KLEINFELDER

AMBIENT AIR QUALITY MODELING REPORT for ANDGAR CORPORATION, DRY CREEK DAIRY HANSEN, IDAHO

November 8, 2007

Kleinfelder Project Number: 88861

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AMBIENT AIR QUALITY MODELING REPORT for ANDGAR CORPORATION, DRY CREEK DAIRY

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Kleinfelder Job No: 88861

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November 8, 2007

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1 EXECUTIVE SUMMARY

The Andgar Corporation is preparing a Permit to Construct (PTC) application on behalf of the Dry Creek Dairy located near Hansen, Idaho. The application requests authorization to construct an anaerobic digester for processing onsite cow manure and three Genset electrical generators for conversion of the digester biogas to electricity.

The proposed Genset electrical generators will result in criteria pollutant emissions of carbon monoxide, particulate matter, nitrogen oxides, sulfur dioxide and volatile organic compounds.

The generators will emit acrolein, isomers of xylene, styrene, toluene, and trichloroethylene which are non-carcinogenic toxic air pollutants (TAPs) listed in IDAPA 58.01.01.585. The potential emission estimates for these compounds do not exceed their respective TAP screening emission levels (EL). The generators will also emit acetaldehyde, benzene, dichloromethane, formaldehyde, dichloroethylene, and vinyl chloride which are carcinogenic TAPs listed in IDAPA 58.01.01.586. The potential emission estimates for acetaldehyde and trichloroethylene do not exceed their respective TAP EL. However, modeling was conducted for benzene, dichloromethane, formaldehyde and vinyl chloride because potential emission estimates exceed their respective TAP EL. Modeling demonstrates compliance with the Acceptable Ambient Concentration (AAC).

Air quality modeling was conducted consistent with the Idaho Department of Environmental Quality (IDEQ) Dispersion Modeling Guidelines (Guidelines), revised December 31, 2002, and the Ambient Air Quality Modeling Protocol for this project submitted to IDEQ and approved October 29, 2001. This 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.

Based on the analysis performed, the proposed stationary source will not cause or significantly contribute to a violation of any ambient air quality standard and demonstrates pre-construction compliance with IDAPA 58.01.01, Section 161 with regards to TAP emissions. Table 1-1 summarizes the results.

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Table 1-1
Modeling Results Compared to Applicable Standards

Pollutant	Averaging Period	Modeled Impacts ($\mu g/m^3$) (Note 1)	NAAQS or AAC ($\mu g/m^3$)
PM_{10}	24 hour Annual	73.7 26.1	150 50
$PM_{2.5}$	24 hour Annual	Note 2	35 15
NO_2	Annual	20.5	100
SO_2	3 hour 24 hour Annual	119.4 64.0 15.6	1,300 365 80
CO	1 hour 8 hour	3,730 2,390.9	40,000 10,000
Acetaldehyde	Annual	Below TAP EL	
Acrolein	24 hour	Below TAP EL	
Benzene	Annual	0.0150	0.12
Dichloromethane	Annual	0.0022	0.24
Formaldehyde	Annual	0.0373	0.077
Isomers of Xylene	24 hour	Below TAP EL	
Styrene	24 hour	Below TAP EL	
Toluene	24 hour	Below TAP EL	
Trichloroethylene	24 hour Annual	Below TAP ELs	
Vinyl Chloride	Annual	0.0012	0.14

Note 1 – Modeled Impacts for primary pollutants considers background concentrations.
Note 2 – Background for PM2.5 has not been established and modeled impacts could not be determined.

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2 BACKGROUND AND PURPOSE

Andgar Corporation is providing this modeling report in support of a PTC application for a proposed new emission source at Dry Creek Dairy near Hansen, Idaho

Andgar Corporation is proposing to construct an anaerobic digester designed to produce biogas from on-site dairy cattle manure. The biogas will be combusted in three on-site electrical generators. The facility operates under SIC code 1629. The facility is a minor source because the potential to emit is less than major source thresholds without requiring limits on its potential to emit.

The facility is located in Twin Falls County, Idaho which is designated as attainment or unclassifiable for criteria pollutants. The approximate center point of the property is located at UTM 4700693 N by 728651 E, Zone 11. The dairy sits on 13,000 acres and the surrounding area is a sparsely populated, rural area with relatively flat terrain at about 4,200 feet above mean sea level. A Site Location Map, Vicinity Map and Facility Layout Map are provided as Figures 1 through 3, respectively, in Appendix A.

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3 EMISSIONS AND SOURCE DATA

3.1. Facility Processes and Emission Controls Affected

The nature of the proposed source is to generate electricity. Since this is Dry Creek Dairy's initial PTC, existing facility processes or emission controls will not be affected.

3.2. Potential Emission Rates

The potential emission rates for the proposed source are summarized in Table 3-1. Emission calculations for the proposed project are provided in Appendix C.

Table 3-1
Potential Emission Rates for Genset Generators

Pollutant	PTE (lbs/hr)	PTE (tons/yr)
PM_{10}	0.21	0.91
SO_2	11.3	49.3
NO_x	7.0	30.6
CO	15.4	67.4
VOC	7.0	30.6
Acetaldehyde	1.2E-03	5.3E-03
Acrolein	5.4E-04	2.4E-03
Benzene	1.4E-02	6.3E-02
Dichloromethane	2.1E-03	9.1E-03
Formaldehyde	3.6E-02	1.6E-01
Isomers of Xylene	2.8E-03	1.2E-02
Styrene	1.1E-03	4.8E-03
Toluene	5.5E-03	2.4E-02
Trichloroethylene	4.2E-04	1.8E-03
Vinyl Chloride	1.2E-03	5.1E-03

Three Genset electrical generators are proposed to be installed adjacent to each other. Each generator has a 12-inch (0.305 meters) diameter stack extending 20 feet (6.1 meters) above ground. The emissions presented in Table 3-1 represent the total potential emissions if all generators were operating simultaneously at capacity. In an emergency situation the biogas will be directed to a back-up flare. During a flare event the emission characteristics and potential emission rate will be the same as the emission estimate from the Genset generators.

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3.3. Good Engineering Practice (GEP) Stack-height Analysis

The exhaust stack from the Genset generators is 20 feet (6.1 meters) in height. Because the stack height is less than 65 meters and is located in simple terrain, GPE stack-height analysis requires actual stack height in calculating emission limitations.

3.4. Facility Layout

The facility layout is provided in Figure 3, Appendix A. As shown, the proposed anaerobic digester and biogas electrical generators will be located at the street address 2952 N 4200 E, Hansen, Idaho. The site is northeast of the intersection of N 4200 E and 2900 Road N. The dairy property includes approximately 13,000 acres. Approximately 2,000 (610 meters) feet west of the emission source is Twin Falls county road N 4200 E. This road is the nearest public receptor to the source. There is an existing house located on the property that is owned by the dairy.

3.5. Source Parameters

The source parameters for the proposed anaerobic digester are summarized in Table 3-2. The stack height and diameter is proposed engineered design criteria. The stack temperature was provided from the equipment manufacturer as a typical stack temperature for this type of application. The velocity was estimated using a software package for sizing the exhaust silencer.

Table 3-2 Source Parameters

Source Description	UTM E	UTM N	Stack Height (m)	Stack Diameter (m)	Stack Velocity (m/sec)	Stack Temp (Deg K)	Receptor Distance (m)
3-Guascor 560 generators	728651	4700693	6.1	0.305	27.8	628	610

3.6. Methodology for Including Area and Volume Sources

The proposed new source was modeled as a point source. No other sources were considered in the modeling analysis.

3.7. Methodology for Including/Excluding Sources from the Modeling Analysis

We did not include the digester flares in the modeling analysis. The use of the flares would only occur in an upset condition and the characteristics of the emissions will be the same as the characteristics of the generator emissions. Including the flares is not expected to have any substantial impact on the modeling results.

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4 MODEL DESCRIPTION AND JUSTIFICATION

4.1. Model Selection and Justification

The estimated potential emission rates from the proposed source exceed PTC exemption thresholds for criteria pollutants. Therefore, air quality modeling is required to demonstrate that the new source will not cause or significantly contribute to a violation of any NAAQS. Additionally, potential uncontrolled emission estimates for several TAPs exceed screening ELs. Modeling was conducted as an approved method to demonstrate compliance with State of Idaho Toxic Air Pollutant regulations.

The SCREEN3 model was chosen to assess the potential air quality impacts from the project. SCREEN3 is known to be a conservative model as it uses a worst-case meteorological conditions. Meteorological data in the SCREEN3 model simulates a full set of atmospheric conditions to calculate the highest possible concentration. SCREEN3 predicts output concentrations for a 1-hour time averaging period for simple terrain.

4.2. Model Setup and Application

The inputs parameters for the SCREEN3 model were selected following the EPA Guidelines and generally recommended procedures. Regulatory default modeling input options were used for mixing height and anemometer height. Model engineering input parameters are identified in Table 3-2. The generator stacks are considered "vertically unrestricted" or point sources. For point sources, SCREEN3 requires stack parameters, emission rates and building information to calculate building downwash and cavity effects.

Since multiple pollutants are emitted from the same source, a unitized (1-g/s) emission rate was used as an emission rate input in order to reduce the modeling analysis into a single run. The resulting normalized concentration (in μg/m3/g/s) for each distance of concern was then multiplied by the calculated emission rate for each HAP as follows:

$$C_{i,d}\ (\mu g/m^3) = ER_i\ (g/s) \times NC_d\ ([\mu g/m^3] / [1 g/s])$$

Where:

ER_i = *Emission Rate of HAP (g/s)*

NC_d = *Normalized Concentration from SCREEN3 output at specified distance*

$C_{i,d}$ = *Concentration of HAP at specified distance*

4.3. Land-use Analysis

The area within 3km of the site was classified as rural using the land–use classification procedure provided in Appendix E of IDEQ's Modeling Guidelines. The majority of the 3km radius around the Dry Creek Dairy is agricultural or undeveloped, with the ground cover being mostly wild grasses, weeds and shrubs, and sparsely located trees.

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4.4. Building Downwash

The regulatory building downwash option was used in SCREEN3. The building housing the Genset electrical generators has a height of 4.27 meters, a minimum horizontal dimension of 15.2 meters and a maximum horizontal dimension of 30.5 meters.

4.5. Terrain Options

The terrain surrounding Dry Creek Dairy is relatively flat. The surrounding terrain generally is not greater than the stack base elevation. The flat terrain option was selected for the model.

4.6. Choice of Meteorology

The full meteorology option was selected as a worst-case scenario for meteorological conditions. This includes all stability classes and wind speeds.

4.7. Discrete Distance Options

The discrete distance option was selected to model to the nearest public receptor. The nearest receptor is approximately 2,000 (610 meters) feet west of the emission source is Twin Falls county road N 4200 E.

4.8. Persistence Factors

SCREEN3 produces output for a one-hour average only. This one-hour average concentration was adjusted to estimate the concentration for the appropriate averaging period. The one-hour average model output was converted to averaging periods consistent with the standard for the pollutant modeled through the use of the persistence factors presented in Table 4-1.

Table 4-1
Persistency Conversion Factors for SCREEN3

Averaging Period	Simple Terrain	Complex Terrain
3-hour	0.9	0.7
8-hour	0.7	
24-hour	0.4	0.15
Quarterly	0.13	
Annual	0.08 (for criteria pollutants) 0.125 (for carcinogenic TAPs, per IDAPA 58.01.01.210.03.a.i)	0.03 (for criteria pollutants) 0.125 (for carcinogenic TAPs, per IDAPA 58.01.01.210.03.a.i)

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5 EVALUATION OF COMPLIANCE WITH STANDARDS

5.1 Criteria Pollutant Results

The modeled contribution from the proposed new source for criteria pollutants was added to background concentrations to estimate the modeled impacts. IDEQ provided the background concentrations for rural/agricultural areas. Modeling results indicate criteria pollutant impacts below applicable NAAQS. As a result, no additional analysis was required. Table 5-1 provides a summary of the results.

Table 5-1
Criteria Pollutant Modeling Results Compared to NAAQS

Pollutant	Averaging Period	Background Concentrations ($\mu g/m^3$)	Estimated Project Contribution ($\mu g/m^3$)	Modeled Impacts ($\mu g/m^3$)	NAAQS or AAC ($\mu g/m^3$)
PM_{10}	24 hour	73	0.702	73.702	150
	Annual	26	0.140	26.140	50
$PM_{2.5}$	24 hour	Note 1	0.702	Note 1	35
	Annual		0.140		15
NO_2	Annual	17	3.54	20.54	100
SO_2	3 hour	34	85.4	119.4	1,300
	24 hour	26	38.0	64.0	365
	Annual	8	7.6	15.6	80
CO	1 hour	3,600	130	3,730	40,000
	8 hour	2,300	90.9	2,390.9	10,000

Note 1 – Background for PM2.5 has not been established and modeled impacts could not be determined.

5.2 TAP Results

The estimated uncontrolled potential mass emission rates were compared to the EL for each carcinogenic or non-carcinogenic TAP. No further analysis was necessary for the TAPs with estimated emission rates below their respective ELs. Table 5-2 provides a summary of the comparative results.

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Table 5-2
TAP Emission Rates Compared to Screening Emission Levels

Pollutant	PTE (lbs/hr)	EL (lbs/hr)	Exceeds EL (yes/no)
Acetaldehyde	1.2E-03	3.0E-03	No
Acrolein	5.4E-04	1.7E-02	No
Benzene	1.4E-02	8.0E-04	Yes
Dichloromethane	2.1E-03	1.6E-03	Yes
Formaldehyde	3.6E-02	5.1E-04	Yes
Isomers of Xylene	2.8E-03	29	No
Styrene	1.1E-03	6.67	No
Toluene	5.5E-03	25	No
Trichloroethylene	4.2E-04	5.1E-04	No
Vinyl Chloride	1.2E-03	9.4E-04	Yes

The modeled impacts for TAPs from the proposed new source that exceeded ELs were estimated using SCREEN3. The Modeled impacts were compared to the applicable AAC. Based on the modeling results, the emissions from the proposed new source are all less than the applicable AAC. A summary of the TAP modeling results is provided in Table 5-3.

Table 5-3
TAP Modeling Results Compared to AAC

Pollutant	Averaging Period	Modeled Impacts ($\mu g/m^3$)	AAC ($\mu g/m^3$)
Benzene	Annual	0.0150	0.12
Dichloromethane	Annual	0.0022	0.24
Formaldehyde	Annual	0.0373	0.077
Vinyl Chloride	Annual	0.0012	0.14

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6 LIMITATIONS

This report was prepared in general accordance with the accepted standard of care that existed in Idaho at the time the report was written. The results contained in this report are based upon the information acquired at the time of the investigation. It is possible that not all conditions were identified during this project. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time.

It should be recognized that identifying and assessing possible environmental, health and safety issues and regulatory requirements is difficult. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the facility. Kleinfelder should be notified for additional consultation if the client wishes to reduce the uncertainties beyond the level associated with this report. It should be recognized that the scope of work described here is not intended to be inclusive, to identify all potential concerns, or to eliminate the possibility of problems. No warranty or guarantee, expressed or implied, is made.

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7 REFERENCES

EPA, 2000. *Meteorological Monitoring Guidance for Regulatory Modeling Applications.* EPA Publication No. EPA-454/R-99-005. U.S. Environmental Protection Agency, Research Triangle Park, NC.

EPA, 1995. *SCREEN3 Model User's Guide*. U.S. Environmental Protection Agency, Research Triangle Park, NC.

EPA's SCRAM Web site: http://www.epa.gov/scram001/index.htm.

IDAPA 58.01.01, et seq. *Rules for the Control of Air Pollution in Idaho.*

IDEQ, 2002. *State of Idaho Air Quality Modeling Guideline*, Doc. IDAQ-011 (rev. 1 12/31/02).

Kleinfelder, October 26, 2007 *Ambient Air Quality Modeling Protocol for Andgar Corporation, Dry Creek Dairy Hansen, Idaho.*

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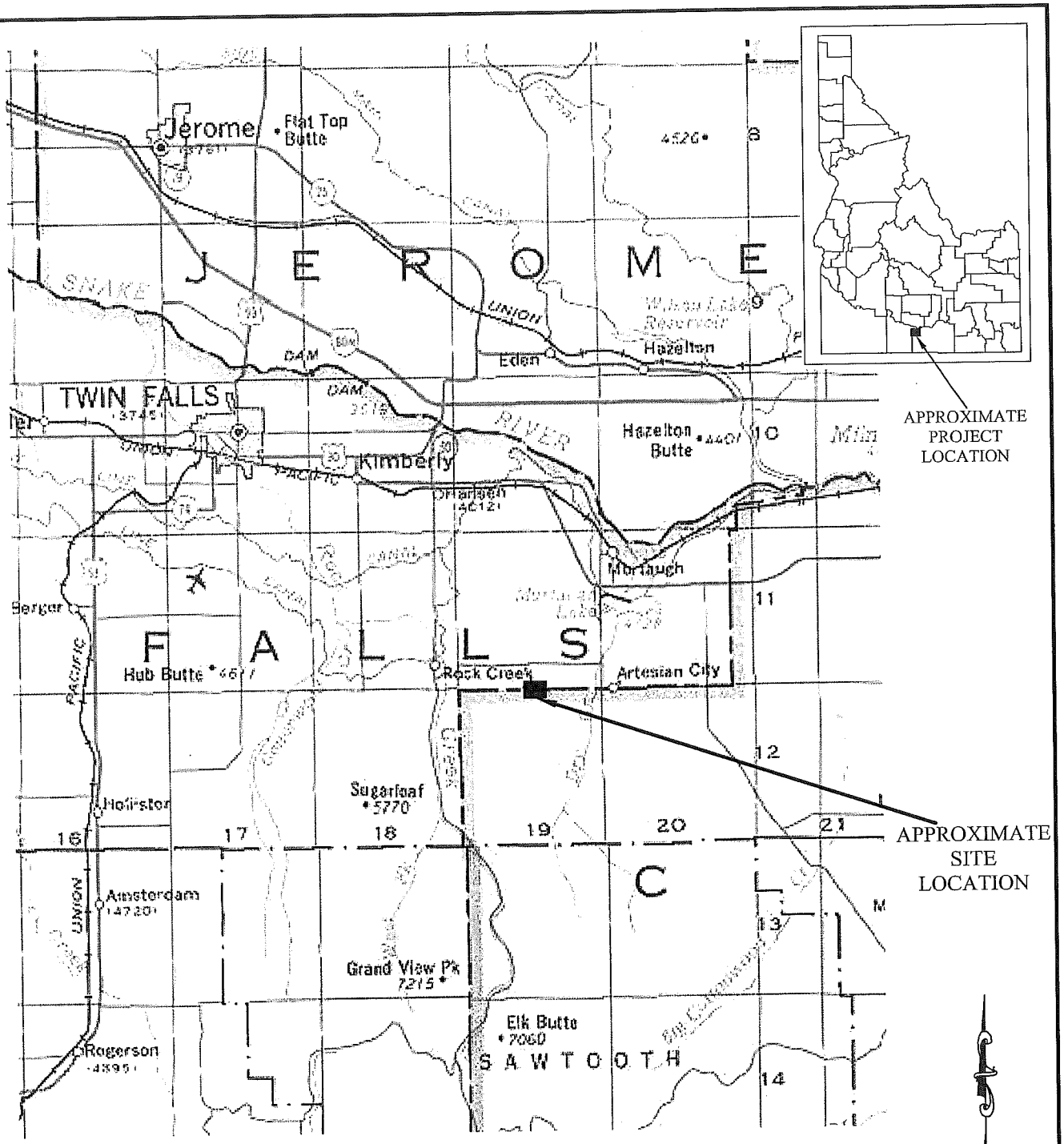
APPENDIX A

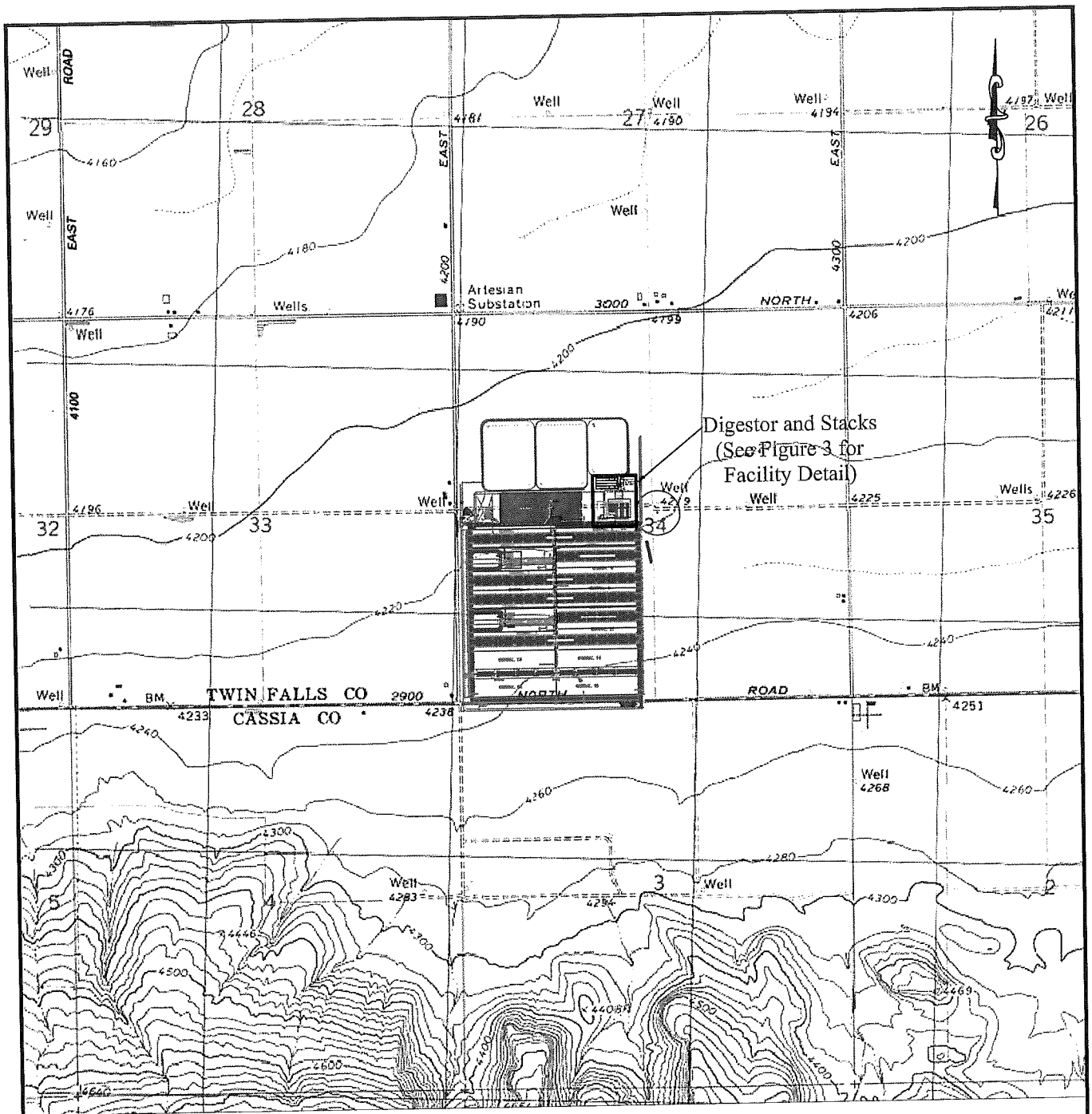
Figures



SOURCE: TOPO! © 2000 National Geographic Holdings

6 0 6
Scale in Miles

KLEINFELDER 2315 S. Cobalt Point Way Meridian, Idaho 83642 PH. 208-893-9700 FAX. 208-893-9703 www.kleinfelder.com	**SITE LOCATION MAP** Manure System Air Modeling 2952 North 4200 East Hansen, Idaho 83334	DRAWN BY: A. Kartchner REVISED BY: A.Kartchner CHECKED BY: A. Marshall FIGURE **1**
DRAWN: Oct 2007 APPROVED BY:	PROJECT NO. 88861 FILE NAME:	

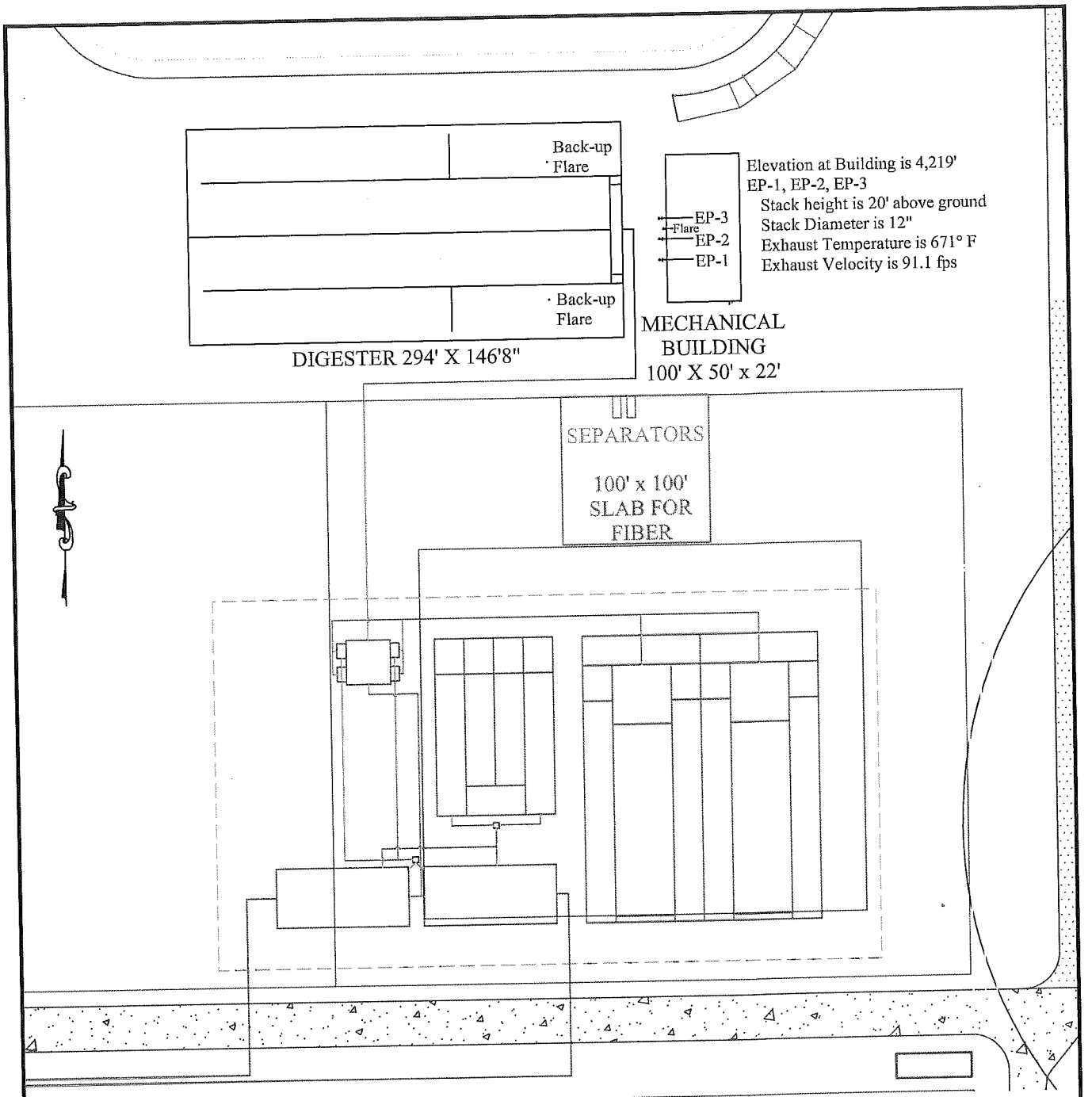


BASE MAP SOURCE: USGS 1:24,000 SCALE QUADRANGLE MAP: Murtaugh, Idaho 1992
FACILITY MAP SOURCE: Site Plan Dry Creek Dairy.dwg, provided by EAC Engineering, dated May 15, 2007.

1 0.5 0 0.5 1

APPROXIMATE SCALE IN MILES

KLEINFELDER 2315 S. Cobalt Point Way Meridian, Idaho 83642 PH. 208-893-9700 FAX. 208-893-9703 www.kleinfelder.com	**VICINITY MAP** Manure System Air Modeling 2952 North 4200 East Hansen, Idaho 83334	DRAWN BY: A. Kartchner REVISED BY: A. Kartchner CHECKED BY: A. Marshall FIGURE **2**
DRAWN: Oct 2007 APPROVED BY:	PROJECT NO. 88861 FILE NAME:	



FACILITY MAP SOURCE: Site Plan Dry Creek Dairy.dwg, provided by EAC Engineering, dated May 15, 2007.

100 0 100
Scale in Feet

KLEINFELDER 2315 S. Cobalt Point Way Meridian, Idaho 83642 PH. 208-893-9700 FAX. 208-893-9703 www.kleinfelder.com	**FACILITY DETAIL** Manure System Air Modeling 2952 North 4200 East Hansen, Idaho 83334	DRAWN BY: A. Kartchner REVISED BY: A. Kartchner CHECKED BY: A. Marshall FIGURE **3**
DRAWN: Oct 2007 APPROVED BY:	PROJECT NO. 88861 FILE NAME:	

APPENDIX B

Modeling Protocol Checklist

Modeling Protocol Checklist for New Minor Sources or Minor Modifications

Checklist Item	Completed (yes / no)	Protocol Section
Introduction and Purpose	Yes	2
• General overview, facility description, terrain description	Yes	2.1
• Project Overview	Yes	2.2
• Goals of the air quality impact analysis (i.e., demonstrate compliance for a permit to construct or a Tier II operating permit)	Yes	2.3
• Applicable regulations and requirements	Yes	2.4
• Pollutants of concern	Yes	2.5
Emission and Source Data	Yes	3
• Facility processes and emission controls effected by the permitting action	Yes	3.1
• Include a list of emission points that will be included in the application. Present a table showing current actual and future allowable emission rates (in maximum pounds per hour tons per year) and the requested emission increase (future allowable minus current actual)	Yes	3.2
• Good engineering practice (GEP) stack-height analysis	Yes	3.3
• Facility layout: location of sources, buildings, and fence lines	Yes	3.4
• Source parameters (emissions rates, UTM coordinates, stack height, stack elevation, stack diameter, stack-gas exit velocity, and stack-gas exit temperature) for each new or modified emission point	Yes	3.5
• Methodology for including area and volume sources in the modeling analysis	Yes	3.6
• Methodology for including/excluding sources from the modeling analysis	Yes	3.7
Air Quality Modeling Methodology	Yes	4
• Model selection and justification	Yes	4.1
• Model setup and application - Model options (i.e., regulatory default) - *Terrain Options* - *Land-use analysis* - *Building Downwash* - *Choice of Meteorology* - *Discrete Distance Option*	Yes	4.2
• Elevation data - *Methodology for accounting for complex terrain*	n/a	

Modeling Protocol Checklist for New Minor Sources or Minor Modifications

Checklist Item	Completed (yes / no)	Protocol Section
• Receptor network - *Description of receptor grids – include methodology for ensuring the maximum concentration will be estimated* - *Discussion/justification of ambient air* - *Determination of receptor elevations*	n/a	
• Meteorological data - *Selection of meteorological databases – justification of appropriateness of meteorological data to area of interest* - *Meteorological data processing* - *Meteorological data analysis (e.g., wind rose)*	Yes	4.6
• Background concentrations	n/a	
Applicable Regulatory Limits	Yes	5
• Methodology for evaluation of compliance with standards (i.e., determination of design concentration)	Yes	5.1
• Full impact analysis - *TAPs analysis* - *NAAQS analysis*	Yes	5.1
• Presentation of results – state how the results of the modeling analysis will be displayed (i.e., list what information will be included)	Yes	5.1
References	Yes	6

APPENDIX C

Emission Calculations

Emission Calculations
Dry Creek Dairy, Hansen, Idaho
Three Genset Electrical Generators

Capacity Assumptions		
Power	3,171	bhp
Fuel consumption	6,570	btu/bhp-hour
Fuel input at capacity	20.8	MMBtu/hr

lbs/hr x **0.1259972** = g/sec

Pollutant	Emission factor (lb/MMbtu)	Data Source	Emissions			TAP Screening	
			lbs/hr	tons/yr	grams/sec	Screening EL (lb/hr)	Exceeds EL?
PM10	9.99E-03	AP-42 Section 3.2, Table 3.2-2 (includes filterable and condensible)	0.21	0.91	2.6E-02	Not applicable	
PM2.5	9.99E-03		0.21	0.91	2.6E-02		
SO2	5.40E-01	Vendor	11.3	49.3	1.4E+00		
NOx	3.36E-01	Vendor	7.0	30.6	8.8E-01		
CO	7.38E-01	Vendor	15.4	67.4	1.9E+00		
VOC	3.36E-01	Vendor	7.0	30.6	8.8E-01		
Lead	na	Vendor			0.0E+00		
Acetaldehyde	5.80E-05	TTN clearing house, Internal combustion engines, commercial/insitutional digester gas, and reciprocating: POTW Digester Gas. December 2005	1.2E-03	5.3E-03	1.5E-04	3.0E-03	No
Acrolein	2.60E-05		5.4E-04	2.4E-03	6.8E-05	1.7E-02	No
Benzene	6.89E-04		1.4E-02	6.3E-02	1.8E-03	8.0E-04	Yes
Dichloromethane	1.00E-04		2.1E-03	9.1E-03	2.6E-04	1.6E-03	Yes
Formaldehyde	1.71E-03		3.6E-02	1.6E-01	4.5E-03	5.1E-04	Yes
Isomers of Xylene	1.36E-04		2.8E-03	1.2E-02	3.6E-04	2.9E+01	No
Styrene	5.26E-05		1.1E-03	4.8E-03	1.4E-04	6.7E+00	No
Toluene	2.62E-04		5.5E-03	2.4E-02	6.9E-04	2.5E+01	No
Trichloroethylene	2.00E-05		4.2E-04	1.8E-03	5.2E-05	5.1E-04	No
Vinyl Chloride	5.60E-05		1.2E-03	5.1E-03	1.5E-04	9.4E-04	Yes

APPENDIX D

SCREEN3 Model Output

11/07/07

13:20:47
*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

C:\Lakes\ScreenView\dcd.scr

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	6.0960
STK INSIDE DIAM (M)	=	.3048
STK EXIT VELOCITY (M/S)	=	27.7673
STK GAS EXIT TEMP (K)	=	628.1500
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	1.5000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	4.2700
MIN HORIZ BLDG DIM (M)	=	15.2000
MAX HORIZ BLDG DIM (M)	=	30.5000

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

BUOY. FLUX = 3.374 M**4/S**3; MOM. FLUX = 8.353 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** 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
610.	66.98	4	3.0	3.0	960.0	22.15	43.34	21.49	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 *** *** CAVITY CALCULATION - 2 ***

```
CONC (UG/M**3)       =     .0000        CONC (UG/M**3)       =     .0000
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)      =      4.34        CAVITY HT (M)      =      4.27
CAVITY LENGTH (M)  =     19.16        CAVITY LENGTH (M)  =     14.07
ALONGWIND DIM (M)  =     15.20        ALONGWIND DIM (M)  =     30.50

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       66.98           610.        0.


**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

Modeling Results

Persistency Factors	
3 hour	0.9
8 hour	0.7
24 hour	0.4
Annual criteria	0.08
Annual TAPs	0.125

Maximum SCREEN3 Impact using concentration input of 1 gram/s 66.98 (ug/m3)/(g/s)

Pollutant	Emissions (grams/sec)	Estimated impacts (ug/m3) (1-hr avg)	1-hr average adjusted to 24 hr average	1 -hr average adjusted to annual average	1-hr average adjusted to 8 hr average	1-hr average adjusted to 3 hr average
PM10	2.62E-02	1.76E+00	7.02E-01	1.40E-01		
PM2.5	2.62E-02	1.76E+00	7.02E-01	1.40E-01		
SO2	1.42E+00	9.49E+01	3.80E+01	7.60E+00		8.54E+01
NO2 (Note 1)	6.61E-01	4.42E+01		3.54E+00		
CO	1.94E+00	1.30E+02			9.09E+01	
VOC	8.81E-01	Modeling not conducted				
Lead						
Acetaldehyde	1.52E-04	Emissions are below EL				
Acrolein	6.82E-05					
Benzene	1.81E-03	1.21E-01		1.51E-02		
Dichloromethane	2.62E-04	1.76E-02		2.20E-03		
Formaldehyde	4.49E-03	3.01E-01		3.76E-02		
Isomers of Xylene	3.57E-04	Emissions are below EL				
Styrene	1.38E-04	Emissions are below EL				
Toluene	6.88E-04	Emissions are below EL				
Trichloroethylene	5.25E-05	Emissions are below EL				
Vinyl Chloride	1.47E-04	9.85E-03		1.23E-03		

Notes

1. NOx conversion to NO2 assumed 0.75, per EPA guidance.

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Appendix 2

1410 NORTH HILTON, BOISE, ID 83706 · (208) 373-0502

C. L. "BUTCH" OTTER, GOVERNOR
TONI HARDESTY, DIRECTOR

October 29, 2007

Andy Marshall
Kleinfelder - Boise

RE: Modeling Protocol for the Dry Creek Dairy Permit to Construct Application for a new Anaerobic Digester and three Electrical Generators at their Facility Located near Hansen, Idaho

Andy:

DEQ received your dispersion modeling protocol on October 29, 2007. The modeling protocol was submitted on behalf of Dry Creek Dairy. The modeling protocol proposes methods and data for use in the ambient impact analyses of a Permit to Construct (PTC) application for a new anaerobic digester and three biogas-fired electrical generators at their existing facility.

The modeling protocol has been reviewed and DEQ has the following comments:

- Comment 1: Emissions calculations were submitted with the protocol. This protocol approval is not providing approval of the emissions calculation methods. If you have concerns about emissions calculation methods, you should contact DEQ through the permit hotline (1-877-5PERMIT).

- Comment 2: The application should provide documentation and justification for stack parameters used in the modeling analyses, clearly showing how stack gas temperatures and flow rates were estimated. In most instances, applicants should use typical parameters, not maximum temperatures and flow rates. Adequate documentation may involve calculation sheets, manufacturer specifications, references of source tests, etc.

- Comment 3: Background concentrations must be added to modeling results if maximum modeled concentrations exceed significant contribution levels. The following are DEQ default background concentrations for rural/agricultural areas:

  PM10 – 24-hour = 73 $\mu g/m^3$; annual = 26 $\mu g/m^3$
  CO – 1-hour = 3,600 $\mu g/m^3$; 8-hour = 2,300 $\mu g/m^3$
  SO2 – 3-hour = 34 $\mu g/m^3$; 24-hour = 26 $\mu g/m^3$; annual = 8 $\mu g/m^3$
  NO2 – annual = 17 $\mu g/m^3$
  Pb – quarterly = 0.03 $\mu g/m^3$

DEQ's modeling staff considers the submitted dispersion modeling protocol, with resolution of the additional items noted above, to be approved. It should be noted, however, that the approval of this modeling protocol is not meant to imply approval of a completed dispersion modeling analysis. Please refer to the *State of Idaho Air Quality Modeling Guideline*, which is available on

the Internet at http://www.deq.state.id.us/air/permits_forms/permitting/modeling_guideline.pdf, for further guidance.

To ensure a complete and timely review of the final analysis, our modeling staff requests that electronic copies of all modeling input and output files are submitted with an analysis report. Also, please attach the protocol and this protocol approval notification.

If you have any further questions or comments, please contact me at (208) 373-0112.

Sincerely,

Kevin Schilling
Stationary Source Air Modeling Coordinator
Idaho Department of Environmental Quality
208 373-0112