DE/AFS/SF

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DEPARTMENT OF ENVIRONMENTAL QUALITY
STATE A Q PROGRAM

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Ventilation
Air Conditioning
Plumbing
Radiant Heating
Refrigeration

• *design, sales & installation*
• *preventative maintenance*
• *service & repair*

ARCHITECTURAL METALS
Flashing
Metal Roofing
Metal Siding

• *design, fabrication & installation*

METAL FABRICATION
Structural
Stairs, Railings
Stainless Steel
Specialty Fabrication
Custom Product Manufacturing

• *design, fabrication & installation*

FOOD SERVICE
Commercial Kitchens
Institutional Kitchens
Restaurant Kitchens

• *design, fabrication & installation*

FOOD PROCESSING EQUIPMENT
Food Manufacturing Equip.
Sorting & Sizing
Washing & Conveying
Packaging
Custom Equipment

• *design, fabrication, sales & installation*

BIOGAS DIGESTERS
• *design, fabrication sales & installation*

6920 Salashan Pkwy, A-102
P.O. Box 2708
Ferndale, WA 98248
Office: 360.366.9900
Fax: 360.366.5800
corporate@andgar.com
http://www.andgar.com

December 5, 2007

Department of Environmental Quality
Air Quality Division
Stationary Source Program
1410 North Hilton
Boise, ID 83706-1255

ATTN: Air Quality Division

RE: 15-Day Pre Permit Construction Approval Application

Dear DEQ,

We are proposing to construct an anaerobic digester on Dry Creek Dairy that will collect the biogas from the cow manure and transform it into renewable energy through the use of three reciprocating engines and generators. A letter from Kleinfelder is included in the application demonstrating that he has performed the screening level modeling and found that the proposed emissions will not cause or significantly contribute to a violation of any air quality standards. A copy of the approved modeling protocol and a copy of the public notice meeting is also attached. Please review the attached application for the pre-permit construction approval and let us know if you have any questions.

Based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Sincerely,

Kyle Juergens
ANDGAR CORPORATION

DE/AFS/SF

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DEPARTMENT OF ENVIRONMENTAL QUALITY
STATE A.Q. PROGRAM

Pre-Permit Construction Approval And Permit To Construct Application

Dry Creek Dairy
Renewable Energy System
2952 North 4200 East
Hansen, ID 83334

Prepared By:

Andgar Corporation
PO Box 2708
6920 Salashan Pkwy, A-102
Ferndale, WA 98248
360-366-9900
360-366-5800 fax
www.andgar.com

Ambient Air Quality Monitoring Report By:

Kleinfelder
2315 S. Cobalt Point Way
Meridian, ID 83642
208-893-9700
208-893-9703 fax

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1410 N. Hilton, Boise, ID 83706
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Air Permit Hotline – 1-877-5PERMIT

PERMIT TO CONSTRUCT APPLICATION

Revision 3
03/26/07

Please see instructions on page 2 before filling out the form.

All information is required. If information is missing, the application will not be processed.

IDENTIFICATION	
1. Company Name	Andgar Corporation
2. Facility Name (if different than #1)	Dry Creek Dairy
3. Facility I.D. No.	1
4. Brief Project Description:	Dairy Anaerobic Digester which captures biogas to produce electricity through gensets
FACILITY INFORMATION	
5. Owned/operated by: (√ if applicable)	☐ Federal government ☐ County government ☐ State government ☐ City government
6. Primary Facility Permit Contact Person/Title	Kyle Juergens / Project Manager
7. Telephone Number and Email Address	360-366-9900 kylej@andgar.com
8. Alternate Facility Contact Person/Title	Bryan VanLoo / Manager
9. Telephone Number and Email Address	360-366-9900 bryanv@andgar.com
10. Address to which permit should be sent	PO Box 2708
11. City/State/Zip	Ferndale WA 98248
12. Equipment Location Address (if different than #10)	2952 North 4200 East
13. City/State/Zip	Hansen, ID 83334
14. Is the Equipment Portable?	☐ Yes ☒ No
15. SIC Code(s) and NAISC Code	Primary SIC: 1629 Secondary SIC (if any): NAICS: 237130
16. Brief Business Description and Principal Product	Anaerobically digest cow manure and capture methane to power engine and produce electricity.
17. Identify any adjacent or contiguous facility that this company owns and/or operates	
PERMIT APPLICATION TYPE	
18. Specify Reason for Application	☒ New Facility ☐ New Source at Existing Facility ☐ Unpermitted Existing Source ☐ Modify Existing Source: Permit No.:_____ Date Issued: _____ ☐ Permit Revision ☐ Required by Enforcement Action: Case No.:_____
CERTIFICATION	
IN ACCORDANCE WITH IDAPA 58.01.01.123 (RULES FOR THE CONTROL OF AIR POLLUTION IN IDAHO), I CERTIFY BASED ON INFORMATION AND BELIEF FORMED AFTER REASONABLE INQUIRY, THE STATEMENTS AND INFORMATION IN THE DOCUMENT ARE TRUE, ACCURATE, AND COMPLETE.	
19. Responsible Official's Name/Title	Kyle Juergens - Project Manager
20. RESPONSIBLE OFFICIAL SIGNATURE	Date: 12/5/07
21. ☒ Check here to indicate you would like to review a draft permit prior to final issuance.	

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PERMIT TO CONSTRUCT APPLICATION

Revision 3
04/03/07

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DEQ USE ONLY
Date Received
Project Number
Payment / Fees Included? Yes ☐ No ☐
Check Number

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER

1. Company Name	Andgar Corporation		
2. Facility Name	Dry Creek Dairy	3. Facility ID No.	1
4. Brief Project Description - One sentence or less	Dairy Anaerobic Digester which captures biogas to produce electricity through gensets.		

PERMIT APPLICATION TYPE

5. ☒ New Facility ☐ New Source at Existing Facility ☐ Unpermitted Existing Source
☐ Modify Existing Source: Permit No.:_____ Date Issued:_____
☐ Required by Enforcement Action: Case No.:_____

6. ☒ Minor PTC ☐ Major PTC

FORMS INCLUDED

Included	N/A	Forms	DEQ Verify
☒	☐	Form GI – Facility Information	☐
☐	☒	Form EU0 – Emissions Units General	☐
☒	☐	Form EU1 - Industrial Engine Information Please Specify number of forms attached: 3	☐
☐	☒	Form EU2 - Nonmetallic Mineral Processing Plants Please Specify number of forms attached: _____	☐
☐	☒	Form EU3 - Spray Paint Booth Information Please Specify number of forms attached: _____	☐
☐	☒	Form EU4 - Cooling Tower Information Please Specify number of forms attached: _____	☐
☐	☒	Form EU5 – Boiler Information Please Specify number of forms attached: _____	☐
☐	☒	Form HMAP – Hot Mix Asphalt Plant Please Specify number of forms attached: _____	☐
☐	☒	Form CBP - Concrete Batch Plant Please Specify number of forms attached: _____	☐
☐	☒	Form BCE - Baghouses Control Equipment	☐
☐	☒	Form SCE - Scrubbers Control Equipment	☐
☒	☐	Forms EI-CP1 - EI-CP4 - Emissions Inventory– criteria pollutants (Excel workbook, all 4 worksheets)	☐
☒	☐	PP – Plot Plan	☐
☒	☐	Forms MI1 – MI4 – Modeling (Excel workbook, all 4 worksheets)	☐
☒	☐	Form FRA – Federal Regulation Applicability	☐

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PERMIT TO CONSTRUCT APPLICATION

Revision 3
03/26/07

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

Company Name:	Facility Name:	Facility ID No:
Andgar Corporation	Dry Creek Dairy	1

Brief Project Description: Dairy Anaerobic Digester which captures biogas to produce electricity through gensets

APPLICABILITY DETERMINATION

1. Will this project be subject to 1990 CAA Section 112(g)? (Case-by-Case MACT)	☒ NO	☐ YES* * If YES, applicant must submit an application for a case-by-case MACT determination [IAC 567 22-1(3)"b" (8)]
2. Will this project be subject to a New Source Performance Standard? (40 CFR part 60)	☒ NO	☐ YES* *If YES, please identify sub-part: _____
3. Will this project be subject to a MACT (Maximum Achievable Control Technology) regulation? (40 CFR part 63) THIS ONLY APPLIES IF THE PROJECT EMITS A HAZARDOUS AIR POLLUTANT	☒ NO	☐ YES* *If YES, please identify sub-part: _____
4. Will this project be subject to a NESHAP (National Emission Standards for Hazardous Air Pollutants) regulation? (40 CFR part 61)	☒ NO	☐ YES* *If YES, please identify sub-part: _____
5. Will this project be subject to PSD (Prevention of Significant Deterioration)? (40 CFR section 52.21)	☒ NO	☐ YES
6. Was netting done for this project to avoid PSD?	☒ NO	☐ YES* *If YES, please attach netting calculations

IF YOU ARE UNSURE HOW TO ANSWER ANY OF THESE QUESTIONS, CALL THE AIR PERMIT HOTLINE AT 1-877-5PERMIT

DEQ AIR QUALITY PROGRAM
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Air Permit Hotline - 1-877-5PERMIT

PERMIT TO CONSTRUCT APPLICATION
Revision 3
4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	**Andgar Corporation**
Facility Name:	Dry Creek Dairy
Facility ID No.:	1
Brief Project Description:	Dairy Anaerobic Digester which captures biogas to produce electricity through gensets.

SUMMARY OF FACILITY WIDE EMISSION RATES FOR CRITERIA POLLUTANTS - POINT SOURCES

1.	2.	3.											
		PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Emissions units	**Stack ID**	**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 Source(s)													
Guascor 560*	1.00	7.0E-02	3.03E-01	3.76	16.43	2.33	10.20	5.12	22.43	2.33	10.20	N/A	N/A
Guascor 560*	2.00	7.0E-02	3.03E-01	3.76	16.43	2.33	10.20	5.12	22.43	2.33	10.20	N/A	N/A
Guascor 560*	3.00	7.0E-02	3.03E-01	3.76	16.43	2.33	10.20	5.12	22.43	2.33	10.20	N/A	N/A
*Values are less than stated													
see attached sheet.													
Reduction in CH4													
Stack #1 = -1,164 Tons/year													
Stack #2 = -1,164 Tons/year													
Stack #3 = -1,164 Tons/year													
Acetaldehyde		1.20E-03	5.26E-03										
Acroline		5.37E-04	2.35E-03										
Benzene		1.42E-02	6.22E-02										
Dichloromethane		2.07E-03	9.07E-03										
Formaldehyde		3.53E-02	1.55E-01										
Isomers of Xyelene		2.81E-03	1.23E-02										
Styrene		1.09E-03	4.77E-03										
Toluene		5.42E-03	2.37E-02										
Trichloroethylene		4.13E-04	1.81E-03										
Vinal Chloride		1.16E-03	5.08E-03										
Total				11.28	49.29	6.99	30.60	15.36	67.29	6.99	30.60		

GROUP	GAS	PRODUCT INFORMATION	INDEX
IC		IC-G-B-56-014	
	POWER RATING	DATE 09-05-07	DEP. 2

GUASCOR

ENGINE:	SFGLD 560	SPEED:	1200
JACKET WATER TEMPERATURE(ºF):	194	FUEL TYPE:	Sewage Gas
INTERCOOLER WATER TEMP(ºF):	131		

APPLICATION:	CONTINUOUS	COMPRESSION RATIO:	11.7:1
COOLING SYSTEM:	TWO CIRCUITS	REGULATION:	Electronic
		IGNITION TIMING:	14º
EXHAUST MANIFOLD TYPE:	WATER COOLED	MAX. BACK PRESSURE:	18 "H2O
EMISSIONS:			
NOX	gr/bhph 1	AMBIENT CONDITIONS ISO 3046/1:	
CO	gr/bhph <22	Atmospheric pressure ("Hg)=	30
NMHC	gr/bhph <1	Ambient temperature (ºF)=	77
		Relative humidity (%)=	30

POWER RATING (4)			NOMINAL	PARTIAL LOADS		
LOAD		%	100%	80%	60%	40%
MECHANICAL POWER	(3, 4, 5)	BHP	1057	845	630	422
BMEP		psi	2045	1639	1218	812
FUEL CONSUMPTION	(1)	Btu/bhp-hour	6570	6724	6960	7480
THERMAL EFFICIENCY		%	38.7	37.8	36.6	34.1
HEAT IN MAIN WATER CIRCUIT	(1)	BTU/min	29970	25591	20700	15639
HEAT IN SECONDARY WATER CIRCUIT	(1)	BTU/min	12397	9156	6597	4891
HEAT IN CHARGE COOLER	(1)	BTU/min	7109	4151	1990	682
HEAT IN OIL COOLER	(1)	BTU/min	5289	5004	4606	4208
HEAT IN EXHAUST GASES (77 ºF)	(1)	BTU/min	26672	22406	17629	12966
HEAT IN EXHAUST GASES (248ºF)	(1)	BTU/min	19004	16221	12872	9643
EXHAUST GAS TEMPERATURE	(1)	ºF	671	694	712	748
HEAT TO RADIATION	(1)	BTU/min	1877	1706	1422	1194
CARBURETION SETTINGS (2)						
O_2 TO EXHAUST(DRY)(ONLY A REFERENCE)		%	8,8	8,6	8,3	8,0
MASS FLOWS						
INTAKE AIR FLOW	(1)	lb/h	8950	7230	5510	3820
EXHAUST GAS FLOW (WET)	(1)	lb/h	9800	7930	6050	4200

NOTES:

1. 100% LOAD TOLERANCES:
   FUEL CONSUMPTION ±5%,
   COOLING CIRCUIT AND EXHAUST GASES ± 15%, RADIATION ±25%
   EXHAUST TEMPERATURE ±20ºC, MASS FLOWS ± 10%.
2. THE ENGINE PERFORMANCE DATA, TIMING ADVANCE AND CARBURETION SETTINGS ARE VALID FOR A GAS THAT FULFILS THE REQUIREMENTS DEFINED IN IC-G-D-30-001, IC-G-D-30-002 AND IC-G-D-30-003
3. NET POWER, MECHANICAL PUMPS NOT INCLUDED.
4. POWERS ARE VALID FOR AMBIENT TEMP.< 77ºF AND AN ALTITUDE OF < 1640ft.OTHER CONDITIONS IN IC-G-B-00-001
5. OVERLOAD NOT ALLOWED
6. THE SPECIFICATIONS AND MATERIALS ARE SUBJECT TO CHANGE WITHOUT NOTIFICATION
7. A ENGINE WITH INLET OR OUTPUT RESTRICTION OVER PUBLISHED LIMITS, OR WITH INADEQUATE MAINTENANCE OR INSTALLATION CAN MODIFY POWER RATING DATA.

Emissions Units - Industrial Engine Information **Form EU1**

PERMIT TO CONSTRUCT APPLICATION

Revision 3
03/27/07

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IDENTIFICATION

Company Name:	Facility Name:	Facility ID No:
Andgar Corporation	Dry Creek Dairy	1
Brief Project Description:	Dairy Anaerobic Digester that collects biogas & makes electricity	

EXEMPTION

Please refer to IDAPA 58.01.01.222.01.c and d for a list of internal combustion engines that are exempt from the Permit to Construct requirements.

ENGINE (EMISSION UNIT) DESCRIPTION AND SPECIFICATIONS

1. Type of Unit: ☒ New Unit ☐ Unpermitted Existing Unit
☐ Modification to a Unit with Permit #: Date Issued:

2. Use of Engine: ☐ Normal Operation ☐ Emergency ☐ Back-up ☒ Other: Renewalbe Energy

3. Engine ID Number:	4. Rated Power:	
1	☒ 1057 Brake Horsepower(bhp)	☒ 750 Kilowatts(kW)
5. Construction Date:	6. Manufacturer:	7. Model:
11/1/2007	Guascor	SFGLD 560
8. Date of Modification (if applicable):	9. Serial Number (if available):	10. Control Device (if any):

FUEL DESCRIPTION AND SPECIFICATIONS

11. Fuel Type	☐ Diesel Fuel (#) (gal/hr)	☐ Gasoline Fuel (gal/hr)	☐ Natural Gas (cf/hr)	☒ Other Fuels (unit:cf/hr)
12. Full Load Consumption Rate				12,532
13. Actual Consumption Rate				11,245
14. Sulfur Content wt%		N/A	N/A	

OPERATING LIMITS & SCHEDULE

15. Imposed Operating Limits (hours/year, or gallons fuel/year, etc.):

16. Operating Schedule (hours/day, months/year, etc.):
24 hours a day 365 days a year

Emissions Units - Industrial Engine Information **Form EU1**

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24 hours a day 365 days a year

Emissions Units - Industrial Engine Information **Form EU1**

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13. Actual Consumption Rate				11,245
14. Sulfur Content wt%		N/A	N/A	

OPERATING LIMITS & SCHEDULE

15. Imposed Operating Limits (hours/year, or gallons fuel/year, etc.):

16. Operating Schedule (hours/day, months/year, etc.):
24 hours a day 365 days a year

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PERMIT TO CONSTRUCT APPLICATION

Revision 3
4/5/2007

Please see instructions on page 2 before filling out the form.

Company Name:	Andgar Corporation
Facility Name:	Dry Creek Dairy
Facility ID No.:	1
Brief Project Description:	Dairy Anaerobic Digester which captures biogas to produce electricity through gensets.

BUILDING AND STRUCTURE INFORMATION

1.	2.	3.	4.	5.	6.	7.
Building ID Number	**Length (ft)**	**Width (ft)**	**Base Elevation (m)**	**Building Height (m)**	**Number of Tiers**	**Description/Comments**
Genset Building	100.00	50.00	1286.00	4.27	1	Concrete Tilt-up with Metal Roof

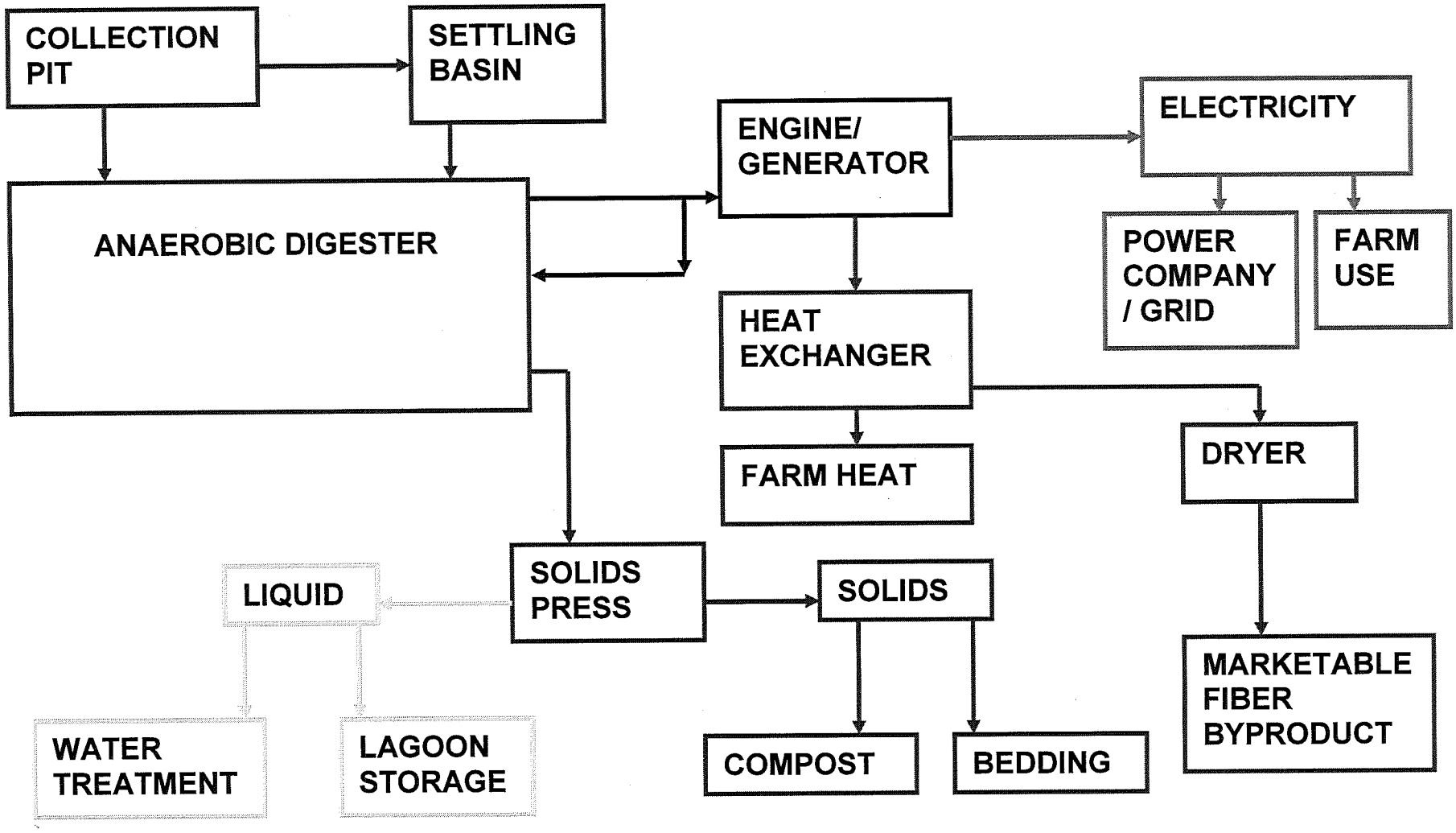
2. PROCESS DESCRIPTION

Andgar Corporation proposes to construct and anaerobic digester renewable energy system on Dry Creek Dairy in Hansen, Idaho. The manure from the dairy will be pumped into the anaerobic digester where the naturally occurring process of digestion will result in the production of methane. The anaerobic digester assists in the collection of the methane rather than allowing it to escape into the atmosphere. The methane will be piped to an adjacent building where it will be utilized in three reciprocating internal combustion engines to produce renewable energy in the form of electricity.

ANDGAR™ corporation

GHD, Inc. ENVIRONMENTAL SERVICES

3. BASIC ANAEROBIC SYSTEM FLOW CHART



4. APPLICABLE REQUIREMENTS

Federal Requirements:

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58/.01.01.201 .....Permit to Construct Required

The proposed project does not meet the permit to construct exemption criteria contained in Sections 220 through 224 of the Rules. Therefore, a PTC is required.

IDAPA 58.01.01.203 .....Permit Requirements for New and Modified Stationary Sources

The application has shown to the satisfaction of DEQ that the facility will comply with all applicable emissions standards, ambient air quality standards, and toxic increments.

IDAPA 58.01.01.210 .....Demonstration of Preconstruction Compliance with Toxic Standards

The application has demonstrated preconstruction compliance for all TAPs identified in the permit application

NSPS & NESHAP The permittee has not proposed to construct or install any equipment that is defined as an affected emissions unit by either NSPS or NESHAP regulations.

The proposed rule found in the Federal Register: Environmental Protection Agency, 40CFR Parts 60, 63, et. al. Standards of Performance for Stationary Spark Ignition Internal Combustion Engines and National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines; Proposed Rule, does mention in Table 3 on page 33809 Landfill/Digester Gas engines > 500HP must meet the emission standards of 2.0 gr/HP-hr for NO_X, 5.0 gr/HP-hr for CO, and 1.0 gr/HP-hr for NMHC. The engines used in this permit to construct meet these emission standards.

5. POTENTIAL EMISSION ESTIMATES

Pollutant	PTE (lbs/hour)	PTE (tons/year)
PM10	0.21	0.91
SO2	11.3	49.3
NOx	7	30.6
CO	15.4	67.4
VOC	7	30.6
Acetaldehyde	1.20E-03	5.30E-03
Acrolein	5.40E-04	2.40E-03
Benzene	1.40E-02	6.30E-02
Dichloromethane	2.10E-03	9.10E-03
Formaldehyde	3.60E-02	1.60E-01
Isomers of Xylene	2.80E-03	1.20E-02
Styrene	1.10E-03	4.80E-03
Toluene	5.50E-03	2.40E-02
Trichloroethylene	4.20E-04	1.80E-03
Vinyl Chloride	1.20E-03	5.10E-03

6. FACILITY CLASSIFICATION

SIC: 1629
The facility is classified by the Standard Industrial Classification # 1629 for Heavy Construction Not Elsewhere Classified.

NAICS: 237130
The facility is classified by the North American Industry Classification System # 237130 for Alternative Energy Structure Construction.

7. SCALED PLOT PLAN

8. AMBIENT IMPACT ANALYSIS

The air modeling, which was performed by Kleinfelder West Inc., was conducted consistent with the Idaho Department of Environmental Quality Dispersion Modeling Guidelines. The Ambient Air Quality Modeling Protocol for this project was submitted to IDEQ was approved October 29, 2007 and is attached at Appendix 2. The report presents the modeled results of the ambient air impacts from the proposed source emissions. The modeled impacts from criteria pollutants are compared to National Ambient Air Quality Standards (NAAQS). The modeled impacts from TAPs are compared to State of Idaho AACs. The full report can be found as attached as Appendix 1.

Appendix 3

Affidavit of Publication

STATE OF IDAHO)
COUNTY OF TWIN FALLS) SS.

I, ~~Ruby Aufderheide~~ Janet Cranney, being first duly sworn upon oath, depose and say that I am Legal Clerk of the TIMES-NEWS,published daily at, Twins Falls, Idaho, and do solemnly swear that a copy of the notice of advertisement, as per clipping attached, was published in the regular and entire issue of said newspaper, and not in any supplement thereof, for one ~~consecutive~~ publication, commencing with the issue dated 27th day of November, 2007 and ending with the issue dated 27th day of November, 2007

And I do further certify that said newspaper is a consolidation, effective February 16, 1942, of the Idaho Evening Times, published theretofore daily except Sunday, and the Twin Falls News, published theretofore daily except Monday, both of which newspapers prior to consolidation had been published under said names in said city and county continuously and uninterruptedly during a period of more than twelve consecutive months, and said TIMES-NEWS, since such consolidation, has been published as a daily newspaper except Saturday, until July 31, 1978, at which time said newspaper began daily publication under said name in said city and county continuously and uninterrupted.

And I further certify that pursuant to Section 60-108 Idaho Code, Thursday of each week has been designated as the day on which legal notice by law or by order of any court of competent jurisdiction within the state of Idaho to be issued thereof Thursday is announced as the day on which said legal will be published.

STATE OF IDAHO
COUNTY OF TWIN FALLS

On this 27th day of November, 2007, before me,

a Notary Public, personally appeared Janet Cranney, known or identified to me to be the person whose name subscribed to the within instrument, and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that he executed the same.

Linda Capps McGuire
Notary Public for Idaho
Residing at Twin Falls, Idaho.

My commision expires: 5-19-09

LINDA CAPPS-McGUIRE
NOTARY PUBLIC
STATE OF IDAHO

PUBLIC NOTICE

Andgar Corporation has applied for an air quality permit to construct for an anaerobic digester located at the West one-half of Section 34, Township 11 South, Range 19 East, B.M. Hansen, Idaho. An informational meeting will be held at Hansen Community Center, 340 Main St. Hansen, ID, at 5:00 pm on December 11, 2007.

PUBLISH: November 27, 2007

APPENDIX 4

Emission Calculations

Emissions Unit	PM_{10}		NO_x		CO		VOC	
	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr	lb/hr	T/yr
Engine No. 1	7.0E-02	3.03E-01	2.33	10.2	5.12	22.46	2.33	10.2
Engine No. 2	7.0E-02	3.03E-01	2.33	10.2	5.12	22.46	2.33	10.2
Engine No. 3	7.0E-02	3.03E-01	2.33	10.2	5.12	22.46	2.33	10.2
Total		9.1E-01		30.6		67.38		30.6

Engine No. 1-3: $\frac{6{,}512 \text{ btu}}{\text{bhp-hour}}$ *1,057bhp = $\frac{6.89\text{MMBtu}}{\text{hr}}$

PM_{10}

Based on AP-42 3.2 "Natural Gas-fired Reciprocating Engine" filterable emission factor of 7.71E-05 lb of PM_{10} & $PM_{2.5}$ /MMBtu Produced for 4-Stroke Lean-burn Engines.

Engine No. 1-3: $\frac{6.89\text{MMBtu}}{\text{hr}} * \frac{.010 \text{ lbs}}{\text{MMBtu}} = \frac{.069\text{lbs}}{\text{hr}} * \frac{8{,}760 \text{ hrs}}{\text{yr}} * \frac{\text{Ton}}{2000 \text{ lbs}} = \frac{.30\text{T}}{\text{yr}}$

NO_x

Based on engine manufacturer data on the combustion of digester gas.

Engine No. 1-3: $\frac{1 \text{ gram}}{\text{bhp-hr}}$ * 1,057bhp = $\frac{1{,}057 \text{ grams}}{\text{hr}} * \frac{\text{lb}}{454 \text{ grams}} = \frac{2.33 \text{ lbs}}{\text{hr}}$ and $\frac{10.2\text{T}}{\text{yr}}$

CO

Based on engine manufacturer data on the combustion of digester gas.

Engine No. 1-3: $\frac{2.2 \text{ grams}}{\text{bhp-hr}}$ * 1,057bhp = $\frac{2{,}325 \text{ grams}}{\text{hr}} * \frac{\text{lb}}{454 \text{ grams}} = \frac{5.12 \text{ lbs}}{\text{hr}}$ and $\frac{22.46\text{T}}{\text{yr}}$

VOC

Based on NMHC from engine manufacturer data on the combustion of digester gas.

Engine No. 1-3: $\frac{1 \text{ gram}}{\text{bhp-hr}}$ * 1,057bhp = $\frac{1{,}057 \text{ grams}}{\text{hr}} * \frac{\text{lb}}{454 \text{ grams}} = \frac{2.33 \text{ lbs}}{\text{hr}}$ and $\frac{10.2\text{lbs}}{\text{yr}}$

H_2S Conversion from ppm to lb/hr

$$\frac{2000ft^3\ H_2S\ (v)}{1.0E^{+06}\ ft^3\ (v)} = \frac{x}{10.0scf/s}\ ;\ x = \frac{0.02\ scfH_2S\ /\ s}{379\ scf\ Gas\ /\ lb\text{-}mole} = \frac{5.0E^{-05}lbH_2S\text{-}mole}{s} * 34.08moleH_2S = \frac{1.7E^{-03}lbH2S}{s} * \frac{3600s}{hr} = \frac{6.2lbH_2}{hr}$$

1) 2000ppm H_2S applicant estimate based on a previously constructed facility.
2) 379 scf Gas/lb-mole is a Natural Gas industry constant.
3) 34.08 is the molecular weight of H_2S.
4) Maximum pound per your emission rate with 864,000 scf/day (10.0 scf/s) of biogas.

H_2S Conversion from H_2S to SO_2

$$\frac{6.2lbH_2S}{hr} * \frac{32}{34} = \frac{5.8lb\ S}{hr}$$

$$\frac{5.8lb\ S}{32} = .18lb\ mole\ S$$

$$.18\ lb\ mole\ SO2 * 64 = \frac{11.3lb\ SO2}{Hr}\ or\ \frac{49.3\ tons}{yr}$$

1) 34 is the molecular weight of H_2S
2) 32 is the molecular weight of Sulfur
3) Assumes 100% H2S conversion for SO2