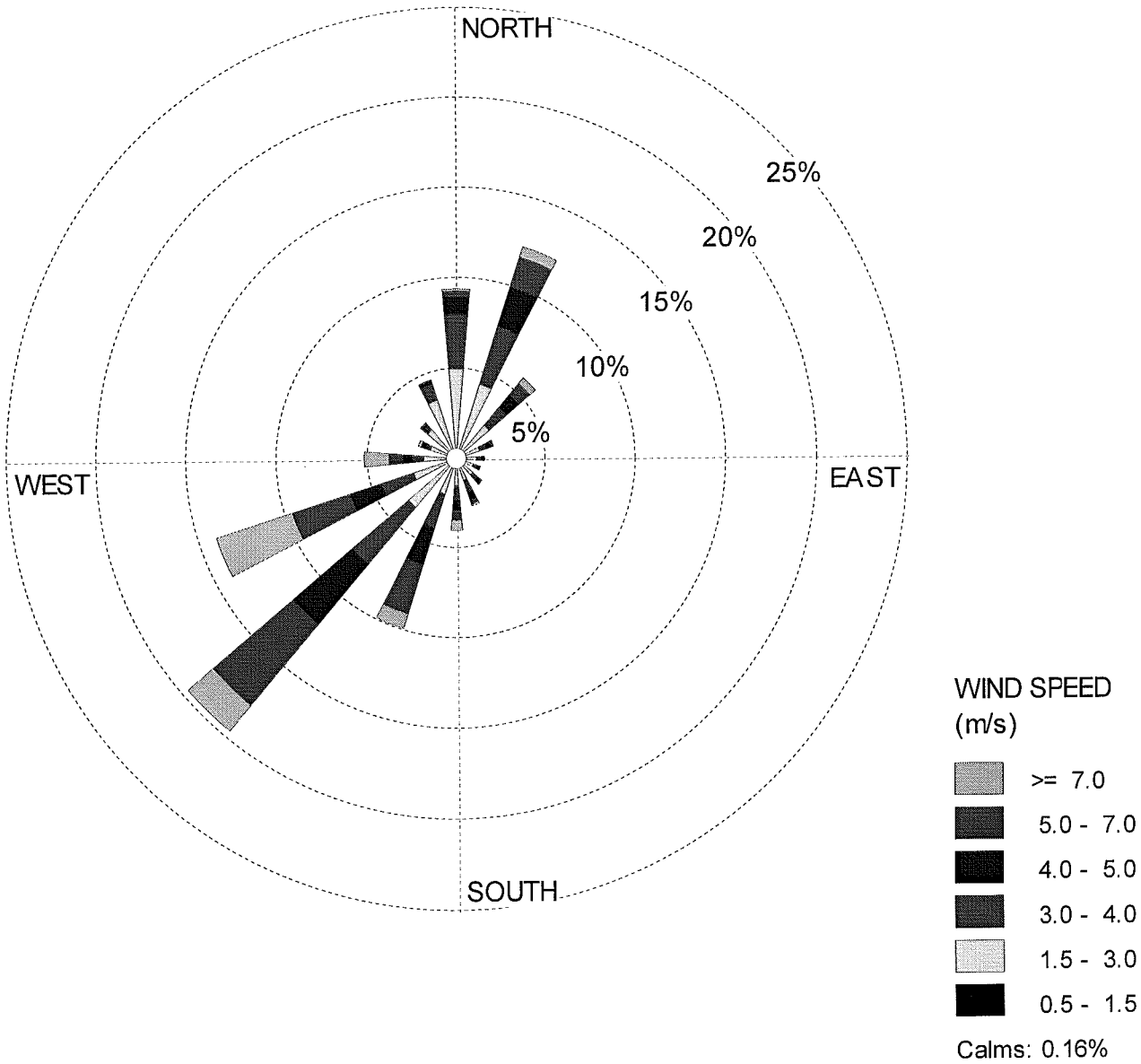
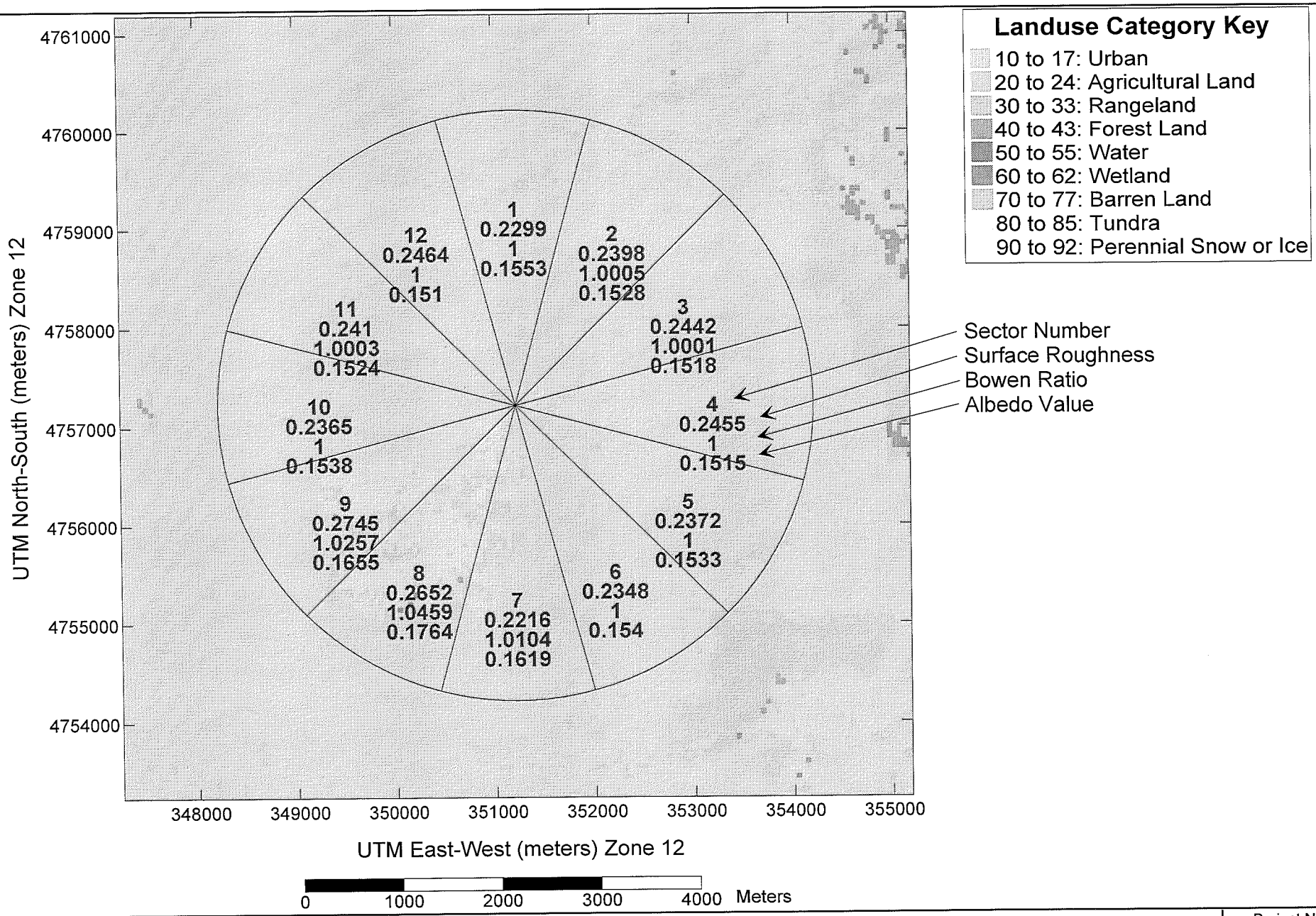


GEOMATRIX

WindRose for INEEL Aberdeen Site, 15m Level, JAN. 2001 – DEC. 2005
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No.
014018.000

Figure
5-3



GEOMATRIX

AERMET ABERDEEN INEEL SITE LAND-USE ANALYSIS
Nebraska Boiler Biogas Burner PTC Application
Aberdeen, Idaho

Project No.
014018.000

Figure
5-4

APPENDIXES

APPENDIX A

DEQ's Permit to Construct Forms

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: 208-373-0502

PERMIT TO CONSTRUCT APPLICATION

Applicants, please see instructions on page 2 before filling out the form.

DEQ Staff, please see instructions for handling this form on page 3.

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER

1. Company Name	J.R. Simplot Company		
2. Facility Name	Aberdeen Plant	3. Facility ID No.	011-00029
4. Brief Project Description - One sentence or less	Nebraska Boiler Biogas Burner Project		

PERMIT APPLICATION TYPE

5. ☐ New Facility ☐ New Source at Existing Facility ☐ Unpermitted Existing Source
☒ Modify Existing Source: Permit No.: P-040318 Date Issued: December 3, 2004
☐ 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: _____	☐
☐	☒	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: 1	☐
☐	☒	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	☐

DEQ USE ONLY

Date Received

Project Number

Payment / Fees Included?
Yes ☐ No ☐

Check Number

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

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

IDENTIFICATION	
1. Company Name	J.R. Simplot Company
2. Facility Name (if different than #1)	Aberdeen Plant
3. Facility I.D. No.	011-00029
4. Brief Project Description:	Nebraska Boiler Biogas Burner Project
FACILITY INFORMATION	
5. Owned/operated by:	☐ Federal government ☐ County government ☐ State government ☐ City government
6. Primary Facility Permit Contact Person/Title	Kelly Packard, Environmental Manager
7. Telephone Number and Email Address	208-397-2508; kelly.packard@simplot.com
8. Alternate Facility Contact Person/Title	Henry Hamanishi, Manager of Environmental Engineering
9. Telephone Number and Email Address	208-389-7375; henry.hamanishi@simplot.com
10. Address to which permit should be sent	P.O. Box 460
11. City/State/Zip	Aberdeen, Idaho 83210
12. Equipment Location Address (if different than #9)	624 Simplot Loop, Aberdeen, Idaho 83210
13. City/State/Zip	Aberdeen, Idaho 83210
14. Is the Equipment Portable?	☐ Yes ☒ No
15. SIC Code and NAISC Code	SIC: 2037 Secondary SIC (if any): NAICS: 311411
16. Brief Business Description and Principal Product	Frozen Potato and Corn Processing
17. Identify any adjacent or contiguous facility that this company owns and/or operates	Not Applicable
PERMIT APPLICATION TYPE	
18. Specify Reason for Application	☐ New Facility ☐ New Source at Existing Facility ☒ Modify Existing Source: Permit No.: P-040318 Date Issued: December 3, 2004 ☐ Unpermitted Existing Source: ☐ 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	Bruce Hauber, Unit Director
20. RESPONSIBLE OFFICIAL SIGNATURE	Bruce Hauber Date: 1/11/08

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

IDENTIFICATION		
Company Name: J.R. Simplot Company	Facility Name: Aberdeen Plant	Facility ID No: 011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project	

EXEMPTION

Please see IDAPA 58.01.01.222 for a list of industrial boilers that are exempt from Permit to Construct requirements.

Boiler (EMISSION UNIT) DESCRIPTION AND SPECIFICATIONS

1. Type of Request ☐ New Unit ☐ Unpermitted Existing Unit ☒ Modification to a unit with Permit #:P-040318

2. Use of Boiler: ☒ % Used For Process ☐ % Used For Space Heat ☐ % Used For Generating Electricity ☐ Other:

3. Boiler ID Number: Nebraska Boiler	4. Rated Capacity: ☒ 80 Million British Thermal Units Per Hour (MMBtu/hr) ☐ 1,000 Pounds Steam Per Hour (1,000 lb steam/hr)	
5. Construction Date: Installed at the Aberdeen facility December 2003	6. Manufacturer: Nebraska	7. Model: NOS-2A-58
8. Date of Modification (if applicable): Not Applicable	9. Serial Number (if available): Not Applicable	10. Control Device (if any): None **Note: Attach applicable control equipment form(s)**

FUEL DESCRIPTION AND SPECIFICATIONS

11. Fuel Type	☐ Diesel Fuel (#) (gal/hr)	☒ Natural Gas (cf/hr)	☐ Coal (unit: /hr)	☒ Other Fuels (unit:cf /hr)
12. Full Load Consumption Rate		93,137 cf/hr		6,479 cf/hr
13. Actual Consumption Rate		≤ 93,137 cf/hr		≤ 6,479 cf/hr
14. Fuel Heat Content (Btu/unit, LHV)		1050 BTU/cf		650 BTU/cf
15. Sulfur Content wt%		5.5 ppm S		5,194 ppm H2S
16. Ash Content wt%		N/A		N/A

STEAM DESCRIPTION AND SPECIFICATIONS

17. Steam Heat Content		N/A		N/A
18. Steam Temperature (°F)	N/A	N/A		N/A
19. Steam Pressure (psi)	N/A	N/A		N/A
20. Steam Type	N/A	N/A	☐ Saturated ☐ Superheated	☐ Saturated ☐ Superheated

OPERATING LIMITS & SCHEDULE

21. Imposed Operating Limits (hours/year, or gallons fuel/year, etc.): None

22. Operating Schedule (hours/day, months/year, etc.): 8,760 hours/year

Federal Requirements Applicability **Form FRA**

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

IDENTIFICATION

Company Name:	Facility Name:	Facility ID No:
J.R. Simplot Company	Aberdeen Plant	011-00029

Brief Project Description: Nebraska Boiler Biogas Burner Project

APPLICABILITY DETERMINATION

1. Will this project be subject to 1990 CAA Section 112(g)? (Case-by-Case MACT)	☒ NO	☐ YES*	☐ DON'T KNOW
	* If YES then 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*	☐ DON'T KNOW
	*If YES please identify sub-part: Subpart Dc		
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 – SEE TABLE A FOR LIST	☒ NO	☐ YES*	☐ DON'T KNOW
	*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*	☐ DON'T KNOW
	*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	☐ DON'T KNOW
6. Was netting done for this project to avoid PSD?	☒ NO	☐ YES*	☐ DON'T KNOW
	*If YES please attach netting calculations		

IF YOU ARE UNSURE HOW TO ANSWER ANY OF THESE QUESTIONS CALL 1-208-373-0502

DEQ AIR QUALITY PROGRAM 1410 N. Hilton Boise, ID 83706 **For assistance: (208) 373-0502**	**PERMIT TO CONSTRUCT APPLICATION**
Company Name:	**J.R. Simplot Company**
Facility Name:	Aberdeen Plant
Facility ID No.:	011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project

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)													
Nebraska Boiler & Cond. Econ.	NBOIL/CON	0.58	2.54	0.05	0.20	3.81	16.69	6.40	28.03	0.42	1.84		
Flare	FLARE	0.05	0.21	6.00	26.30	0.29	1.25	1.55	6.80	0.59	2.57		
Hot Water Heater	HWHEAT	0.04	0.16	0.00	0.01	0.49	2.13	0.41	1.79	0.03	0.12		
Dryer Line 1 Stack 1	DS1	0.65	2.08	0.00	0.01	1.20	5.20	0.50	2.19	0.03	0.11		
Dryer Line 1 Stack 2	DS2	0.65	2.08	0.00	0.01	1.20	5.20	0.50	2.19	0.03	0.11		
Dryer Line 1 Stack 3	DS3	0.65	2.08	0.00	0.01	1.20	5.20	0.50	2.19	0.03	0.11		
Dryer Line 1 Stack 4	DS4	0.65	2.08	0.00	0.01	1.20	5.20	0.50	2.19	0.03	0.11		
Plant Vent 1	PLANT1	0.50	2.18	0.00	0.01	0.50	2.18	0.42	1.83	0.03	0.12		
Plant Vent 2	PLANT2	0.50	2.18	0.00	0.01	0.50	2.18	0.42	1.83	0.03	0.12		
Plant Vent 3	PLANT3	0.50	2.18	0.00	0.01	0.50	2.18	0.42	1.83	0.03	0.12		
Plant Vent 4	PLANT4	0.50	2.18	0.00	0.01	0.50	2.18	0.42	1.83	0.03	0.12		
Plant Vent 5	PLANT5	0.50	2.18	0.00	0.01	0.50	2.18	0.42	1.83	0.03	0.12		
Plant Vent 6	PLANT6	0.50	2.18	0.00	0.01	0.50	2.18	0.42	1.83	0.03	0.12		
WESP	WESP	15.52	44.00	--	--	--	--	--	--	--	62.00		
Total		21.77	68.27	6.08	26.64	12.36	53.92	12.86	56.35	1.30	67.70		

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

Company Name:	**J.R. Simplot Company**
Facility Name:	Aberdeen Plant
Facility ID No.:	011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project

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

		3.											
1.	2.	PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Fugitive Source Name	Fugitive 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
Fugitive Source(s)													
Gasoline Handling	GASHNDL	--	--	--	--	--	--	--	--	0.19	0.85	--	--
Road Dust	RDUST	0.38	1.65	--	--	--	--	--	--	--	--	--	--
Total		0.38	1.65							0.19	0.85		

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

Company Name:	**J.R. Simplot Company**
Facility Name:	Aberdeen Plant
Facility ID No.:	011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project

SUMMARY OF EMISSIONS INCREASE (PROPOSED PTE - PREVIOUSLY MODELED PTE) - POINT SOURCES

		3.											
1.	2.	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)													
Nebraska Boiler	NBOIL/CONDE	0.00	0.01	6.00	26.29	0.22	0.97	0.02	0.07	0.00	0.00	0	0
Total		0.00	0.01	6.00	26.29	0.22	0.97	0.02	0.07	0.00	0.00		

	DEQ AIR QUALITY PROGRAM 1410 N. Hilton Boise, ID 83706 **For assistance: (208) 373-0502**	**PERMIT TO CONSTRUCT APPLICATION**
Company Name:	**J.R. Simplot Company**	
Facility Name:	Aberdeen Plant	
Facility ID No.:	011-00029	
Brief Project Description:	Nebraska Boiler Biogas Burner Project	

SUMMARY OF EMISSIONS INCREASE (PROPOSED PTE - PREVIOUSLY MODELED PTE) - FUGITIVE SOURCES

		3. Air Pollutant Maximum Change in Emissions Rate (lbs/hr or t/yr)											
1.	2.	PM_{10}		SO_2		NO_X		CO		VOC		Lead	
Fugitive Source Name	Fugitive 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
Fugitive Source(s)													
Not Applicable													
Total													

DEQ AIR QUALITY PROGRAM 1410 N. Hilton Boise, ID 83706 **For assistance: (208) 373-0502**	**PERMIT TO CONSTRUCT APPLICATION**

Company Name:	J.R. Simplot Company
Facility Name:	Aberdeen Plant
Facility ID No.:	011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project

SUMMARY OF AIR IMPACT ANALYSIS RESULTS - CRITERIA POLLUTANTS

		1.		2.	3.	4.		5.
Criteria Pollutants	**Averaging Period**	**Significant Impact Analysis Results (µg/m3)**	**Significant Contribution Level (µg/m3)**	**Full Impact Analysis Results (µg/m3)**	**Background Concentration (µg/m3)**	**Total Ambient Impact (µg/m3)**	**NAAQS (µg/m3)**	**Percent of NAAQS**
PM_{10}	24-hour		5				150	
	Annual		1				50	
SO_2	3-hr	104.54	25	444.81	34.00	478.81	1300	37%
	24-hr	20.00	5	150.32	26.00	176.32	365	48%
	Annual	3.18	1	16.24	8.00	24.24	80	30%
NO_2	Annual		1				100	
CO	1-hr		2000				10000	
	8-hr		500				40000	

	DEQ AIR QUALITY PROGRAM 1410 N. Hilton Boise, ID 83706 **For assistance: (208) 373-0502**	**PERMIT TO CONSTRUCT APPLICATION**
Company Name:	J.R. Simplot Company	
Facility Name:	Aberdeen Plant	
Facility ID No.:	011-00029	
Brief Project Description:	Nebraska Boiler Biogas Burner Project	

POINT SOURCE STACK PARAMETERS

1.	2.	3a.	3b.	4.	5.	6.	.7	8.	9.	10.
Emissions units	**Stack ID**	**UTM Easting (m)**	**UTM Northing (m)**	**Base Elevation (m)**	**Stack Height (m)**	**Modeled Diameter (m)**	**Stack Exit Temperature (K)**	**Stack Exit Flowrate (acfm)**	**Stack Exit Velocity (m/s)**	**Stack orientation (e.g., horizontal, rain cap)**
Point Source(s)										
Nebraska Boiler - Scenario 1	NBOIL	350854.86	4756330.5	1,340.00	16.76	1.37	449.82	26940	8.60	vertical
Nebraska Boiler - Scenario 2	NBOIL	350854.87	4756330.5	1,340.00	16.76	1.37	449.82	13470	4.30	vertical
Condensing Econ. - Scenario 2	CONDE	350858.5	4756338.2	1,340.00	11.83	0.61	294.26	8,813.00	14.25	vertical
Condensing Econ. - Scenario 3	CONDE	350858.5	4756338.2	1,340.00	11.83	0.61	294.26	17627	28.50	vertical
Flare	FLARE	350922.32	4756305.6	1,340.00	6.45	0.36	1,273.00	4,314.00	20.00	vertical
Hot Water Heater	HWHEAT	350910.56	4756321.4	1,340.00	6.10	0.31	422.00	1,302.00	8.41	vertical
Dryer Line 1 Stack 1	DS1	350795.4	4756342.2	1,340.00	7.90	0.61	306.48	16038	25.90	vertical
Dryer Line 1 Stack 2	DS2	350798	4756345.3	1,340.00	7.90	0.61	306.48	16038	25.90	vertical
Dryer Line 1 Stack 3	DS3	350801.4	4756349.5	1,340.00	7.90	0.61	306.48	16038	25.90	vertical
Dryer Line 1 Stack 4	DS4	350804	4756352.6	1,340.00	7.90	0.61	306.48	16038	25.90	vertical
Plant Vent 1	PLANT1	350767	4756338	1,340.00	5.95	0.001	313.71	NA	0.001	horizontal
Plant Vent 2	PLANT2	350779	4756352.6	1,340.00	5.95	0.001	314.71	NA	0.001	horizontal
Plant Vent 3	PLANT3	350791	4756367.2	1,340.00	5.95	0.001	315.71	NA	0.001	horizontal
Plant Vent 4	PLANT4	350803	4756381.8	1,340.00	5.95	0.001	316.71	NA	0.001	horizontal
Plant Vent 5	PLANT5	350815	4756396.4	1,340.00	5.95	0.001	317.71	NA	0.001	horizontal
Plant Vent 6	PLANT6	350827	4756411	1,340.00	5.95	0.001	318.71	NA	0.001	horizontal
WESP **	WESP	350796.26	4756394.4	1,340.00	19.81	1.22	332.04	28504	11.52	vertical

** WESP stack parameters provided for completeness, however the WESP has no potential SO2 emissions and was not included in facility-wide SO2 modeling.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

Company Name:	J.R. Simplot Company
Facility Name:	Aberdeen Plant
Facility ID No.:	011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project

FUGITIVE SOURCE PARAMETERS

1.	2.	3a.	3b.	4.	5.	6.	7.	8.	9.	10.
Emissions units	Stack ID	UTM Easting (m)	UTM Northing (m)	Base Elevation (m)	Release Height (m)	Easterly Length (m)	Northerly Length (m)	Angle from North (°)	Initial Vertical Dimension (m)	Initial Horizontal Dimension (m)
Area Source(s)										
Not Applicable										
Volume Source(s)										
Not Applicable										

DEQ AIR QUALITY PROGRAM
1410 N. Hilton
Boise, ID 83706
For assistance: (208) 373-0502

PERMIT TO CONSTRUCT APPLICATION

Company Name:	J.R. Simplot Company
Facility Name:	Aberdeen Plant
Facility ID No.:	011-00029
Brief Project Description:	Nebraska Boiler Biogas Burner Project

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**
COMP. Building	41.33	93.00	1340.00	23.33	1	See BPIP Prime Input File for Actual Dimensions
Boiler Room	48.00	48.00	1340.00	24.75	1	See BPIP Prime Input File for Actual Dimensions
Maintanence Shop	49.50	48.00	1340.00	20.17	1	See BPIP Prime Input File for Actual Dimensions
Parts Room	39.67	48.00	1340.00	22.00	1	See BPIP Prime Input File for Actual Dimensions
Engineering Office	24.00	36.00	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Water Storage Tank	38.00	38.00	1340.00	32.00	1	See BPIP Prime Input File for Actual Dimensions
Water Tank Room (NE of Storage Tank)	37.17	25.33	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Chemical Building	50.00	26.00	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Pump House	62.00	40.31	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Raw Storage #1	130.00	248.46	1340.00	21.98	1	See BPIP Prime Input File for Actual Dimensions
Main Production Building	448.67	144.00	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Freeze Packing	111.00	103.58	1340.00	33.14	1	See BPIP Prime Input File for Actual Dimensions
Dry Warehouse	85.31	84.46	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Cold Storage	187.00	428.00	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Raw Receiving	70.17	82.38	1340.00	28.87	1	See BPIP Prime Input File for Actual Dimensions
Rail Road Building	35.00	79.67	1340.00	19.03	1	See BPIP Prime Input File for Actual Dimensions
Waste Plant	118.42	61.79	1340.00	29.86	1	See BPIP Prime Input File for Actual Dimensions
Clarifier Building	60.17	46.08	1340.00	29.86	1	See BPIP Prime Input File for Actual Dimensions
Digester Building	40.29	69.00	1340.00	23.95	1	See BPIP Prime Input File for Actual Dimensions
Influent Building	48.00	55.33	1340.00	18.04	1	See BPIP Prime Input File for Actual Dimensions
Conditioning Tank	18.50	18.50	1340.00	14.11	1	See BPIP Prime Input File for Actual Dimensions
Mag. Hydrox. Tank	8.00	8.00	1340.00	44.95	1	See BPIP Prime Input File for Actual Dimensions

APPENDIX B

Facility-Wide Emission Inventory

Aberdeen Plant Potential to Emit (TPY)[a]

	Nebraska Boiler[b]	Hot Water Heater[b]	Biogas Flare[b]	Dryer 1 (A-D1)	WESP	AMUs	Road Dust	Gasoline Storage and Handling	Facility-Wide Emissions	Hazardous Air Pollutant?	Total HAP Emissions
Criteria Air Pollutants											
NOx	17.7	2.1	1.3	5.2	-	13.1	-	-	39.2	No	-
CO	28.1	1.7	6.8	8.8	-	11.0	-	-	56.4	No	-
SO2	26.5			0.1	-	0.08	-	-	26.6	No	-
PM-10	2.5	0.2	0.2	8.3	44.0	1.0	1.7	-	57.9	No	-
VOC	1.8	0.1	2.6	0.5	62.0	0.7	-	0.9	68.6	No	-
Toxic Air Pollutants											
3-Methylchloranthrene	6.0E-07	3.7E-08	-	1.5E-07	-	2.4E-07	-	-	1.0E-06	No	-
Benzene	7.0E-04	4.3E-05	-	1.8E-04	-	2.7E-04	-	-	1.2E-03	Yes	1.2E-03
Benzo(a)pyrene	4.0E-07	2.5E-08	-	1.0E-07	-	1.6E-07	-	-	6.8E-07	No	-
Dichlorobenzene	4.0E-04	2.5E-05	-	1.0E-04	-	1.6E-04	-	-	6.8E-04	No	-
Formaldehyde	2.5E-02	1.5E-03	-	6.3E-03	-	9.8E-03	-	-	4.3E-02	Yes	4.3E-02
Hexane	6.0E-01	3.7E-02	-	1.5E-01	-	2.4E-01	-	-	1.0	Yes	1.0
Naphthalene	2.0E-04	1.3E-05	-	5.1E-05	-	8.0E-05	-	-	3.5E-04	Yes	3.5E-04
Pentane	8.7E-01	5.4E-02	-	2.2E-01	-	3.4E-01	-	-	1.5	No	-
Toluene	1.1E-03	7.0E-05	-	2.8E-04	-	4.4E-04	-	-	1.9E-03	Yes	1.9E-03
Arsenic	6.7E-05	4.1E-06	-	1.7E-05	-	2.6E-05	-	-	1.1E-04	Yes	1.1E-04
Barium	1.5E-03	9.1E-05	-	3.7E-04	-	5.7E-04	-	-	2.5E-03	No	-
Beryllium	4.0E-06	2.5E-07	-	1.0E-06	-	1.6E-06	-	-	6.8E-06	Yes	6.8E-06
Cadmium	3.7E-04	2.3E-05	-	9.2E-05	-	1.4E-04	-	-	6.3E-04	Yes	6.3E-04
Chromium-Total[c]	4.7E-04	2.9E-05	-	1.2E-04	-	1.8E-04	-	-	8.0E-04	Yes	8.0E-04
Chromium III	3.8E-04	2.4E-05	-	9.6E-05	-	1.5E-04	-	-	6.5E-04	-	-
Chromium VI	8.4E-05	5.2E-06	-	2.1E-05	-	3.3E-05	-	-	1.4E-04	-	-
Cobalt	2.8E-05	1.7E-06	-	7.0E-06	-	1.1E-05	-	-	4.8E-05	Yes	4.8E-05
Copper	2.8E-04	1.8E-05	-	7.1E-05	-	1.1E-04	-	-	4.8E-04	No	-
Manganese	1.3E-04	7.8E-06	-	3.2E-05	-	5.0E-05	-	-	2.2E-04	Yes	2.2E-04
Mercury	8.7E-05	5.4E-06	-	2.2E-05	-	3.4E-05	-	-	1.5E-04	Yes	1.5E-04
Molybdenum	3.7E-04	2.3E-05	-	9.2E-05	-	1.4E-04	-	-	6.3E-04	No	-
Nickel	7.0E-04	4.3E-05	-	1.8E-04	-	2.7E-04	-	-	1.2E-03	Yes	1.2E-03
Selenium	8.0E-06	5.0E-07	-	2.0E-06	-	3.1E-06	-	-	1.4E-05	Yes	1.4E-05
Zinc	9.7E-03	6.0E-04	-	2.4E-03	-	3.8E-03	-	-	1.7E-02	No	-
Nitrous Oxide	7.4E-01	4.5E-02	-	1.8E-01	-	2.9E-01	-	-	1.3	No	-
Polyaromatic Hydrocarbons (a subset of Toxic Air Pollutants)											
Benz(a)anthracene	6.0E-07	3.7E-08	-	1.5E-07	-	2.4E-07	-	-	1.0E-06	No	-
Benzo(a)pyrene	4.0E-07	2.5E-08	-	1.0E-07	-	1.6E-07	-	-	6.8E-07	No	-
Benzo(b)fluoranthene	6.0E-07	3.7E-08	-	1.5E-07	-	2.4E-07	-	-	1.0E-06	No	-
Benzo(k)fluoranthene	6.0E-07	3.7E-08	-	1.5E-07	-	2.4E-07	-	-	1.0E-06	No	-
Chrysene	6.0E-07	3.7E-08	-	1.5E-07	-	2.4E-07	-	-	1.0E-06	No	-
Dibenzo(a,h)anthrancene	4.0E-07	2.5E-08	-	1.0E-07	-	1.6E-07	-	-	6.8E-07	No	-
Indeno(1,2,3-cd)pyrene	6.0E-07	3.7E-08	-	1.5E-07	-	2.4E-07	-	**Toxics Total (Including PAHs)**	1.0E-06	No	-
PAH Total	*3.8E-06*	*2.4E-07*	-	*9.5E-07*	-	*1.5E-06*	-		**3.8**	**Total HAPs**	**1.1**

(a) This summary table is intended for informational purposes only. The J.R. Simplot Company is not proposing annual emission limits. Annual emissions were based on 8760 hours of operation at the short-term emission rate.

(b) As proposed in this PTC application, the Nebraska boiler, Hot Water Heater, and Biogas Flare will all be capable of combusting the biogas generated in the facility's anaerobic digester. Each source is capable of combusting all of the biogas generated by the digester on an hourly and annual basis. Therefore, the SO2 limit associated with biogas combustion should include all three sources. Additionally, while the Nebraska boiler is combusting the biogas, it will also generate SO2 emissions from natural gas combustion. The SO2 emissions attributable to the Nebraska boiler's natural gas combustion (0.2 tpy) are included in the SO2 limit.

(c) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. We have conservatively assumed 18 percent of the chromium emissions are chromium VI.

NEBRASKA BOILER - Natural Gas Only

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit lb/hr	Potential to Emit TPY
NOx	50.0	3.8	16.7
CO	84.0	6.4	28.0
SO2	0.6	0.05	0.2
PM-10	7.6	0.6	2.5
VOC	5.5	0.4	1.8

Heat Input Capacity	80	MMBtu/hr
Fuel Usage*	0.076	MMscf/hr
*(based on	1050	Btu/scf)

Pollutant	Emission Factor (lb/MMscf)[a]	lb/hr	TPY
3-Methylchloranthrene	1.80E-06	1.37E-07	6.01E-07
Benzene	2.10E-03	1.60E-04	7.01E-04
Benzo(a)pyrene	1.20E-06	9.14E-08	4.00E-07
Dichlorobenzene	1.20E-03	9.14E-05	4.00E-04
Formaldehyde	7.50E-02	5.71E-03	2.50E-02
Hexane	1.8	1.37E-01	6.01E-01
Naphthalene	6.10E-04	4.65E-05	2.04E-04
Pentane	2.6	1.98E-01	8.68E-01
Toluene	3.40E-03	2.59E-04	1.13E-03
Arsenic	2.00E-04	1.52E-05	6.67E-05
Barium	4.40E-03	3.35E-04	1.47E-03
Beryllium	1.20E-05	9.14E-07	4.00E-06
Cadmium	1.10E-03	8.38E-05	3.67E-04
Chromium-Total[b]	1.40E-03	1.07E-04	4.67E-04
Chromium III	1.15E-03	8.75E-05	3.83E-04
Chromium VI	2.52E-04	1.92E-05	8.41E-05
Cobalt	8.40E-05	6.40E-06	2.80E-05
Copper	8.50E-04	6.48E-05	2.84E-04
Manganese	3.80E-04	2.90E-05	1.27E-04
Mercury	2.60E-04	1.98E-05	8.68E-05
Molybdenum	1.10E-03	8.38E-05	3.67E-04
Nickel	2.10E-03	1.60E-04	7.01E-04
Selenium	2.40E-05	1.83E-06	8.01E-06
Zinc	2.90E-02	2.21E-03	9.68E-03
Nitrous oxide	2.2	1.68E-01	7.34E-01

PAHs			
Pollutant	**Emission Factor (lb/MMscf)[a]**	**lb/hr**	**TPY**
Benz(a)anthracene	1.80E-06	1.37E-07	6.01E-07
Benzo(a)pyrene	1.20E-06	9.14E-08	4.00E-07
Benzo(b)fluoranthene	1.80E-06	1.37E-07	6.01E-07
Benzo(k)fluoranthene	1.80E-06	1.37E-07	6.01E-07
Chrysene	1.80E-06	1.37E-07	6.01E-07
Dibenzo(a,h)anthrancene	1.20E-06	9.14E-08	4.00E-07
Indeno(1,2,3-cd)pyrene	1.80E-06	1.37E-07	6.01E-07
PAH Total		**8.7E-07**	**3.8E-06**

(a) Emission Factors from AP-42 Section 1.4, Natural Gas Combustion, July 1998. NOx emission factor for boilers with Low NOx burners.

(b) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. We have conservatively assumed 18 percent of the chromium emissions are chromium VI.

Nebraska Boiler with Biogas Burner

NATURAL GAS COMBUSTION

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit lb/hr	Potential to Emit TPY
NOx	50.0	3.61	15.81
CO	84.0	6.06	26.56
SO2	0.6	0.043	0.19
PM10	7.6	0.55	2.40
VOC	5.5	0.40	1.74

*Natural Gas fuel usage based on biogas producing 4.2 MMBtu/hr and natural gas producing 75.8 MMBtu/hr.

Heat Input Capacity [e]	75.8	MMBtu/hr
Fuel Usage* Natural Gas	0.072 1050	MMscf/hr Btu/scf)

BIOGAS COMBUSTION

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit[b] lb/hr	Potential to Emit[b] TPY*
NOx	100.0	0.42	1.84
CO	84.0	0.35	1.55
SO2[d]	-	6.0	26.3
PM-10	7.6	0.03	0.14
VOC	5.5	0.02	0.10

*Biogas fuel usage based on estimates of anaerobic digester's biogas production per day (155,500 scf), and assuming that all of the biogas would be combusted in the Nebraska Boiler.

Heat Input Capacity [e]	4.2	MMBtu/hr
Fuel Usage* Biogas	0.006 650	MMscf/hr Btu/scf)

NATURAL GAS and BIOGAS COMBUSTION

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit[f] lb/hr	Potential to Emit[f] TPY
3-Methylchloranthrene	1.80E-06	1.38E-07	6.02E-07
Benzene	2.10E-03	1.60E-04	7.03E-04
Benzo(a)pyrene	1.20E-06	9.17E-08	4.02E-07
Dichlorobenzene	1.20E-03	9.17E-05	4.02E-04
Formaldehyde	7.50E-02	5.73E-03	2.51E-02
Hexane	1.8	1.38E-01	6.02E-01
Naphthalene	6.10E-04	4.66E-05	2.04E-04
Pentane	2.6	1.99E-01	8.70E-01
Toluene	3.40E-03	2.60E-04	1.14E-03
Arsenic	2.00E-04	1.53E-05	6.69E-05
Barium	4.40E-03	3.36E-04	1.47E-03
Beryllium	1.20E-05	9.17E-07	4.02E-06
Cadmium	1.10E-03	8.40E-05	3.68E-04
Chromium-Total[c]	1.40E-03	1.07E-04	4.68E-04
Chromium III	1.15E-03	8.77E-05	3.84E-04
Chromium VI	2.52E-04	1.93E-05	8.43E-05
Cobalt	8.40E-05	6.42E-06	2.81E-05
Copper	8.50E-04	6.49E-05	2.84E-04
Manganese	3.80E-04	2.90E-05	1.27E-04
Mercury	2.60E-04	1.99E-05	8.70E-05
Molybdenum	1.10E-03	8.40E-05	3.68E-04
Nickel	2.10E-03	1.60E-04	7.03E-04
Selenium	2.40E-05	1.83E-06	8.03E-06
Zinc	2.90E-02	2.22E-03	9.70E-03
Nitrous oxide	2.2	1.68E-01	7.36E-01

PAHs

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit[f] lb/hr	Potential to Emit[f] TPY
Benz(a)anthracene	1.80E-06	1.38E-07	6.02E-07
Benzo(a)pyrene	1.20E-06	9.17E-08	4.02E-07
Benzo(b)fluoranthene	1.80E-06	1.38E-07	6.02E-07
Benzo(k)fluoranthene	1.80E-06	1.38E-07	6.02E-07
Chrysene	1.80E-06	1.38E-07	6.02E-07
Dibenzo(a,h)anthrancene	1.20E-06	9.17E-08	4.02E-07
Indeno(1,2,3-cd)pyrene	1.80E-06	1.38E-07	6.02E-07
PAH Total		**8.7E-07**	**3.8E-06**

(a) Emission Factors from AP-42 Section 1.4, Natural Gas Combustion, July 1998.

(b) Emission rates were scaled to represent the methane portion of the biogas, 65%.

(c) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. We have conservatively assumed 18 percent of the chromium emissions are chromium VI.

(d) Emission Factor provided by Simplot. SO2 calculations were provided with September 2003 PTC application.

(e) Total rated boiler heat input is 80 MMBtu/hr for burning either natural gas, biogas, or a mixture of the two fuels

(f) Toxic and hazardous air pollutant emissions based on firing Nebraska boiler (80 MMBtu/hr) with 75.79MMBtu/hr natural gas and 4.21MMBtu/hr biogas. Biogas emission rates sclaed to represent the methane portion of the biogas (65 percent).

Cleaver Brooks 700-350-160 Boiler

NATURAL GAS COMBUSTION

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit lb/hr	Potential to Emit TPY
NOx	100.0	0.47	2.06
CO	84.0	0.40	1.73
SO2	0.6	0.003	0.01
PM10	7.6	0.04	0.16
VOC	5.5	0.03	0.11

Heat Input Capacity	4.95	MMBtu/hr
Fuel Usage*	0.005	MMscf/hr
*(based on	1050	Btu/scf)

BIOGAS COMBUSTION

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit[b] lb/hr	Potential to Emit[b] TPY*
NOx	100.0	0.42	1.84
CO	84.0	0.35	1.55
SO2[e]	-	-	26.3
PM-10	7.6	0.03	0.14
VOC	5.5	0.02	0.10

*based on 8760 hours of operation at the short-term emission rate, except SO2. See Note b.

**Fuel Usage based on estimates of anaerobic digester's biogas production per day (155,500 scf), and assuming that all of the biogas would be combusted in the Hot Water Heater.

Heat Input Capacity	4.2	MMBtu/hr
Fuel Usage*	0.006	MMscf/hr
Biogas	650	Btu/scf)

Pollutant	Emission Factor (lb/MMscf)[a]	Natural Gas Combustion lb/hr	Natural Gas Combustion TPY	Biogas Combustion[b] lb/hr	Biogas Combustion[b] TPY
3-Methylchloranthrene	1.80E-06	8.49E-09	3.72E-08	3.57E-11	1.57E-10
Benzene	2.10E-03	9.90E-06	4.34E-05	4.17E-08	1.83E-07
Benzo(a)pyrene	1.20E-06	5.66E-09	2.48E-08	2.38E-11	1.04E-10
Dichlorobenzene	1.20E-03	5.66E-06	2.48E-05	2.38E-08	1.04E-07
Formaldehyde	7.50E-02	3.54E-04	1.55E-03	1.49E-06	6.52E-06
Hexane	1.8	8.49E-03	3.72E-02	3.57E-05	1.57E-04
Naphthalene	6.10E-04	2.88E-06	1.26E-05	1.21E-08	5.30E-08
Pentane	2.6	1.23E-02	5.37E-02	5.16E-05	2.26E-04
Toluene	3.40E-03	1.60E-05	7.02E-05	6.75E-08	2.96E-07
Arsenic	2.00E-04	9.43E-07	4.13E-06	3.97E-09	1.74E-08
Barium	4.40E-03	2.07E-05	9.09E-05	8.74E-08	3.83E-07
Beryllium	1.20E-05	5.66E-08	2.48E-07	2.38E-10	1.04E-09
Cadmium	1.10E-03	5.19E-06	2.27E-05	2.18E-08	9.57E-08
Chromium-Total[c]	1.40E-03	6.60E-06	2.89E-05	2.78E-08	1.22E-07
Chromium III	1.15E-03	5.41E-06	2.37E-05	2.28E-08	9.98E-08
Chromium VI	2.52E-04	1.19E-06	5.20E-06	5.00E-09	2.19E-08
Cobalt	8.40E-05	3.96E-07	1.73E-06	1.67E-09	7.30E-09
Copper	8.50E-04	4.01E-06	1.76E-05	1.69E-08	7.39E-08
Manganese	3.80E-04	1.79E-06	7.85E-06	7.54E-09	3.30E-08
Mercury	2.60E-04	1.23E-06	5.37E-06	5.16E-09	2.26E-08
Molybdenum	1.10E-03	5.19E-06	2.27E-05	2.18E-08	9.57E-08
Nickel	2.10E-03	9.90E-06	4.34E-05	4.17E-08	1.83E-07
Selenium	2.40E-05	1.13E-07	4.96E-07	4.76E-10	2.09E-09
Zinc	2.90E-02	1.37E-04	5.99E-04	5.76E-07	2.52E-06
Nitrous oxide	2.2	1.04E-02	4.54E-02	4.37E-05	1.91E-04

PAHs

Pollutant	Emission Factor (lb/MMscf)[a]	Natural Gas Combustion lb/hr	Natural Gas Combustion TPY	Biogas Combustion[b] lb/hr	Biogas Combustion[b] TPY
Benz(a)anthracene	1.80E-06	8.49E-09	3.72E-08	7.58E-09	3.32E-08
Benzo(a)pyrene	1.20E-06	5.66E-09	2.48E-08	5.05E-09	2.21E-08
Benzo(b)fluoranthene	1.80E-06	8.49E-09	3.72E-08	7.58E-09	3.32E-08
Benzo(k)fluoranthene	1.80E-06	8.49E-09	3.72E-08	7.58E-09	3.32E-08
Chrysene	1.80E-06	8.49E-09	3.72E-08	7.58E-09	3.32E-08
Dibenzo(a,h)anthrancene	1.20E-06	5.66E-09	2.48E-08	5.05E-09	2.21E-08
Indeno(1,2,3-cd)pyrene	1.80E-06	8.49E-09	3.72E-08	7.58E-09	3.32E-08
PAH Total		**5.4E-08**	**2.4E-07**	**4.8E-08**	**2.1E-07**

(a) Emission Factors from AP-42 Section 1.4, Natural Gas Combustion, July 1998.

(b) Emission rates were scaled to represent the methane portion of the biogas, 65%.

(c) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. We have conservatively assumed 18 percent of the chromium emissions are chromium VI.

(d) Emission Factor provided by Simplot. SO2 calculations were provided with September 2003 PTC application.

(e) SO2 emission limit for total SO2 emissions from the Hot Water Heater and the biogas flare. SO2 emission limit based on 12-month period. See PTC Permit P-030318.

BIOGAS FLARE (A-BF)

Pollutant	Emission Factor (lb/MMscf CH4)	Emission Factor (lb/MMBtu)[a]	Potential to Emit lb/hr	Potential to Emit TPY[d]
NOx	-	0.068	0.29	1.25
CO	-	0.37	1.55	6.80
SO2[b]	-	-	-	26.3
PM-10[c]	7.6	-	0.049	0.21
VOC	-	0.14	0.59	2.57

Biogas Flow Rate	0.006	MMscf/hr
Biogas Heat Content	650	btu/scf
Flare Heat Capacity	4.2	MMbtu/hr

(a) Emission factors from AP-42 Section 13.5, Industrial Flares, September 1991. This Section contains emission factors for only NOx, CO

(b) SO2 emission limit for total SO2 emissions from the Hot Water Heater and the biogas flare. SO2 emission limit based on 12-month period. See PTC Permit P-030318.

(c) Emission Factor from AP-42 Section 1.4, Natural Gas Combustion, July 1998. We assumed the emission factor applies only to the CH4 content of the biogas; as such, the emission rates were scaled down to represent the CH4 content of the biogas: 65%.

(d) Based on 8760 hours of operation at the short-term emission rate, except for SO2. See Note b.

Sulfur Dioxide Calculations

Basis:

155,500	scf/day	Biogas (based on COD reduction, 5.0 cf methane/lb COD reduced)
101,075	scf/day	Methane @ 65% methane (design for Biothane system)
5194	ppmv	Hydrogen Sulfide in Biogas (Henry's Law calculation for partition of gas/liquid H2S)

Calculation: at 5194 ppmv H2S in Biogas = 0.0005194 volume fraction of total Biogas

(155,500 scf/day) x (0.005194) = 807.7 scf H2S/day

PV = nRT
P = pressure, atmospheres
V = volume, cubic feet
n = lbmoles
R = gas constant, atm-cf/lbmoles-deg. R
T = temperature, deg. R

For standard pressure and temperature (STP)
T = 32 deg. F, 0 deg. C, 492 deg. R
P = 1 atm.

$$n = \frac{PV}{RT} = \frac{(1\text{ atm})(807.7\text{ scf H2S/day})}{(0.7302\text{ atm-cf/lbmoles-deg. R})(460+32\text{ deg. R})}$$

$$= 2.248 \text{ lbmoles/day}$$

	H_2S	+	$1\frac{1}{2}O_2$	→	SO_2	+	H_2O
MW	34				64		
lbmoles/d	2.248				2.248		
lbs/day	76.432				143.872		

143.89 lbs/day x 365 days = 52,520 lbs/yr SO_2
5.995417

= 26.26 tons/yr SO_2

Emission Factor for sulfur dioxide

$$\frac{(143.872\text{ lbs SO2/d})(1{,}000{,}000)}{(101{,}075\text{ scf CH4/d})(\text{ MM })} = 1424 \text{ lbs SO2/MM scf CH4}$$

DRYER 1 (A-D1)

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit lb/hr	Potential to Emit TPY*
NOx[b]		1.2	5.2
CO[b]		2.0	8.8
SO2	0.6	0.011	0.05
PM-10[b]		2.6	8.3
VOC	5.5	0.10	0.5

*SO2 and VOC annual emission rates based on 8760 hours of operation at the short-term emission rate.

Heat Input Capacity	20	MMBtu/hr
Fuel Usage**	0.019	MMscf/hr
**(based on	1050	Btu/scf)

Pollutant	Emission Factor (lb/MMscf)[a]	lb/hr	TPY
3-Methylchloranthrene	1.80E-06	3.43E-08	1.50E-07
Benzene	2.10E-03	4.00E-05	1.75E-04
Benzo(a)pyrene	1.20E-06	2.29E-08	1.00E-07
Dichlorobenzene	1.20E-03	2.29E-05	1.00E-04
Formaldehyde	7.50E-02	1.43E-03	6.26E-03
Hexane	1.8	3.43E-02	1.50E-01
Naphthalene	6.10E-04	1.16E-05	5.09E-05
Pentane	2.6	4.95E-02	2.17E-01
Toluene	3.40E-03	6.48E-05	2.84E-04
Arsenic	2.00E-04	3.81E-06	1.67E-05
Barium	4.40E-03	8.38E-05	3.67E-04
Beryllium	1.20E-05	2.29E-07	1.00E-06
Cadmium	1.10E-03	2.10E-05	9.18E-05
Chromium-Total[c]	1.40E-03	2.67E-05	1.17E-04
Chromium III	1.15E-03	2.19E-05	9.58E-05
Chromium VI	2.52E-04	4.80E-06	2.10E-05
Cobalt	8.40E-05	1.60E-06	7.01E-06
Copper	8.50E-04	1.62E-05	7.09E-05
Manganese	3.80E-04	7.24E-06	3.17E-05
Mercury	2.60E-04	4.95E-06	2.17E-05
Molybdenum	1.10E-03	2.10E-05	9.18E-05
Nickel	2.10E-03	4.00E-05	1.75E-04
Selenium	2.40E-05	4.57E-07	2.00E-06
Zinc	2.90E-02	5.52E-04	2.42E-03
Nitrous Oxide	2.2	0.04	1.84E-01

PAHs			
Pollutant	**Emission Factor (lb/MMscf)[a]**	**lb/hr**	**TPY**
Benz(a)anthracene	1.80E-06	3.43E-08	1.50E-07
Benzo(a)pyrene	1.20E-06	2.29E-08	1.00E-07
Benzo(b)fluoranthene	1.80E-06	3.43E-08	1.50E-07
Benzo(k)fluoranthene	1.80E-06	3.43E-08	1.50E-07
Chrysene	1.80E-06	3.43E-08	1.50E-07
Dibenzo(a,h)anthrancene	1.20E-06	2.29E-08	1.00E-07
Indeno(1,2,3-cd)pyrene	1.80E-06	3.43E-08	1.50E-07
PAH Total		**2.2E-07**	**9.5E-07**

(a) Emission Factors from AP-42 Section 1.4, Natural Gas Combustion, July 1998.

(b) These emission rates are emission limits established in PTC 011-00029, issued March 24, 2000.

(c) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. We have conservatively assumed 18 percent of the chromium emissions are chromium VI.

AIR MAKEUP UNITS

Pollutant	Emission Factor (lb/MMscf)[a]	Potential to Emit lb/hr	TPY*
NOx	100.0	3.0	13.06
CO	84.0	2.5	10.97
SO2	0.6	0.02	0.08
PM-10	7.6	0.23	0.99
VOC	5.5	0.16	0.72

*based on 8760 hours of operation at the short-term emission rate.

Total Heat Input Capacity	31.3	MMBtu/hr
Fuel Usage**	0.030	MMscf/hr
**(based on	1050	Btu/scf)

Pollutant	Emission Factor (lb/MMscf)[a]	lb/hr	TPY
3-Methylchloranthrene	1.80E-06	5.37E-08	2.35E-07
Benzene	2.10E-03	6.26E-05	2.74E-04
Benzo(a)pyrene	1.20E-06	3.58E-08	1.57E-07
Dichlorobenzene	1.20E-03	3.58E-05	1.57E-04
Formaldehyde	7.50E-02	2.24E-03	9.79E-03
Hexane	1.8	5.37E-02	2.35E-01
Naphthalene	6.10E-04	1.82E-05	7.96E-05
Pentane	2.6	7.75E-02	3.39E-01
Toluene	3.40E-03	1.01E-04	4.44E-04
Arsenic	2.00E-04	5.96E-06	2.61E-05
Barium	4.40E-03	1.31E-04	5.74E-04
Beryllium	1.20E-05	3.58E-07	1.57E-06
Cadmium	1.10E-03	3.28E-05	1.44E-04
Chromium-Total[b]	1.40E-03	4.17E-05	1.83E-04
Chromium III	1.15E-03	3.42E-05	1.50E-04
Chromium VI	2.52E-04	7.51E-06	3.29E-05
Cobalt	8.40E-05	2.50E-06	1.10E-05
Copper	8.50E-04	2.53E-05	1.11E-04
Manganese	3.80E-04	1.13E-05	4.96E-05
Mercury	2.60E-04	7.75E-06	3.39E-05
Molybdenum	1.10E-03	3.28E-05	1.44E-04
Nickel	2.10E-03	6.26E-05	2.74E-04
Selenium	2.40E-05	7.15E-07	3.13E-06
Zinc	2.90E-02	8.64E-04	3.79E-03
Nitrous oxide	2.2	6.56E-02	2.87E-01

PAHs			
Pollutant	**Emission Factor (lb/MMscf)[a]**	**lb/hr**	**TPY**
Benz(a)anthracene	1.80E-06	5.37E-08	2.35E-07
Benzo(a)pyrene	1.20E-06	3.58E-08	1.57E-07
Benzo(b)fluoranthene	1.80E-06	5.37E-08	2.35E-07
Benzo(k)fluoranthene	1.80E-06	5.37E-08	2.35E-07
Chrysene	1.80E-06	5.37E-08	2.35E-07
Dibenzo(a,h)anthrancene	1.20E-06	3.58E-08	1.57E-07
Indeno(1,2,3-cd)pyrene	1.80E-06	5.37E-08	2.35E-07
PAH Total		**3.39829E-07**	**1.49E-06**

AMU	Heat Input Capacity (MMBtu/hr)
AMU Heater 1	5.0
AMU Heater 2	7.5
AMU Heater 3	3.0
AMU Heater 4	6.5
AMU Heater 5	3.0
AMU Heater 6	0.3
AMU Heater 7	2.0
AMU Heater 8	1.0
AMU Heater 9	3.0
Total Input Capacity	**31.3**

(a) Emission Factors from AP-42 Section 1.4, Natural Gas Combustion, July 1998.

(b) AP-42 provides a chromium emission factor for natural gas fired external combustion, but does not include guidance for partitioning emissions between the carcinogenic chromium VI (hexavalent chromium) and the chromium III (trivalent chromium). In the EPA's Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress (EPA-453/R-98-004a), chromium emissions from natural gas-fired units are not included. However, data on speciation of chromium were available from 11 coal- and oil-fired test sites. From these limited data, EPA estimated that the average chromium VI from the coal-fired utilities was 11 percent, and the average from oil-fired utilities was 18 percent. We have conservatively assumed 18 percent of the chromium emissions are chromium VI.

WET ELECTROSTATIC PRECIPITATOR (WESP)

Pollutant	Potential to Emit	
	lb/hr	TPY
PM-10[a]	15.5	44.0
VOC[b]	-	62.0

(a) PM10 emission rate is an emission limit established in PTC P-050313, issued April 21, 2006.

(b) VOC emission rate is an emission limit established in PTC 011-00029, issued June 8, 1999. As described in the Tier I application, Simplot proposes to rescind this emission limit.

ROAD DUST CALCULATIONS

Pollutant	Emission Factor (lb/VMT)[a]	Potential to Emit			
		lb/hr	TPY		
PM10	0.6	0.4	1.7	VMT/Day[b]	15.1

(a) Emission factor provided by J.R. Simplot Company, based on AP-42 Sections 13.2.1 and 13.2.4.

(b) The VMT calculations are based on a traffic analysis of Simplot's Caldwell potato processing facility. The VMT calculations were correlated to the Caldwell facility's annual finished-product throughput rate then scaled to represent the Aberdeen facility's production rate.

GASOLINE HANDLING

Pollutant	Emission Factor	Emission Factor Unit	Potential to Emit	
			lb/hr	TPY
VOC-Tank Loading	23.2	lb/1000 gallons	0.13	0.56
VOC-Tank Breathing			0.07	0.29

Annual Throughput	48,000	gallons

Emission factors and emission rates provided by J.R. Simplot Company.

Nebraska Boiler Exhaust Flow Calculations

Assumed Natural Gas Composition (% by Volume)	
N2	1.00%
CH4	95.00%
C2H6	3.00%
C3H8	1.00%
C4H10	0.00%

Assume:

20.8 **% O2 in air**
79.2 **% N2 in air**

Combusting 1 ft3 of:

N2	yields	0 ft3 CO2 +	0 ft3 H2O
CH4	yields	1 ft3 CO2 +	2 ft3 H2O
C2H6	yields	2 ft3 CO2 +	3 ft3 H2O
C3H8	yields	3 ft3 CO2 +	4 ft3 H2O
C4H10	yields	4 ft3 CO2 +	5 ft3 H2O

Per natural gas constituent, combustion requires this quantity of oxygen:

N2	0 ft3 O2
CH4	2 ft3 O2
C2H6	4 ft3 O2
C3H8	5 ft3 O2
C4H10	7 ft3 O2

Based on the above gas composition,
1 ft3 of natural gas contains:

0.01 ft3	N2
0.95 ft3	CH4
0.03 ft3	C2H6
0.01 ft3	C3H8
0.00 ft3	C4H10

And requires this quantity of oxygen for combustion:

N2	0.00 ft3	
CH4	1.90 ft3	
C2H6	0.11 ft3	
C3H8	0.05 ft3	
C4H10	0.00 ft3	
	2.06 ft3	Total O2 needed for combustion
	9.88 ft3	Total Air (including O2) needed for combustion
	7.82 ft3	Total N2 in the combustion air

Per natural gas constituent, Combustion Products from 1 ft3 of natural gas:

From:	CO2	H2O	N2
N2-fuel bound	0 ft3	0 ft3	0.01 ft3
N2-air bound	0 ft3	0 ft3	7.82 ft3
CH4	0.95 ft3	1.90 ft3	0 ft3
C2H6	0.06 ft3	0.09 ft3	0 ft3
C3H8	0.03 ft3	0.04 ft3	0 ft3
C4H10	0 ft3	0 ft3	0 ft3
	1.04 ft3	2.03 ft3	7.83 ft3

10.9 ft3 exhaust/ft3 natural gas burned, total
14.3 ft3 exhaust/ft3 natural gas burned, 5% excess O2, total

80 MMBtu/hr, Maximum heat input of boiler
1050 btu/scf, heat content of natural gas
76,190 scf/hour natural gas burned
1,092,114 scf exhaust @ 5% O2/hour
18,202 scf exhaust @ 5% O2/min
26908 acfm exhaust @ 5% O2 and 350 F

Condensing Economizer Exhaust Flow Calculations

Assumed Natural Gas Composition (% by Volume)

N2	1.00%
CH4	95.00%
C2H6	3.00%
C3H8	1.00%
C4H10	0.00%

Assume:

20.8 **% O2 in air**
79.2 **% N2 in air**

Combusting 1 ft3 of:

N2	yields	0 ft3 CO2 +	0 ft3 H2O
CH4	yields	1 ft3 CO2 +	2 ft3 H2O
C2H6	yields	2 ft3 CO2 +	3 ft3 H2O
C3H8	yields	3 ft3 CO2 +	4 ft3 H2O
C4H10	yields	4 ft3 CO2 +	5 ft3 H2O

Per natural gas constituent, combustion requires this quantity of oxygen:

N2	0 ft3 O2
CH4	2 ft3 O2
C2H6	4 ft3 O2
C3H8	5 ft3 O2
C4H10	7 ft3 O2

Based on the above gas composition, 1 ft3 of natural gas contains:

0.01 ft3	N2
0.95 ft3	CH4
0.03 ft3	C2H6
0.01 ft3	C3H8
0.00 ft3	C4H10

And requires this quantity of oxygen for combustion:

N2	0.00 ft3	
CH4	1.90 ft3	
C2H6	0.11 ft3	
C3H8	0.05 ft3	
C4H10	0.00 ft3	
	2.06 ft3	Total O2 needed for combustion
	9.88 ft3	Total Air (including O2) needed for combustion
	7.82 ft3	Total N2 in the combustion air

Per natural gas constituent, Combustion Products from 1 ft3 of natural gas:

From:	CO2	H2O	N2
N2-fuel bound	0 ft3	0 ft3	0.01 ft3
N2-air bound	0 ft3	0 ft3	7.82 ft3
CH4	0.95 ft3	1.90 ft3	0 ft3
C2H6	0.06 ft3	0.09 ft3	0 ft3
C3H8	0.03 ft3	0.04 ft3	0 ft3
C4H10	0 ft3	0 ft3	0 ft3
	1.04 ft3	2.03 ft3	7.83 ft3

10.9 ft3 exhaust/ft3 natural gas burned, total
14.3 ft3 exhaust/ft3 natural gas burned, 5% excess O2, total

80 MMBtu/hr, Maximum heat input of boiler
1050 btu/scf, heat content of natural gas
76,190 scf/hour natural gas burned
1,092,114 scf exhaust @ 5% O2/hour
18,202 scf exhaust @ 5% O2/min
18264 acfm exhaust @ 5% O2 and 70 F

Hot Water Heater Exhaust Flow Calculations

Assumed Natural Gas Composition (% by Volume)	
N2	1.00%
CH4	95.00%
C2H6	3.00%
C3H8	1.00%
C4H10	0.00%

Assume:

20.8 **% O2 in air**
79.2 **% N2 in air**

Combusting 1 ft3 of:

N2	yields	0 ft3 CO2 +	0 ft3 H2O
CH4	yields	1 ft3 CO2 +	2 ft3 H2O
C2H6	yields	2 ft3 CO2 +	3 ft3 H2O
C3H8	yields	3 ft3 CO2 +	4 ft3 H2O
C4H10	yields	4 ft3 CO2 +	5 ft3 H2O

Per natural gas constituent, combustion requires this quantity of oxygen:

N2	0 ft3 O2
CH4	2 ft3 O2
C2H6	4 ft3 O2
C3H8	5 ft3 O2
C4H10	7 ft3 O2

Based on the above gas composition,
1 ft3 of natural gas contains:

0.01 ft3	N2
0.95 ft3	CH4
0.03 ft3	C2H6
0.01 ft3	C3H8
0.00 ft3	C4H10

And requires this quantity of oxygen for combustion:

N2	0.00 ft3	
CH4	1.90 ft3	
C2H6	0.11 ft3	
C3H8	0.05 ft3	
C4H10	0.00 ft3	
	2.06 ft3	Total O2 needed for combustion
	9.88 ft3	Total Air (including O2) needed for combustion
	7.82 ft3	Total N2 in the combustion air

Per natural gas constituent, Combustion Products from 1 ft3 of natural gas:

From:	CO2	H2O	N2
N2-fuel bound	0 ft3	0 ft3	0.01 ft3
N2-air bound	0 ft3	0 ft3	7.82 ft3
CH4	0.95 ft3	1.90 ft3	0 ft3
C2H6	0.06 ft3	0.09 ft3	0 ft3
C3H8	0.03 ft3	0.04 ft3	0 ft3
C4H10	0 ft3	0 ft3	0 ft3
	1.04 ft3	2.03 ft3	7.83 ft3

10.9 ft3 exhaust/ft3 natural gas burned, total
12.7 ft3 exhaust/ft3 natural gas burned, 3% excess O2, total

4.95 MMBtu/hr, Maximum heat input of hot water heater
1050 btu/scf, heat content of natural gas
4,714 scf/hour natural gas burned
60,024 scf exhaust @ 3% O2/hour
1,000 scf exhaust @ 3% O2/min
1441 acfm exhaust @ 3% O2 and 300 F

APPENDIX C

Modeling Protocol Approval

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

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

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

January 8, 2008

Kyle Heitkamp
Geomatrix Consultants
Lynnwood, Washington

RE: Modeling Protocol for the J.R. Simplot Company Proposed Biogas Burner at their Facility in Aberdeen, Idaho

Kyle Heitkamp:

DEQ received your dispersion modeling protocol via email on January 2, 2008. The modeling protocol was submitted on behalf of J.R. Simplot Company (Simplot). The modeling protocol proposes methods and data for use in the ambient impact analyses associated with a Permit to Construct application for a modification to the Nebraska boiler, enabling the combustion of biogas, at their facility in Aberdeen, Idaho.

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

- Comment 1: 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 or measured. If parameters are based on source test results, the date of the test should be provided. In most instances, applicants should use typical parameters, not maximum temperatures and flow rates.

- Comment 2: The proposed receptor grid appears reasonable. However, it is the applicant's responsibility to use a sufficiently tight receptor network such that the maximum modeled concentration is reasonably resolved. If DEQ conducts verification modeling analyses with a tighter receptor grid and compliance with standards is no longer demonstrated, the permit will be denied.

- Comment 3: The protocol did not specify the dates used for the meteorological data. The most recent five years of available meteorological data should be used unless otherwise approved by DEQ.

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 (including BPIP and AERMAP input and output files) are submitted with an analysis report. 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

APPENDIX D

Modeling Analysis Compact Disk