flare[d,e,f]	0.10	0.45	8.20	35.92	1.38	6.02	2.75	12.05	4.95	21.68	0	0
Post Project Totals[g]	**0.14**	**0.60**	**8.20**	**35.92**	**4.66**	**20.40**	**10.24**	**44.86**	**4.95**	**21.68**	**0.00**	**0.00**

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) Based on AP-42 Table 3.2-2 (7/00) for PM_{10} (including filterable and condensable) for 4-stroke lean-burn IC engines combusting natural gas and the Manufacturer's guarantee for SO_2, NO_X, CO and VOC.
d) PM_{10} emissions are based upon the EPA RACT/BACTLAER Clearinghouse (RBLC), ID #IA-0088.
e) SO_2 EF based upon a mass balance of the sulfur content of the biogas.
f) NO_X, CO, and VOC emissions are based upon the EPA RACT/BACTLAER Clearinghouse (RBLC), ID #IA-0088.
g) The post project PTE is the estimated worst-case emissions from either the total of the two IC engines or the flare (DEQ assumption for worst-case emissions).

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 or if emissions modeling 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 4 CHANGES IN POTENTIAL TO EMIT FOR CRITERIA POLLUTANTS

	PM_{10}		SO_2		NO_X		CO		VOC		Lead	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Point Sources												
Pre-Project Potential to Emit	0.00101	0.0043	6.51	28.51	10.24	44.84	9.08	39.76	4.31	18.87	0	0
Post Project Potential to Emit	0.14	0.60	8.20	35.92	4.66	20.40	10.24	44.86	4.95	21.68	0	0
Changes in Potential to Emit	**0.14**	**0.60**	**1.69**	**7.41**	**-5.58**	**-24.44**	**1.16**	**5.10**	**0.64**	**2.81**	**0.00**	**0.00**

Non-Carcinogenic TAP Emissions

A summary of the estimated uncontrolled and controlled non-carcinogenic emissions increase of toxic air pollutants (TAP) is provided in the following table. The estimated uncontrolled emissions increases of TAP were below/exceeded applicable emissions screening levels (EL). Estimated controlled TAP emissions were below the annual major source threshold.

Pre- and post project, as well as the change in, non-carcinogenic TAP emissions are presented in the following table:

Table 5 PRE- AND POST PROJECT NON-CARCINOGENIC TAP EMISSIONS SUMMARY POTENTIAL TO EMIT

Non-Carcinogenic Toxic Air Pollutants	Pre-Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Post Project 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Change in 24-hour Average Emissions Rates for Units at the Facility (lb/hr)	Non-Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Acrolein	0.0	0.00036	0.00036	0.017	No
Selenium	0.0	0.000152	0.0002	0.013	No
Styrene monomer	0.0	0.00072	0.00072	6.67	No
Toluene	0.0	0.0036	0.00360	25	No
Trichloroethylene	0.0	0.0002	0.0002	17.93	No
Xyelene (o-, m-, p-isomers)	0.0	0.00188	0.00188	29	No

Therefore, modeling is not required for any of the TAPs listed 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 uncontrolled and controlled carcinogenic emissions increase of toxic air pollutants (TAP) is provided in the following table. The estimated uncontrolled emissions increases of TAP exceeded applicable emissions screening levels (EL). Estimated controlled TAP emissions were below the annual major source threshold.

Pre- and post project, as well as the change in, carcinogenic TAP emissions are presented in the following table:

Table 6 PRE- AND POST PROJECT CARCINOGENIC TAP EMISSIONS SUMMARY POTENTIAL TO EMIT

Carcinogenic Toxic Air Pollutants	Pre-Project Annual Average Emissions Rates for Units at the Facility (lb/hr)	Post Project Annual Average Emissions Rates for Units at the Facility (lb/hr)	Change in Annual Average Emissions Rates for Units at the Facility (lb/hr)	Carcinogenic Screening Emission Level (lb/hr)	Exceeds Screening Level? (Y/N)
Acetaldehyde	0.0	0.00072	0.0007	3.0E-03	No
Benzene	**0.0**	**0.0094**	**0.0094**	**8.0E-04**	**Yes**
Dichloromethane	0.0	0.0014	0.0014	1.6E-03	No
Formaldehyde	**0.0**	**0.0026**	**0.0026**	**5.1E-04**	**Yes**
Nickel	**0.0**	**2.8E-5**	**0.000028**	**2.7E-05**	**Yes**
Vinyl Chloride	0.0	0.00077	0.00077	9.4E-04	No

Therefore, modeling is required for Benzene and Formaldehyde because the annual average carcinogenic screening ELs identified in IDAPA 58.01.01.586 were exceeded.

Post Project HAP Emissions

The following table presents the post project potential to emit for HAP pollutants from all emissions units at the facility as submitted by the Applicant and verified by DEQ staff. See Appendix A for a detailed presentation of the calculations of these emissions for each emissions unit.

Table 7 HAP EMISSIONS SUMMARY POTENTIAL TO EMIT

HAP Pollutants	PTE (T/yr)
Acetaldehyde	0.0032
Acrolein	0.0016
Benzene	0.0416
Dichloromethane	0.0060
Formaldehyde	0.0114
Nickel	0.00012
Vinyl Chloride	0.0034
Selenium	0.00066
Styrene monomer	0.00316
Toluene	0.0158
Trichloroethylene	0.0012
Xyelene (o-, m-, p-isomers)	0.0082

Ambient Air Quality Impact Analyses

As discussed previously in the Emissions Inventories Section, facility-wide emissions were determined incorrectly for the previous air permitting project at this facility. Because this previous project was the initial project at this facility, in order to determine if this facility demonstrated compliance with the NAAQS the corrected facility-wide emissions inventory was used to remodel the emissions from this facility as if it were the initial installation. As presented in the Modeling Memo in Appendix B, the estimated emission rates of PM_{10}, SO_2, NO_X, CO, VOC, HAP, and TAPs from this project were below/exceeded 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.

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. The applicant has also demonstrated pre-construction compliance to DEQ's satisfaction that the emissions increase due to this permitting action will not exceed any acceptable ambient concentration (AAC) or acceptable ambient concentration for carcinogens (AACC) for toxic air pollutants (TAP). A summary of the Ambient Air Impact Analysis for TAPs is provided in Appendix B.

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).

[1] Criteria pollutant thresholds in Table 1, State of Idaho Air Quality Modeling Guideline, Doc ID AQ-011, rev. 1, December 31, 2002.

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.

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 modified emissions source. 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_{10} emissions at this facility are subject to the State of Idaho visible emissions standard of 20% opacity. This requirement is assured by Permit Conditions 10 and 23.

Standards for New Sources (IDAPA 58.01.01.676)

IDAPA 58.01.01.676 Standards for New Sources

Fuel-Burning Equipment is defined as any furnace, boiler, apparatus, stack and all appurtenances thereto, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer. This project involves two IC engines and a flare, none of which produce heat or power by indirect heat transfer.

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

IDAPA 58.01.01.301 Requirement to Obtain Tier I Operating Permit

IDAPA 58.01.01.006.118 defines a Tier I source as "Any source located at a major facility as defined in Section 008." IDAPA 58.01.01.008.10 defines a Major Facility as either:

- For HAPS a facility with the potential to emit ten (10) tons per year (tpy) or more of any hazardous air pollutant, other than radionuclides, or
- The facility emits or has the potential to emit twenty-five (25) tpy or more of any combination of any hazardous air pollutants, other than radionuclides.

or, for non-attainment areas (Note: The State of Idaho currently has no serious non-attainment areas therefore the Major Source threshold is defined as follows):

- The facility emits or has the potential to emit one hundred (100) tons per year or more of any regulated air pollutant. The fugitive emissions shall not be considered in determining whether the facility is major unless the facility is a "Designated Facility":

Therefore, it needs to be determined if this facility is a HAP Major Source. The following table compares this facility's post-project facility-wide annual PTE for all HAPs emitted by the source to the HAPS Major Source thresholds in order to determine if this facility is a HAPs Major Source.

Table 8 PTE FOR HAP POLLUTANTS COMPARED TO THE HAP MAJOR SOURCE THRESHOLDS

HAP Pollutants	PTE (T/yr)	Major Source Threshold (T/yr)	Exceeds the Major Source Threshold?
Acetaldehyde	0.0032	10	No
Acrolein	0.0016	10	No
Benzene	0.0416	10	No
Dichloromethane	0.0060	10	No
Formaldehyde	0.0114	10	No
Nickel	0.00012	10	No
Vinyl Chloride	0.0034	10	No
Selenium	0.00066	10	No
Styrene monomer	0.00316	10	No
Toluene	0.0158	10	No
Trichloroethylene	0.0012	10	No
Xyelene (o-, m-, p-isomers)	0.0082	10	No
Total	**0.10**	**25**	**No**

As presented in the preceding table the PTE for each HAP is less than 10 T/yr and the PTE for all HAPs combined is less than 25 T/yr. Therefore, this facility is not a HAPs Major Source subject to Tier I requirements.

Therefore, it needs to be determined if this facility is a criteria pollutant Major Source. As discussed previously the DF-AP #1, LLC facility is located in Gooding County (AQCR 63), which is designated as unclassifiable/attainment for $PM_{2.5}$, PM_{10}, SO_2, NO_X, CO, and Ozone for federal and state criteria air pollutants. Therefore, the following table compares the post-project facility-wide annual PTE for all criteria pollutants emitted by the source to the applicable criteria pollutant Major Source thresholds in order to determine if the facility is a criteria pollutant Major Source.

Table 9 PTE FOR CRITERIA POLLUTANTS COMPARED TO THE CRITERIA POLLUTANT MAJOR SOURCE THRESHOLDS

Criteria Pollutants	PTE (T/yr)	Major Source Threshold (T/yr)	Exceeds the Major Source Threshold?
PM_{10}	0.60	100	No
SO_2	35.92	100	No
NO_X	20.40	100	No
CO	44.86	100	No
VOC	21.68	100	No

As presented in the preceding table the PTE for each criteria pollutant is less than 100 T/yr. Therefore, this facility is not a criteria pollutant Major Source subject to Tier I requirements.

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)

The facility is subject to the requirements of 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines.

40 CFR 60, Subpart JJJJ — Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

DF-AP #1, LLC is proposing to operate two 1,057 horsepower, NSPS non-certified, lean-burn, SI IC engines that exclusively combust biogas that is produced from an on-site anaerobic digester.

§ 60.4230 — Am I subject to this subpart?

DF-AP #1, LLC will commence construction after June 12, 2006, and the SI IC engines were manufactured after July 1, 2007 and have a capacity greater than 500 HP but less than 1,350 HP. Therefore, in accordance with 40 CFR 60.4230(a)(4)(i), 40 CFR 60, Subpart JJJJ is applicable to DF-AP #1, LLC.

§ 60.4231 — What emission standards must I meet if I am a manufacturer of stationary spark ignited internal combustion engines?

DF-AP #1, LLC will be an operator of SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

§ 60.4232 — How long must my engines meet the emission standards if I am a manufacturer of stationary SI internal combustion engines?

DF-AP #1, LLC will be an operator of SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

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

In accordance with 40 CFR 60.4233(e), as the owner and operator of the two SI lean-burn IC engines that combust digester gas and are rated at greater than 75KW (100 bhp), DF-AP #1, LLC must comply with the emission standards in 40 CFR 60, Subpart JJJJ, Table 1 as summarized in the following Table:

Table 10 40 CFR 60, SUBPART JJJJ, TABLE 1 SUMMARY

Engine Type and Fuel	Maximum Engine Horsepower (bhp)	Manufacture Date	Emission Standards[1]					
			g/bhp-hr			ppmvd at 15% O_2		
			NO_X	CO	VOC^2	NO_X	CO	VOC^2
Lean Burn Digester Gas Fired	500≥ BHP <1,350	1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80

[1] –. Owners and operators of stationary non-certified spark ignited IC engines may choose to comply with the emission standards in units of either g/bhp-hr **or** ppmvd at 15% O_2.

[2] –. When calculating emissions of volatile organic compounds, emission of formaldehyde should not be included.

These requirements are assured by PTC condition 12.

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

As the owner and operator of two SI IC engines that combust digester gas, DF-AP #1, LLC must operate and maintain these engines to achieve the emission standards as required in 40 CFR 60.4233 over the entire life of the engines. This requirement is assured by PTC condition 22.

§ 60.4235 — What fuel requirements must I meet if I am an owner of operator of a stationary SI gasoline fired engine internal combustion engine subject to this subpart?

As the owner and operator of two SI IC engines that combust digester gas, DF-AP #1, LLC is not subject to this section of the rule.

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

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. DF-AP #1, LLC has installed IC engines that meet the applicable requirements in §60.4233 prior to January 1, 2010. Therefore, this section does not apply to the engines at this facility.

§ 60.4237 What are the monitoring requirements if I am an owner or operator of an emergency stationary SI internal combustion engine?

The IC engines that DF-AP #1, LLC will be installing will be used for primary electrical production and production of electricity that will be sold to the community electrical grid. These engines will not be used in "emergencies" as defined in 40 CFR 60.4248. Therefore, this section does not apply to the engines at this facility.

§ 60.4238 What are my compliance requirements if I am a manufacturer of a stationary SI internal combustion engines ≤19KW (25HP).

DF-AP #1, LLC is an operator of the SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. This section does not apply to this facility.

§ 60.4239 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines >19 KW (25HP) that use gasoline?

DF-AP #1, LLC is an operator of the SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

§ 60.4239 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines >19KW (25HP) that use gasoline?

DF-AP #1, LLC is an operator of the SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

§ 60.4240 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines >19KW (25HP) that are rich burn engines that use LPG?

DF-AP #1, LLC is an operator of the SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

§ 60.4241 What are my compliance requirements if I am a manufacturer of stationary SI internal combustion engines participating in the voluntary certification program?

DF-AP #1, LLC is an operator of the SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

§ 60.4242 What other requirements must I meet if I am a manufacturer of stationary SI internal combustion engines?

DF-AP #1, LLC is an operator of the SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

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

DF-AP #1, LLC is the owner and operator of two SI IC engines, digester gas-fired, non 40 CFR 60, Subpart JJJJ certified engines and must comply with standards specified in 40 CFR 60.4233(f). Each engine is rated at greater than 500 bhp. Therefore, DF-AP #1, LLC must keep a maintenance plan and records of conducted maintenance. In addition, DF-AP #1, LLC must conduct an initial performance test within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, in accordance with 40 CFR 60.4243(b)(2)(ii). This requirement is assured by PTC condition 26.

40 CFR 60.4243(g), does not apply to the two SI IC engines because the engines are not equipped with either a three-way catalyst or a non-selective catalytic reduction system. According to the preamble for 40 CFR 60, Subpart JJJJ in the Federal Register dated January 18, 2008, EPA expects that an air-to-fuel ratio controller will be operated only in the case of rich burn engines operating with a 3-way catalyst or non-selective catalytic reduction system. The two Guascor model #SFGLD 560 SI IC engines are considered lean-burning engines because the manufacturer's recommended operating air/fuel ratio divided by the stoichiometric air/fuel ratio at full load conditions is greater than 1.1 in accordance with the definition of "Rich burn engine" of 40 CFR 60.4248.

Each engine is rated at greater than 500HP and was manufactured after July 1, 2007, and before July 1, 2008, but is not subject to 40 CFR 60.4233(b) or (c) because these engines are exclusively combusting digester gas and not gasoline or LPG fuels. Therefore, 40 CFR 60.4243(h) does not apply to the two SI IC engines proposed for this facility.

§ 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?

According to 40 CFR 60.4243(b)(2)(ii) by reference of 40 CFR 60.4243(c), DF-AP #1, LLC is subject to conduct performance testing. This section specifies the performance test procedures that must be followed. 40 CFR 60, Subpart JJJJ, Table 2 specifies the methods and requirements for performance testing. This requirement is assured by PTC condition 27.

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

DF-AP #1, LLC is the owner and operator of two SI IC engines, which are digester gas-fired, non 40 CFR 60, Subpart JJJJ certified engines. This section specifies the notification and recordkeeping requirements. DF-AP #1, LLC shall submit all notifications and supporting documentation to EPA and DEQ in accordance with General Provision 7 and this section of 40 CFR 60, Subpart JJJJ. This requirement is assured by PTC condition 28.

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

Table 3 of 40 CFR 60, Subpart JJJJ specifies the applicable sections of 40 CFR 60, Appendix A - General Provisions. This requirement is assured by PTC condition 29.

§ 60.4247 What parts of the mobile source provisions apply to me if I am a manufacturer of stationary SI internal combustion engines?

DF-AP #1, LLC will be an operator of SI IC engines and not a "Manufacturer" by definition of 40 CFR 60.4248. Therefore, this section does not apply to this facility.

§ 60.4248 What definitions apply to this subpart?

This section contains definitions that are found throughout this subpart. This section generally applies to the facility's applicability to 40 CFR 60, Subpart JJJJ.

NESHAP Applicability (40 CFR 61)

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

MACT Applicability (40 CFR 63)

The facility is not subject to any MACT standards in 40 CFR Part 63.

Permit Conditions Review

This section describes the permit conditions that have been added or revised as a result of this permitting action.

New Permit Condition 7 establishes the emission limits for the IC engines and flare.

Existing Permit Condition 2.3:

The concentration of the Hydrogen sulfide (H_2S) entering the generators from anaerobic digester shall not exceed 2300 ppm_v calculated to 3.9 lb. H_2S per hour.

Revised Permit Condition 8:

The average annual concentration of Hydrogen sulfide (H_2S) in the biogas produced by the anaerobic digester shall not exceed 2,000 ppmv.

This permit condition has been revised to include an averaging period (an annual average was used to be consistent with other previously issued dairy digester permits) and the calculated H_2S amount was removed because it was unnecessary as long as the concentration limit is being met.

New Permit Condition 9 establishes the biogas production limit as provided by the Applicant. This biogas production limit was used to calculate the emissions rates which were then modeled to determine the 24 and annual concentration impacts of PM_{10}, NO_X, SO_2, and CO to demonstrate compliance with the NAAQS.

New Permit Conditions 12, 13, 26, 27, and 28 incorporate 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. See the "NSPS Applicability (40 CFR 60)" Section of this Statement of Basis for a detailed review.

Existing Permit Condition 2.13 (New Permit Condition 20) was modified to include additional Operation and Maintenance Manual requirements to be consistent with other previously issued dairy digester permits.

New Permit Condition 21 establishes that the Permittee may establish alternative operation parameters for the anaerobic digester, the IC engines No.1 and No.2, and the flare. This was done to be consistent with other previously issued dairy digester permits.

New Permit Condition 23 establishes that the permittee shall conduct a monthly facility-wide inspection of potential sources of visible emissions. This was done to be consistent with other previously issued dairy digester permits.

New Permit Condition 24 establishes that the permittee shall maintain records of all odor complaints and corrective actions taken. This was done to be consistent with other previously issued dairy digester permits.

New Permit Condition 25 establishes that the Permittee shall maintain records as required by the Recordkeeping General Provision.

New Permit Conditions 26 incorporates 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. This condition specifically incorporates the source testing requirements.

New Permit Conditions 27 incorporates 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. This condition specifically incorporates the source testing standards requirements.

New Permit Conditions 28 incorporates 40 CFR 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. This condition specifically incorporates the notification, reporting, and records keeping requirements.

New Permit Conditions 29 incorporates the General Provisions of 40 CFR 60 Subpart A. Because the IC engines are subject to NSPS Subpart JJJJ, these general provisions also apply to the IC engines.

New Permit Conditions 30 establishes that the federal requirements of 40 CFR Part 63, Subpart JJJJ, are incorporated by reference into the requirements of this permit per current DEQ guidance

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. During this time, there were no comments on the application and 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

IC Engines PTE Emissions Calculations:

For the natural gas-fired IC engines the Applicant has supplied the fuel consumption at full rated horsepower and the full rated horsepower of each IC engine. The two IC engines are identical, therefore the heat input to each engine is calculated as follows:

Fuel $Use_{IC\text{-}X}$ (MMBtu/hr) = Fuel consumption (Btu/bhp-hr) x Rated Horsepower of IC engine IC-1 (bhp) ÷ 1,000,000 Btu/MMBtu

Fuel $Use_{IC\text{-}X}$ MMBtu/hr = 6,505 Btu/bhp-hr x 1,057 bhp ÷ 1,000,000 Btu/MMBtu

Fuel $Use_{IC\text{-}X}$ MMBtu/hr = 6.876 MMBtu/hr

Table A.1 IC ENGINE IC-1 AND IC-2 HOURLY AND ANNUAL PTE FOR PM_{10}

Emissions Unit	Rated Heat Input (MMBtu/hr)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (lb/MMBtu)[1]	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
IC-1 and IC-2	6.876	8,760	PM_{10}	0.00999	0.07	0.30

[1] – Based on AP-42 Table 3.2-2 (7/00) for PM_{10} (including filterable and condensable) for 4-stroke lean-burn IC engines combusting natural gas.

Table A.2 IC ENGINE IC-1 AND IC-2 HOURLY AND ANNUAL PTE FOR NO_X, CO, and VOC

Emissions Unit	Rated Power Output (Bhp)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (g/Bhp-hr)[1]	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
IC-1 and IC-2	1,057	8,760	NO_X	1.0	2.33	10.20
			CO	2.2	5.12	22.43
			VOC	1.0	2.33	10.20

[1] – Based on the Manufacturer's guarantee for NO_X, CO, and VOC.

H_2S conversion from ppm to lb/hr:

Assumptions:

- 2,000ppm H_2S applicant concentration estimate
- 379 scf gas/lb-mole is a Natural Gas industry constant
- 34.08 is the molecular weight of H_2S
- Maximum biogas combustion rate of 584,880 scf/day (6.77 scf/s) of biogas (per the Applicant)

$$\frac{2000 f^3 H_2S(v)}{1.0E^{+06} f^3(v)} = \frac{x}{6.77 scf/s}; x = \frac{0.0135 scf H_2S/s}{379 scf Gas/lb-mole} = \frac{3.6E^{-05} lb H_2S - mole}{s} * 34.08 mole H_2S = \frac{1.2E^{-03} lb H_2S}{s} * \frac{3600 s}{hr} = \frac{4.4 lb H_2S}{hr}$$

H_2S conversion from lb-H_2S/hr to lb-SO_2/hr

Assumptions:

- 34 is the molecular weight of H_2S
- 32 is the molecular weight of Sulfur
- 64 is the molecular weight of SO_2
- Assumes 100% H_2S conversion for SO_2

  4.4 lb-H_2S/hr x 32 lb-S/lb-mol-S ÷ 34 lb-H_2S/lb-mol-H_2S = 4.12 lb-S/hr

  4.12 lb-S ÷ 32 lb-S/lb-mol-S = 0.129 lb-mol-S

  0.129 lb-mol-S ÷ 64 lb-SO_2/lb-mol-SO_2 = **8.2 lb-SO_2/hr = 35.92 T-SO_2/yr**

Equation used for TAPs/HAPs emissions (emissions from each engine):

TAPs/HAPs Emissions (lb/hr) = EF (lb/MMBtu) x Max. Heat Input for each engine (MMBtu/hr)

Table A.3 IC ENGINE IC-1 AND IC-2 HOURLY AND ANNUAL PTE FOR TAPS/HAPS

Pollutant	Emission Factor[1] (lb/MMBtu)	Heat Input Rating (MMBtu/hr)	Annual Operation (hr/yr)	PTE[2] (lb/hr)	PTE[2] (T/yr)
Acetaldehyde	5.30E-05	6.876	8,760	0.00036	0.0016
Acrolein	2.60E-05	6.876	8,760	0.00018	0.0008
Benzene	6.89E-04	6.876	8,760	0.0047	0.0208
Dichloromethane	1.01E-04	6.876	8,760	0.0007	0.0030
Formaldehyde	1.90E-04	6.876	8,760	0.0013	0.0057
Nickel[3]	2.0E-06	6.876	8,760	0.000014	0.00006
Vinyl Chloride	5.60E-05	6.876	8,760	0.000385	0.0017
Selenium	1.10E-05	6.876	8,760	0.000076	0.00033
Styrene monomer	5.26E-05	6.876	8,760	0.00036	0.00158
Toluene	2.62E-04	6.876	8,760	0.00180	0.0079
Trichloroethylene	2.00E-05	6.876	8,760	0.0001	0.0006
Xyelene (o-, m-, p-isomers)	1.36E-04	6.876	8,760	0.00094	0.0041
				Total	**0.05**

[1] The Applicant provided Emission Factors from U.S. Environmental Protection Agency (EPA) "Internal Combustion Engines, Commercial/Institutional, Digester Gas, and Reciprocating: POTW Digester Gas." Technology Transfer Network Clearinghouse for Inventories and Emission Factors Dec. 2005. July 24, 2007. http://cfpub.epa.gov/oarweb/index.cfm?action=fire.main

[2] This total is for each engine. The total for the project is this total PTE multiplied by two since there are two IC engines installed at this facility.

[2] Source AP-42, Section 3.1 (4/00).

Flare PTE Emissions Calculations:

Table A.4 FLARE HOURLY AND ANNUAL PTE FOR CRITERIA POLLUTANTS

Emissions Unit	Rated Heat Input (MMBtu/hr)	Annual Hours of Operation (hrs/yr)	Criteria Pollutant	Emissions Factors (lb/MMBtu)	Hourly Emissions (lb/hr)	Annual Emissions (ton/yr)
Flare[1,2,3]	13.752	8,760	PM_{10}	0.00750	0.10	0.45
			SO_2	0.5963	8.20	35.92
			NO_X	0.100	1.38	6.02
			CO	0.200	2.75	12.05
			VOC	0.360	4.95	21.68

[1] – PM_{10} emissions are based upon the EPA RACT/BACTLAER Clearinghouse (RBLC), ID #IA-0088.
[2] – SO_2 EF = 0.5963 lb/MMBtu per the Applicant.
[3] – NO_X, CO, and VOC emissions are based upon the EPA RACT/BACTLAER Clearinghouse (RBLC), ID #IA-0088.

TAPs/HAPs emissions from the flare are assumed to be the same as estimated TAPs/HAPs emissions from the IC engines.

APPENDIX B – AMBIENT AIR QUALITY IMPACT ANALYSES

MEMORANDUM

DATE: May 20, 2010

TO: Darrin Pampaian, P.E., Air Quality Analyst, Stationary Source Air Program

BY: Darrin Mehr, Air Quality Analyst, MMEI/Air Program

PROJECT NUMBER: P-2010.0002

SUBJECT: Modeling Demonstration for the PTC Application for a Larger Anaerobic Digester Biogas-Fired Generator Set than Originally Permitted at the Big Sky West Dairy Facility near Tuttle, Idaho

1.0 Summary

DF-AP, LLC and Andgar Corporation (Andgar) submitted an application for a PTC modification to install a larger internal combustion engine/generator (IC engine) set than originally permitted at the Big Sky West Dairy (BSWD). There are two existing IC engines on-site and operating at this facility. The project creates electricity for the power grid.

DEQ permitting staff and management have directed DEQ modeling staff to conduct a revised facility-wide modeling demonstration for this project. The sources in question include two Guascor 560 biogas-fired IC engines and an elevated open flare. Emissions inventory data were supplied to modeling staff by the project permit writer.

This modeling analysis was based on the permit application materials received on February 8, 2010, March 23, 2010, April 6, 2010, and a final regulated air pollutant emission inventory from the DEQ permit writer from April 7, 2010. Please refer to the permit statement of basis to review a complete history for this project.

The facility is not a *designated facility*, as defined in IDAPA 58.01.01.006, Rules for the Control of Air Pollution in Idaho (Rules). The facility's potential to emit (PTE) of particulate matter with an aerodynamic diameter of ten microns or less (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), and nitrogen oxides (NO_x) each is less than 100 tons per year (T/yr). This is a non-major source.

The proposed project is subject to review under Section 200 of the Rules. Section 203.02 of the Rules requires the facility to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS). Section 210 of the Rules requires the facility to demonstrate compliance with the toxic air pollutants (TAPs) increments, which are listed in Sections 585 and 586 of the Rules.

The modeling analyses: 1) utilized appropriate methods and models; 2) were conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations from emissions associated with the facility were below national ambient air quality standards and other applicable increments at all ambient air locations.

This modeling analysis was conducted by DEQ, on behalf of the applicant, DF-AP, LLC/Andgar Corporation.

Key assumptions and results that should be considered in the development of the permit are shown in Table 1.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES	
Criteria/Assumption/Result	**Explanation/Consideration**
The two IC engines were modeled at a combined hourly SO_2 emission rate of 8.2 pounds per hour (lb/hr) and 35.9 tons per year (T/yr). Annual NO_x emissions were modeled at 20.4 T/yr.	Only impacts of SO_2 and NO_2 exceeded the significant contribution levels. These sources were modeled as operating concurrently at these emission rates. NO_2 and SO_2 impacts were below the NAAQS. NO_2 impacts were at 41% of the NAAQS including the ambient background concentration. 3-hour, 24-hour, and annual SO_2 impacts were 51%, 84%, and 80% of the NAAQS including the ambient background concentration.
Hydrogen sulfide was the only non-carcinogenic TAP with emissions that exceeded the screening emission limits (EL) specified in Section 585 of the Rules. Carcinogenic TAP emissions that exceeded the EL values specified by Section 586 of the Rules included benzene, formaldehyde, and nickel.	Non-carcinogenic and carcinogenic TAPs impacts were below all allowable increments. Concurrent operation of the two IC engines resulted in predicted ambient impacts of benzene at 84% of the allowable increment, formaldehyde impacts at 36% of the allowable increment, and nickel impacts at only 7% of the increment.
Emissions of all criteria air pollutants except NO_2 and SO_2 were below significant contribution levels. A NAAQS compliance demonstration was not required for PM_{10} ($PM_{2.5}$), CO, NO_x, or lead.	
Concurrent operation of the flare and either or both of the IC engines is allowed. The analysis was based on the amount of biogas generated at the anaerobic digester's capacity of 584,880 standard cubic feet per day. Any combination of operation of two of the three sources meets applicable standards.	The worst-case ambient impact occurs for the scenario with the IC engine operating. The flare's maximum impact was nearly one tenth of the ambient impact for an IC engine. The IC engines have equal or greater emission rates than the flare so the IC engines are the dominant sources for NAAQS and TAP increment compliance. The maximum unit emission rate ambient impacts for the flare and the IC engine occurred at different distances from the emission sources so the impacts for each source are not at the same location: • 53 meters for the flare • 30 meters for an IC engine.

2.0 Background Information

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance.

2.1.1 Area Classification

The Andgar/BSWD facility is located in Gooding County, which 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), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}).

There are no Class I areas within 10 kilometers of the facility.

2.1.2 *Significant and Full Impact Analyses*

If estimated maximum pollutant impacts to ambient air from the emissions sources at the facility exceed the significant contribution levels (SCLs) of Section 006.105 of the Rules, then a full impact analysis is necessary to demonstrate compliance with Section 203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions, and emissions from any identified co-contributing sources, to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

Table 2. CRITERIA AIR POLLUTANTS APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Contribution Levels[a] ($\mu g/m^3$)[b]	Class II NAAQS Regulatory Limit[c] ($\mu g/m^3$)	Modeled Value Used[d]
PM_{10}[e]	Annual	1.0	50[f]	Maximum 1st highest[g]
	24-hour	5.0	150[h]	Maximum 6th highest[i]
Carbon monoxide (CO)	8-hour	500	10,000[j]	Maximum 2nd highest[g]
	1-hour	2,000	40,000[j]	Maximum 2nd highest[g]
Sulfur Dioxide (SO_2)	Annual	1.0	80[f]	Maximum 1st highest[g]
	24-hour	5	365[j]	Maximum 2nd highest[g]
	3-hour	25	1,300[j]	Maximum 2nd highest[g]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[f]	Maximum 1st highest[g]
Lead (Pb)	Quarterly	NA	1.5[k,l]	Maximum 1st highest[g]
	Rolling 3-month average	NA	0.15[i]	Maximum 1st highest[g]

[a] Idaho Air Rules Section 006.105
[b] Micrograms per cubic meter
[c] National Ambient Air Quality Standards specified by Idaho Air Rules Section 577 for criteria pollutants
[d] The maximum 1st highest modeled value is always used for significant impact analysis
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f] Never expected to be exceeded in any calendar year
[g] Concentration at any modeled receptor
[h] Never expected to be exceeded more than once in any calendar year.
[i] Concentration at any modeled receptor when using five years of meteorological data
[j] Not to be exceeded more than once per year
[k] Measured as total suspended particulates
[l] Not to be exceeded in any quarter. Demonstration of compliance with the 0.15 $\mu g/m^3$ rolling 3-month average standard promulgated by EPA in late 2008 became effective in the Idaho NSR program when this standard was incorporated by reference into the Idaho Air Rules, i.e., when the Idaho Legislature adjourned *sine die* on March 29, 2010.

2.1.3 *TAPs Analyses*

The increase in emissions from the proposed project are required to demonstrate compliance with the toxic air pollutant (TAP) increments, with an ambient impact dispersion analysis required for any TAP having a requested potential emission rate or emission rate increase that exceeds the screening emission rate limit (EL) specified by Idaho Air Rules (Rules) Section 585 or 586.

This project is for an existing anaerobic digester facility which proposes to install one larger emissions source (IC engine) to combust captured anaerobic digester biogas. Any TAP emissions increases associated with this project are subject to the requirements of the TAPs regulations. DEQ modeling staff has been requested to conduct a modeling demonstration for this facility reflecting all emissions sources operating at the requested capacity by the permitting group. Therefore, modeling staff should model TAP emissions at emission rates corresponding to potential emissions instead of just the individual project TAP emission increases.

The analyses submitted in the application and supplemental information from the permit writer determined that modeling was required for TAPs regulated under Sections 585 and 586 of the Rules based on the potential emissions of the facility.

2.2 Background Concentrations

Background concentration values were provided by DEQ for this project. Default rural agricultural background values are appropriate for this facility. NO_2 and SO_2 emissions were expected to exceed modeling thresholds. The following background concentrations were used:

- NO_2: 17 $\mu g/m^3$, annual average,
- SO_2: 34 $\mu g/m^3$, 3-hour average,
  26 $\mu g/m^3$, 24-hour average, and
  8 $\mu g/m^3$, annual average.

3.0 Modeling Impact Assessment

3.1 Modeling Methodology

3.1.1 Overview of Analyses

SCREEN3 was used for the air impact analyses. SCREEN3 generates maximum one-hour concentrations for a single source. Since there are two identical generators, impacts were evaluated by multiplying the emissions from one generator by a factor of two. The model was then run using the stack characteristics associated with a single generator.

Persistence factors are used to convert one-hour concentrations from SCREEN3 output to concentrations associated with other averaging periods. The following factors listed in Table 3 are readily accepted persistence factors that were used (as specified in the *State of Idaho Air Quality Modeling Guideline*):

Table 3. SCREEN3 PERSISTENCE FACTORS

Averaging Period	Factor (dimensionless)
1-hour to 3-hour	0.9
1-hour to 8-hour	0.7
1-hour to 24-hour	0.4
1-hour to quarterly	0.13
1-hour to annual (criteria pollutants)	0.08
1-hour to annual (carcinogenic TAPs)	0.125 (specified by Idaho Air Rules)

The original modeling analysis for the initial PTC for the facility considered impacts from the generator engines, but not the flare. The flare was not included because it was considered as operational only during upset/emergency conditions. Upon further consideration it was determined the flare may operate occasionally during other periods.

DEQ assessed pollutant impacts of three scenarios: 1) two engines' impact on flat terrain while operating at capacity; 2) one flare impact on flat terrain operating at capacity; and, 3) one flare operating at half of rated capacity and one engine operating at rated capacity on flat terrain. DEQ modeled each scenario using a 1.0 pound per hour emissions rate to enable easy calculation of dispersion factors. Dispersion factors specify the maximum 1-hour impact per unit of emissions, and are calculated by dividing the SCREEN3 output maximum impact, in units of micrograms per cubic meter ($\mu g/m^3$), by the emissions rate used in the model (1.0 pound per hour). Concentrations of specific pollutants are then calculated by multiplying the

dispersion factor by the specific pollutant emissions rate in grams per second and the persistence factor for the averaging period of interest. This approach is valid because pollutant impacts vary linearly with emissions rates.

DEQ modeling staff assumed concurrent operation of the two IC engines. The flare is assumed to not operate while both IC engines are operating. Stack parameters and emission rates are identical for the IC engines and were modeled under an individual operating scenario reflecting complete utilization of the anaerobic digester biogas production at the two engines' rated capacity.

A second scenario was modeled for the elevated open flare. This flare was not modeled for the original permit to construct for this facility. DEQ modeling staff modeled the flare as an individual source operating at stated biogas production rates listed in the permit application for the daily quantity of biogas production. Standard SCREEN3 algorithms were used. Exhaust gas plume radiation values are not variable for SCREEN3. The high level of radiation assumed in the SCREEN3 program should produce conservative flare impacts because thermal buoyancy of the exhaust gases should decrease as radiation of the flared gases increases.

A third scenario representing a single IC engine operating at capacity and the flare operating at one half of the biogas production was also considered. However, the results of the three scenarios showed that the most conservative impacts occur during concurrent operation of the two IC engines.

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

Table 4. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Addition Description
General facility location	Near Tuttle, Idaho	
Model	SCREEN3	SCREEN3, Version 96043
Meteorological data	Worst Case	Used the "Full Meteorology" option in SCREEN3
Land Use (urban or rural)	Rural	Urban heat rise coefficients were not used. DEQ maintains that a rural land use designation is appropriate based upon a Google Earth review of the area surrounding the facility.
Terrain	Not considered	The sources were modeled using flat terrain assumptions.
Building downwash	Considered	Building dimensions were input to SCREEN3
Receptor Grid	Automated distance	SCREEN3 determines the maximum concentration between two specified downwind distances. The initial receptor was placed at 1 meter distance from the Andgar building/point sources out to 5,000 meters. The minimum distance to ambient air provided by the applicant was 26 meters. Any impacts closer than 26 meters were disregarded.

3.1.2 Modeling protocol

A modeling protocol was not submitted to DEQ by DF-AP, LLC/Andgar. Modeling was conducted by DEQ using methods documented in the State of Idaho Air Quality Modeling *Guideline*.

3.1.3 Model Selection

SCREEN3, Version 96043, was used by DEQ, on behalf of DF-AP, LLC/Andgar, to conduct the ambient air analyses for NAAQS and TAPs compliance demonstrations.

In the event screening modeling would predict ambient impacts greater than NAAQS or TAPs increments either a refined modeling run would need to be conducted or limitations on operations that reduced predicted ambient impacts would need to be accounted for in the screening modeling.

3.1.4 Meteorological Data

The full meteorology option was used for this SCREEN3 analysis. The entire set of wind speeds and stability classes are used with the full meteorology option.

3.1.5 Terrain Effects

The modeling analyses conducted by DEQ assumed flat terrain. Examination of the surrounding area using Google Earth imaging affirmed that significant terrain variation in the immediate area was not present. There are no nearby terrain effects that could cause a complex terrain situation.

3.1.6 Facility Layout

DEQ checked Google Earth to verify the facility's layout. The Google Earth images pre-date the construction of the anaerobic digester and the structure housing the generators. The layout of emissions sources, the digester, and the generator set structure was accepted as submitted in the annotated overhead picture of the site.

3.1.7 Building Downwash

Plume downwash effects caused by structures at the facility were accounted for in the modeling analyses by entering the dominant structure's dimensions in SCREEN3. Regulatory default settings were applied in the SCREEN3 model setup.

The "PB" building was considered to be the dominant structure. The footnote on the plot plan states that the digester structure is only 2 to 4 feet above ground, so even though the digester structure is immediately adjacent to the stacks and has a larger width and length than the PB building, the short height of the digester structure is the important parameter in determining the dominant structure for SCREEN3 modeling. The height of the PB building was increased to 23.5 feet and the IC engine stack release heights were maintained at 27.5 feet above grade.

3.1.8 Ambient Air Boundary

On April 6, 2010, DF-AP, LLC submitted a Google Earth image of the facility with the leased property boundary depicted on the picture. Distances between the leased property boundary and the IC engines and flare were listed on this document and were used to establish the minimum distance to ambient air for the SCREEN3 modeling runs. Ambient air was determined to exist for all areas immediately exterior to the leased property. DF-AP, LLC stated that "*...the dairy's employees are not permitted to enter the leased property area without permission from DF-AP #1, LLC management.*" No other control measures were discussed.

However, the following information is relevant if the control measures used to prohibit public access are not deemed adequate for establishing an ambient air boundary per the *State of Idaho Modeling Guideline*. The maximum ambient impacts were predicted to occur at a distance of 30 meters from the IC engines. The distance from the engines to the ambient air boundary is 26 meters. Because the minimum distance to ambient air is less than that of the maximum impact used to establish the design concentrations for the NAAQS and TAPs compliance demonstrations, no changes to the analysis would be required even if the ambient air was only one meter away from the emission sources. The ambient impacts would be identical for the one meter distance and the 26 meter distance cases.

3.1.9 Receptor Network

The receptor spacing used by DEQ met the minimum recommendations specified in the *State of Idaho Air Quality Modeling Guideline*.

3.2 Emission Rates

3.2.1 Modeled Emission Rates

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application. The permit writer provided the emissions inventory for modeling. The following approach was used for this modeling demonstration:

- All modeled criteria air pollutant and TAP emissions rates were equal to or greater than the facility's emissions calculated in the emission inventory provided by DEQ permitting staff, which represent the requested permit allowable emission rates listed in the air quality permit.

Table 5 lists the hourly emission rates that were modeled to demonstrate compliance with the significant contribution levels (SCLs) and National Ambient Air Quality Standards (NAAQS) with short-term and annual averaging periods. The emission rates listed in the table below were modeled continuously for 8,760 hours per year for pollutants with an annual averaging period, and continuously for 1-hour, 3-hour, 8-hour, and 24-hour averaging periods. Both IC engines and the flare were assumed to not operate concurrently due to the physical limitation on biogas production. No emissions of lead were provided, and this pollutant is not anticipated to be emitted in quantities above a modeling threshold.

Table 5. EMISSIONS RATES USED FOR MODELING

Emissions Point	Description	Emissions Rates (lb/hr)			
		PM_{10}[a]	Sulfur Dioxide	Carbon Monoxide	Oxides of Nitrogen
Engine 1	Guascor SFGLD 560 biogas-fired internal combustion engine	0.07	4.1	5.12	2.33
Engine 2	Guascor SFGLD 560 biogas-fired internal combustion engine	0.07	4.1	5.12	2.33
Flare	Flare	0.1	8.2	2.78	1.39

[a]Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers

The carcinogenic toxic air pollutant (TAP) annual average emission rates listed below in Table 6 were modeled to demonstrate compliance with the applicable acceptable ambient concentration (AACC) increments. The non-carcinogenic TAP 24-hour average emission rates listed below in Table 6 were modeled to demonstrate compliance with the applicable acceptable ambient concentration (AAC) increments. Emissions of all other TAPs were estimated to be below emissions screening levels (ELs) listed in Sections 585 and 586 of the Rules, and air impact analyses were not required. The emission rates were modeled continuously for 8,760 hours per year without any additional restrictions on the emission rates or hours of operation. Multiply the hourly emission rates listed in Table 6 by 8,760 hours per year to obtain the annual emissions of each TAP represented in the modeling demonstration. Hydrogen sulfide is a non-carcinogenic TAP that was modeled at these emission rates for 24 hours per day.

Table 6. MODELED TOXIC AIR POLLUTANT EMISSIONS RATES				
TAP	CAS #	IC Engine Number 1 (lb/hr)[a]	IC Engine Number 2 (lb/hr)	Flare (lb/hr)
Hydrogen sulfide	7783-06-4	2.2	2.2	4.4
Benzene	71-43-2	0.0047	0.0047	0.0094
Formaldehyde	50-00-0	0.0013	0.0013	0.0026
Nickel	7440-02-0	1.40E-05	1.40E-05	2.80E-05

[a] Pounds per hour

3. 3 Emission Release Parameters

3.3.1 Point Sources

Table 7 provides emissions release parameters, including stack height, stack diameter, exhaust temperature, and exhaust velocity for point sources. Values used in the analyses appeared reasonable and within expected ranges for these types of emissions units.

Table 7. POINT SOURCE STACK PARAMETERS					
Release Point	Description	Stack Height (m)[a]	Stack Gas Flow Temperature (K)[b]	Stack Gas Flow Velocity (m/sec)[c]	Stack Diameter (m)
Engine 1	Internal Combustion Engine Number 1	8.38	628	22.1	0.305
Engine 2	Internal Combustion Engine Number 2	8.38	628	22.1	0.305

[a] Meters
[b] Kelvin
[c] Meters per second

3.3.3 Flare Sources

Flare source exhaust parameters are listed below in Table 8, and were accepted as submitted in the application. The release height and heat release are calculated values based on the design of the flare, the quantity of landfill gas incinerated, and the heat content of the landfill gas. The rated heat release rate and the physical release height of the flare were provided by DF-AP, LLC/Andgar.

Table 8. FLARE STACK PARAMETERS					
Release Point	Description	Effective Release Height (m)[a]	Stack Temperature (K)[b]	Stack Velocity (m/s)[c]	Heat Release (MMBtu/hr)[d]
Flare	Elevated Flare	12.0[e]	1273[f]	20[f]	13.89

[a] Meters
[b] Kelvin
[c] Meters per second
[d] Million British thermal units per hour
[e] The physical release height of the flare stack is 8.7 meters. The effective release height is calculated in SCREEN3.
[f] SCREEN3 assumes an effective exhaust exit velocity of 20 m/s and temperature of 1273 Kelvin.

3.4 Results for Ambient Impact Analyses

Results of the SCREEN3 modeling, using the 1.0 pound per hour emissions rate, are shown in Table 9. Impacts from the engines and flare on flat terrain were greater than all impacts to the identified terrain feature, and these results were used to generate the dispersion factors. Table 9 lists the maximum pollutant concentrations, calculated from the dispersion factor, pollutant specific emissions rates, and persistence factors for the averaging periods of interest.

Only the dispersion factor for the engines' impact on flat terrain was used to calculate impacts of PM_{10}, SO_2, CO, NO_2, and TAPs. This was because the IC engines have equal or higher emissions of all pollutants compared to the flare and the IC engines have the largest dispersion factors regardless of whether the flare operates at full or half capacity.

Table 9. SCREEN3 MODEL UNIT EMISSION RATE IMPACTS

Scenario	Dispersion Factor[a] ($\mu g/m^3$)	Maximum 1-Hour Impacts ($\mu g/m^3$ / lb/hr)[b]						Location of Maximum Impact
		1-hr	3-hr	8-hr	24-hr	Annual Criteria[c]	Annual TAPs	
IC Engines impact on flat terrain	85.72	85.72	77.15	60.00	34.29	6.86	10.72	30 meters from source
Flare impact on flat terrain	8.53	8.53	7.68	5.97	3.41	0.68	1.07	53 meters from source
Flare impact at half capacity	12.5	12.50	11.25	8.75	5.00	1.00	1.56	33 meters from source

[a] SCREEN3 maximum 1-hour output divided by the emissions rate used in the model (1.0 lb/hr)
[b] Micrograms per cubic meter concentration per pound per hour of emissions

3.4.1 Significant Impact Analyses

A significant impact analysis was performed for this project. Results are listed in Table 10. Impacts were calculated by multiplying the emission rates listed in Table 5 by the unit emission rate ambient impact for each specific averaging period listed in Table 9. The impacts for two IC engines are listed in Table 10 because the IC engine impacts are the dominant ambient impacts compared to the flare's impacts.

Table 10. RESULTS FOR THE SIGNIFICANT IMPACT ANALYSES

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)[a]	Significant Contribution Level ($\mu g/m^3$)	Full Ambient Impact Analysis Required Yes/No
PM_{10}[b]	24-hour	4.80	5.0	No
	Annual	0.96	1.0	No
Carbon monoxide (CO)	1-hour	877.77	2,000	No
	8-hour	614.44	500	No
Sulfur dioxide (SO_2)	3-hour	632.61	25	Yes
	24-hour	281.16	5	Yes
	Annual	56.23	1.0	Yes
Nitrogen dioxide (NO_2)	Annual	23.97[c]	1.0	Yes

[a] Micrograms per cubic meter
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[c] The 75% NO_2/NO_x ratio allowed by EPA policy was applied to the NO_x impact value

3.4.2 Full Impact Analyses

A full impact analysis was performed by DEQ for this project. Only NO_2 and SO_2 required a full impact analysis. Results are listed in Table 11. The listed NAAQS impacts in Table 11 represent the worst-case ambient impacts using two IC engines operating simultaneously and continuously for 8,760 hours per year.

Table 11. RESULTS OF FULL IMPACT ANALYSES						
Pollutant	Averaging Period	Modeled Design Concentration ($\mu g/m^3$)[a]	Background Concentration ($\mu g/m^3$)	Total Ambient Impact ($\mu g/m^3$)	NAAQS[b] ($\mu g/m^3$)	Percent of NAAQS
NO_2[c]	Annual	24.0[e]	17	41.0	100	41%
SO_2[d]	3-hour	632.6	34	666.6	1,300	51%
	24-hour	281.2	26	307.2	365	84%
	Annual	56.2	8	64.2	80	80%

[a] Micrograms per cubic meter
[b] National ambient air quality standards
[c] Nitrogen dioxide
[d] Sulfur dioxide
[e] The 75% NO_2/NO_x ratio allowed by EPA policy was applied to the NO_x impact value

3.4.3 Toxic Air Pollutant Impact Analyses

Dispersion modeling for TAPs was required to demonstrate compliance with TAP increments specified by Idaho Air Rules Section 586. No increase in TAPs emissions with a 24-hour averaging period (non-carcinogenic TAPs) was requested for this project. This project's caused emission increases that exceeded the screening emission rate limits. The requested emission increases were modeled to demonstrate compliance with the allowable TAP increments.

The results of the TAPs analyses are listed in Table 12. The predicted ambient TAPs impacts were below allowable increments.

Table 12. RESULTS OF NONCARCINOGENIC AND CARCINOGENIC TAPs ANALYSES				
Toxic Air Pollutant	CAS No.[a]	Maximum Modeled Concentration ($\mu g/m^3$)[b]	AAC/ AACC[c] ($\mu g/m^3$)	Percent of AAC/AACC (%)
Non-carcinogenic				
Hydrogen Sulfide	7783-06-4	150.9	700	22%
Carcinogenic				
Benzene	71-43-2	0.101	0.12	84%
Formaldehyde	50-00-0	0.028	0.007	36%
Nickel	7440-02-0	0.0003	0.0042	7%

[a] Chemical Abstract Service Number
[b] Micrograms per cubic meter
[b] Acceptable ambient concentration for noncarcinogens / acceptable ambient concentration for carcinogens

4.0 Conclusions

The ambient air impact analysis submitted demonstrated to DEQ's satisfaction that emissions from the facility, as represented by the applicant in the permit application, will not cause or significantly contribute to a violation of any air quality standard.

Appendix A

SCREEN 3 MODELING RUNS:

1) INTERNAL COMBUSTION ENGINE

2) FLARE AT FULL CAPACITY

3) FLARE AT HALF CAPACITY

1) INTERNAL COMBUSTION ENGINE

03/26/10
11:15:40

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Big Sky West WORST CASE AMBIENT AIR BOUNDARY- **IC Engine; PB bldg**

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = POINT
EMISSION RATE (G/S) = 0.126000
STACK HEIGHT (M) = 8.3820
STK INSIDE DIAM (M) = 0.3048
STK EXIT VELOCITY (M/S)= 22.0994
STK GAS EXIT TEMP (K) = 628.0000
AMBIENT AIR TEMP (K) = 293.1500
RECEPTOR HEIGHT (M) = 0.0000
URBAN/RURAL OPTION = RURAL
BUILDING HEIGHT (M) = 7.1600
MIN HORIZ BLDG DIM (M) = 13.7160
MAX HORIZ BLDG DIM (M) = 24.3840

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 2.684 M**4/S**3; MOM. FLUX = 5.295 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****
*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	U10M STAB	USTK (M/S)	MIX HT (M/S)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	0.000	0	0.0	0.0	0.0	0.00	0.00	0.00	NA
100.	45.80	5	5.0	5.0	10000.0	11.46	6.12	6.74	SS
200.	28.82	4	4.5	4.5	1440.0	11.89	15.56	10.60	SS
300.	20.64	4	3.5	3.5	1120.0	14.73	22.61	13.29	SS
400.	16.05	4	3.0	3.0	960.0	17.09	29.45	16.13	SS
500.	12.98	4	2.5	2.5	800.0	20.56	36.15	18.77	SS
600.	11.05	4	2.5	2.5	800.0	20.56	42.72	21.67	SS
700.	9.500	4	2.0	2.0	640.0	25.88	49.19	24.03	SS
800.	8.447	4	2.0	2.0	640.0	25.88	55.57	26.78	SS
900.	7.478	4	2.0	2.0	640.0	25.88	61.88	29.47	SS
1000.	6.798	4	1.5	1.5	480.0	34.78	68.13	32.09	SS
1100.	6.590	6	3.5	3.5	10000.0	23.52	36.96	16.03	SS
1200.	6.427	6	3.0	3.0	10000.0	25.12	40.01	16.65	SS
1300.	6.308	6	3.0	3.0	10000.0	25.12	43.04	17.43	SS
1400.	6.177	6	2.5	2.5	10000.0	27.19	46.05	17.98	SS
1500.	6.092	6	2.5	2.5	10000.0	27.19	49.03	18.73	SS
1600.	5.977	6	2.5	2.5	10000.0	27.19	51.99	19.47	SS
1700.	5.903	6	2.0	2.0	10000.0	29.98	54.94	19.91	SS
1800.	5.843	6	2.0	2.0	10000.0	29.98	57.87	20.62	SS

1900.	5.759	6	2.0	2.0	10000.0	29.98	60.78	21.32	SS
2000.	5.625	6	1.5	1.5	10000.0	34.04	63.68	21.63	SS
2100.	5.588	6	1.5	1.5	10000.0	34.04	66.56	22.21	SS
2200.	5.535	6	1.5	1.5	10000.0	34.04	69.42	22.78	SS
2300.	5.471	6	1.5	1.5	10000.0	34.04	72.28	23.34	SS
2400.	5.397	6	1.5	1.5	10000.0	34.04	75.12	23.89	SS
2500.	5.328	6	1.0	1.0	10000.0	40.50	77.95	24.42	SS
2600.	5.331	6	1.0	1.0	10000.0	40.50	80.76	24.95	SS
2700.	5.323	6	1.0	1.0	10000.0	40.50	83.57	25.47	SS
2800.	5.304	6	1.0	1.0	10000.0	40.50	86.36	25.98	SS
2900.	5.276	6	1.0	1.0	10000.0	40.50	89.15	26.48	SS
3000.	5.241	6	1.0	1.0	10000.0	40.50	91.92	26.98	SS
3500.	4.934	6	1.0	1.0	10000.0	40.50	105.65	28.98	SS
4000.	4.607	6	1.0	1.0	10000.0	40.50	119.17	30.84	SS
4500.	4.290	6	1.0	1.0	10000.0	40.50	132.50	32.57	SS
5000.	3.993	6	1.0	1.0	10000.0	40.50	145.67	34.21	SS

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

30.	**85.72**	**6**	**4.0**	**4.0**	**10000.0**	**9.23**	**1.37**	**3.68**	**SS**

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** REGULATORY (Default) ***
PERFORMING CAVITY CALCULATIONS
WITH ORIGINAL SCREEN CAVITY MODEL
(BRODE, 1988)
****

*** CAVITY CALCULATION - 1 ***
CONC (UG/M**3) = 0.000
CRIT WS @10M (M/S) = 99.99
CRIT WS @ HS (M/S) = 99.99
DILUTION WS (M/S) = 99.99
CAVITY HT (M) = 8.11
CAVITY LENGTH (M) = 18.01
ALONGWIND DIM (M) = 13.72

*** CAVITY CALCULATION - 2 ***
CONC (UG/M**3) = 0.000
CRIT WS @10M (M/S) = 99.99
CRIT WS @ HS (M/S) = 99.99
DILUTION WS (M/S) = 99.99
CAVITY HT (M) = 7.30
CAVITY LENGTH (M) = 16.23
ALONGWIND DIM (M) = 24.38

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S. CONC SET = 0.0
****
END OF CAVITY CALCULATIONS
****

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	**85.72**	**30.**	**0.**

2) FLARE AT FULL CAPACITY

09:18:59

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Big Sky West Dairy WORST CASE AMBIENT AIR BOUNDARY- **FLARE AT 13.89 MMBTU/HR**

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = FLARE
EMISSION RATE (G/S) = 0.126000
FLARE STACK HEIGHT (M) = 8.6868
TOT HEAT RLS (CAL/S) = 972284.
RECEPTOR HEIGHT (M) = 0.0000
URBAN/RURAL OPTION = RURAL
EFF RELEASE HEIGHT (M) = 12.0067
BUILDING HEIGHT (M) = 7.1600
MIN HORIZ BLDG DIM (M) = 13.7160
MAX HORIZ BLDG DIM (M) = 24.3840

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 16.121 M**4/S**3; MOM. FLUX = 9.830 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	0.000	1	1.0	1.0	320.0	182.18	1.71	1.67	NO
100.	6.716	4	20.0	20.6	6400.0	15.55	8.29	9.71	HS
200.	3.667	4	20.0	20.6	6400.0	18.04	15.68	13.05	HS
300.	2.609	4	15.0	15.4	4800.0	22.92	22.84	16.36	HS
400.	2.275	4	10.0	10.3	3200.0	28.78	29.84	19.63	HS
500.	2.096	4	10.0	10.3	3200.0	28.78	36.46	22.45	HS
600.	1.920	4	8.0	8.2	2560.0	32.97	43.14	25.45	HS
700.	1.760	4	8.0	8.2	2560.0	32.97	49.55	28.11	HS
800.	1.597	4	8.0	8.2	2560.0	32.97	55.90	30.72	HS
900.	1.440	4	8.0	8.2	2560.0	32.97	62.17	31.56	HS
1000.	1.379	4	5.0	5.1	1600.0	45.55	68.80	34.62	HS
1100.	1.311	4	5.0	5.1	1600.0	45.55	74.93	36.54	HS
1200.	1.242	4	5.0	5.1	1600.0	45.55	81.01	38.41	HS
1300.	1.174	4	5.0	5.1	1600.0	45.55	87.05	40.24	HS
1400.	1.116	4	4.5	4.6	1440.0	49.27	93.16	42.27	HS
1500.	1.062	4	4.5	4.6	1440.0	49.27	99.12	44.00	HS
1600.	1.014	4	4.0	4.1	1280.0	53.93	105.18	46.03	HS
1700.	0.9717	4	4.0	4.1	1280.0	53.93	111.05	47.68	HS

1800.	0.9305	4	4.0	4.1	1280.0	53.93	116.90	49.30	HS
1900.	0.8968	5	1.0	1.1	10000.0	85.51	93.73	38.63	NO
2000.	0.9361	5	1.0	1.1	10000.0	85.51	97.98	39.53	NO
2100.	0.9646	5	1.0	1.1	10000.0	85.51	102.21	40.33	NO
2200.	0.9901	5	1.0	1.1	10000.0	85.51	106.43	41.13	NO
2300.	1.013	5	1.0	1.1	10000.0	85.51	110.63	41.91	NO
2400.	1.032	5	1.0	1.1	10000.0	85.51	114.83	42.69	NO
2500.	1.050	5	1.0	1.1	10000.0	85.51	119.01	43.45	NO
2600.	1.064	5	1.0	1.1	10000.0	85.51	123.17	44.21	NO
2700.	1.077	5	1.0	1.1	10000.0	85.51	127.33	44.96	NO
2800.	1.088	5	1.0	1.1	10000.0	85.51	131.47	45.70	NO
2900.	1.096	5	1.0	1.1	10000.0	85.51	135.60	46.43	NO
3000.	1.103	5	1.0	1.1	10000.0	85.51	139.72	47.16	NO
3500.	1.116	5	1.0	1.1	10000.0	85.51	160.14	50.67	NO
4000.	1.104	5	1.0	1.1	10000.0	85.51	180.29	54.02	NO
4500.	1.076	6	1.0	1.1	10000.0	72.26	133.62	36.84	NO
5000.	1.089	6	1.0	1.1	10000.0	72.26	146.68	38.29	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

53.	**8.531**	**4**	**20.0**	**20.6**	**6400.0**	**14.13**	**4.70**	**7.24**	**HS**

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
26.	7.703	4	20.0	20.6	6400.0	13.04	2.40	5.34	HS
30.	7.926	4	20.0	20.6	6400.0	13.22	2.73	5.61	HS

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** REGULATORY (Default) ***
PERFORMING CAVITY CALCULATIONS
WITH ORIGINAL SCREEN CAVITY MODEL
(BRODE, 1988)
****

*** CAVITY CALCULATION - 1 *** *** CAVITY CALCULATION - 2 ***
CONC (UG/M**3) = 0.000 CONC (UG/M**3) = 0.000

CRIT WS @10M (M/S) = 99.99 CRIT WS @10M (M/S) = 99.99
CRIT WS @ HS (M/S) = 99.99 CRIT WS @ HS (M/S) = 99.99
DILUTION WS (M/S) = 99.99 DILUTION WS (M/S) = 99.99
CAVITY HT (M) = 8.11 CAVITY HT (M) = 7.30
CAVITY LENGTH (M) = 18.01 CAVITY LENGTH (M) = 16.23
ALONGWIND DIM (M) = 13.72 ALONGWIND DIM (M) = 24.38

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S. CONC SET = 0.0

****
END OF CAVITY CALCULATIONS
****

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	**8.531**	**53.**	**0.**

3) FLARE AT HALF CAPACITY

05/20/10
12:22:53

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Big Sky West Dairy WORST CASE AMBIENT AIR BOUNDARY- FLARE AT 6.945 MMBTU/HR

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = FLARE
EMISSION RATE (G/S) = 0.126000
FLARE STACK HEIGHT (M) = 8.6868
TOT HEAT RLS (CAL/S) = 486142.
RECEPTOR HEIGHT (M) = 0.0000
URBAN/RURAL OPTION = RURAL
EFF RELEASE HEIGHT (M) = 11.0704
BUILDING HEIGHT (M) = 7.1600
MIN HORIZ BLDG DIM (M) = 13.7160
MAX HORIZ BLDG DIM (M) = 24.3840

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 8.060 M**4/S**3; MOM. FLUX = 4.915 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	0.000	1	1.0	1.0	320.0	112.83	1.38	1.33	NO
100.	9.244	4	15.0	15.2	4800.0	15.44	8.30	9.72	HS
200.	5.246	4	10.0	10.2	3200.0	21.16	15.83	13.23	HS
300.	4.647	4	8.0	8.1	2560.0	23.69	22.90	16.44	HS
400.	4.068	4	8.0	8.1	2560.0	23.69	29.67	19.38	HS
500.	3.681	4	5.0	5.1	1600.0	31.26	36.60	22.68	HS
600.	3.384	4	5.0	5.1	1600.0	31.26	43.11	25.40	HS
700.	3.099	4	4.5	4.6	1440.0	33.50	49.60	28.20	HS
800.	2.863	4	4.0	4.1	1280.0	36.31	56.04	30.98	HS
900.	2.598	4	3.5	3.6	1120.0	39.91	62.43	32.06	HS
1000.	2.436	4	3.5	3.6	1120.0	39.91	68.62	34.28	HS
1100.	2.275	4	3.0	3.0	960.0	44.72	74.93	36.55	HS
1200.	2.149	4	3.0	3.0	960.0	44.72	81.01	38.42	HS
1300.	2.027	4	3.0	3.0	960.0	44.72	87.05	40.24	HS
1400.	1.916	4	2.5	2.5	800.0	51.45	93.27	42.50	HS
1500.	1.830	4	2.5	2.5	800.0	51.45	99.22	44.22	HS

1600.	1.811	6	2.0	2.1	10000.0	49.60	53.15	24.22	HS
1700.	1.722	6	2.0	2.1	10000.0	49.60	56.03	24.24	HS
1800.	1.775	5	1.0	1.0	10000.0	69.96	88.59	35.57	NO
1900.	1.822	5	1.0	1.0	10000.0	69.96	92.88	36.53	NO
2000.	1.861	5	1.0	1.0	10000.0	69.96	97.17	37.48	NO
2100.	1.882	5	1.0	1.0	10000.0	69.96	101.43	38.33	NO
2200.	1.896	5	1.0	1.0	10000.0	69.96	105.68	39.16	NO
2300.	1.906	5	1.0	1.0	10000.0	69.96	109.92	39.99	NO
2400.	1.910	5	1.0	1.0	10000.0	69.96	114.14	40.80	NO
2500.	1.911	5	1.0	1.0	10000.0	69.96	118.34	41.60	NO
2600.	1.909	5	1.0	1.0	10000.0	69.96	122.53	42.39	NO
2700.	1.903	5	1.0	1.0	10000.0	69.96	126.71	43.17	NO
2800.	1.898	6	1.0	1.1	10000.0	59.61	87.47	29.45	NO
2900.	1.926	6	1.0	1.1	10000.0	59.61	90.22	29.89	NO
3000.	1.950	6	1.0	1.1	10000.0	59.61	92.96	30.33	NO
3500.	1.981	6	1.0	1.1	10000.0	59.61	106.56	32.13	NO
4000.	1.976	6	1.0	1.1	10000.0	59.61	119.97	33.81	NO
4500.	1.948	6	1.0	1.1	10000.0	59.61	133.23	35.40	NO
5000.	1.906	6	1.0	1.1	10000.0	59.61	146.33	36.91	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

33.	**12.50**	**4**	**20.0**	**20.3**	**6400.0**	**12.25**	**3.05**	**5.87**	**HS**

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
26.	12.45	4	20.0	20.3	6400.0	11.98	2.38	5.33	HS
30.	12.49	4	20.0	20.3	6400.0	12.12	2.71	5.60	HS

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** REGULATORY (Default) ***
PERFORMING CAVITY CALCULATIONS
WITH ORIGINAL SCREEN CAVITY MODEL
(BRODE, 1988)
****

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*** CAVITY CALCULATION - 1 ***      *** CAVITY CALCULATION - 2 ***
 CONC (UG/M**3)   =   0.000       CONC (UG/M**3)   =   0.000
 CRIT WS @10M (M/S) =  99.99       CRIT WS @10M (M/S) =  99.99
 CRIT WS @ HS (M/S) =  99.99       CRIT WS @ HS (M/S) =  99.99
 DILUTION WS (M/S) =   99.99       DILUTION WS (M/S) =   99.99
 CAVITY HT (M)    =   8.11       CAVITY HT (M)    =   7.30
 CAVITY LENGTH (M) =  18.01       CAVITY LENGTH (M) =  16.23
 ALONGWIND DIM (M) =  13.72       ALONGWIND DIM (M) =  24.38

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

**************************************
   END OF CAVITY CALCULATIONS
**************************************


   **************************************
   *** SUMMARY OF SCREEN MODEL RESULTS ***
   **************************************

 CALCULATION      MAX CONC   DIST TO   TERRAIN
 PROCEDURE       (UG/M**3)   MAX (M)   HT (M)
-------------    ----------  -------  -------
SIMPLE TERRAIN    12.50         33.      0.
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APPENDIX C – FACILITY DRAFT COMMENTS

The following comments were received from the facility on June 30, 2010:

Facility Comment: Statement of Basis, Table 1 - Anaerobic Digester Throughput should be 145,455 gallons per day; Biogas Production should be 584,880 cubic feet per day.

DEQ Response: The requested corrections will be made to the Statement of Basis.

Facility Comment: Statement of Basis, Table 5 - It appears the emission rates shown are for one engine and not both engines combined?

DEQ Response: The requested correction will be made to the Statement of Basis.

Facility Comment: Statement of Basis, Table 6 - It appears the emission rates shown are for one engine and not both engines combined?

DEQ Response: The requested correction will be made to the Statement of Basis.

Facility Comment: Statement of Basis, Table 7 - It appears the emission rates shown are for one engine and not both engines combined?

DEQ Response: The requested correction will be made to the Statement of Basis.

Facility Comment: Statement of Basis, Table 8 - It appears the emission rates shown are for one engine and not both engines combined?

DEQ Response: The requested correction will be made to the Statement of Basis.

Facility Comment: Statement of Basis, Page 14 regarding 40 CFR 60.4243 - I thought that DF-AP #1, LLC was under the limit requiring initial and annual performance testing? If the engines were 40 CFR 60, Subpart JJJJ certified then would the testing be required?

DEQ Response: 40 CFR 60.4243 (iiii) states "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 within 1 year of engine startup and conduct subsequent performance testing every 8,760 hours or 3 years, whichever comes first, thereafter to demonstrate compliance." The IC engines installed at this facility are rated at 1,057 bhp. Therefore, source testing is required and this requirement will be left in the permit.

Facility Comment: Statement of Basis, Appendix B - The subject line calls out a Landfill-Gas Fired Generator and not an Anaerobic Digester Biogas Fired Generator.

DEQ Response: The requested correction will be made to the Statement of Basis.

Facility Comment: Statement of Basis, Appendix B, Page 3, Section 2.1.3 TAPs Analysis - Second paragraph states, "This project is for an existing landfill facility..." Should be anaerobic digester facility. It continues to state, "to combust captured anaerobic digester gas." which is correct.

DEQ Response: The requested correction will be made to the Statement of Basis.

Facility Comment: Permit to Construct, Page 5, Paragraph 15 - The digester designer/operator has tried to use pilot flames for biogas flares in the past and found them to be extremely unreliable. The pilot flame wouldn't always light the main flare because it would be prone to being extinguished by the wind which is typically unobstructed in the rural areas. The current flares are spark ignited by an ignition source that is programmable to spark for specified duration on a specified interval.

DEQ Response: This condition will be changed to "The permittee shall install, maintain, and operate a flare during operation of the anaerobic digester. A flame shall be present at all times when combustible gases are vented through the flare. The outlet of the flare shall be equipped with an automatic ignition system, or, shall operate with a pilot flame present at all times when combustible gases are vented through the flare."

Facility Comment: Permit to Construct, Page 5, Paragraph 16 - The permittee will observe and confirm the proper operation of the ignition system.

DEQ Response: This condition will be changed to "The permittee shall install, maintain, and operate a heat sensing device such as a thermocouple, ultraviolet beam sensor, infrared sensor, or an alternative equivalent device, capable of continuously detecting that the flare flame is present."

Facility Comment: Permit to Construct, Page 7, Paragraph 20 - The pilot flame detection system should be replaced with the monitoring the flare ignition system for proper operation.

DEQ Response: This sub-condition title will be changed to "Flare Ignition System."

Facility Comment: Permit to Construct, Page 7, Paragraph 20 - The pilot flame detection system should be replaced with the monitoring the flare ignition system for proper operation.

DEQ Response: This condition was changed to "Procedure for flare flame reignition, and"

Facility Comment: Permit to Construct, Page 8, Paragraph 26 - Is performance testing every year required for engines that are 40 CFR Subpart JJJJ certified..

DEQ Response: As mentioned previously performance testing of the IC engines is required every 8,760 hours of operation or 3 years, whichever comes first.

APPENDIX D – PROCESSING FEE

PTC Fee Calculation

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: DF-AP #1, LLC - Big Sky West Dairy
Address: 2395 South 1500 East
City: Gooding
State: ID
Zip Code: 83330
Facility Contact: Marlin Statema
Title: Manager
AIRS No.: 047-00022

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	0.0	24.44	-24.4
SO_2	7.4	0	7.4
CO	5.1	0	5.1
PM10	0.6	0	0.6
VOC	2.8	0	2.8
TAPS/HAPS	0.0	0	0.0
Total:	0.0	24.44	**-8.5**
Fee Due	**$ 1,000.00**		

Comments: