

**Technical Consultant: Daniel Robb**

**Project Participant: Aurora Ridge Dairy - 114N**

**1<sup>st</sup> visit: 12/4/2009**

All monitoring instrumentation was inspected to insure that it is accurately installed and that it reliably measures the required data. The monitoring equipment is installed in the correct location, and meter readings were verified with one time measurements.

The Sage flow meter recording total flow was displaying an error code, and the value (in red) doesn't add up based on the flare and engine flows. This is not a major concern since we are only interested in, and getting data from, the Sage meter measuring engine flow.

**2<sup>nd</sup> visit: 4/6/2010**

All monitoring equipment is in same location and operating correctly. No changes were observed with the genset, electric panels, or meters. Speaking with Jason Burroughs, the facilities crops manager who maintains the digester, everything has been running well with two minor changes. First, the digester temperature was increased from 101°F to 103°F. This increased biogas production and helped the H<sub>2</sub>S removal system run better. Secondly, manure was exceptionally dry which caused pumping issues. Since less manure was going into the digester biogas production dropped, causing generator output to drop from 500 kW to as low as 400 kW. (Between 5/1/2010 and 5/10/2010)

**3<sup>rd</sup> visit: 7/15/2010**

All monitoring equipment is in same location and operating correctly. No changes were observed with the genset or electric panels. The biogas flow meters were just cleaned in the beginning of July. The farm exports only ¼ of the electricity produced during summer months, and ½ or more during winter months.

**4<sup>th</sup> visit: 11/2/2010**

All monitoring equipment is in same location and operating correctly. No changes were observed with the genset or electric panels. Farm is generating more gas, which has to be flared due to NYSEG not allowing them to generate over 500kW. Talk of dedicated lines being run to farms to accept power to grid, which would let them increase generator set point and use the extra gas.

**5<sup>th</sup> visit: 3/16/2011**

All monitoring equipment is in same location and operating correctly. No changes were observed with the genset or electric panels.

**6<sup>th</sup> visit: 8/4/2011**

All monitoring equipment is in the same location and operating correctly. No changes were observed with the genset or electrical panels.

**7<sup>th</sup> visit: 11/18/2011**

All monitoring equipment is in the same location and operating correctly. No changes were observed with the genset or electrical panels.

**8<sup>th</sup> visit: 1/17/2012**

All monitoring equipment is in the same location and operating correctly. No changes were observed with the genset or electrical panels.

**9<sup>th</sup> visit: 5/23/2012**

All monitoring equipment is in the same location and operating correctly. No changes were observed with the genset or electrical panels.

**10<sup>th</sup> visit: 8/23/2012**

All monitoring equipment is in the same location and operating correctly. No changes were observed with the meters, genset, or electrical panels. The unit had been shut down for cleaning and repairs to be made to the digester heating and biogas recirculation piping since 8/15/12, with an unspecified date for restart.

**11<sup>th</sup> visit: 11/7/2012**

All monitoring equipment is in the same location and operating correctly. No changes were observed with the meters, genset, or electrical panels. The unit had been shut down for cleaning and repairs to be made to the digester heating and biogas recirculation piping since 8/15/12, and was back up and running on 10/10/12.

**Aurora Ridge Dairy - Quarterly M&V**

Notes	12/4/2009	4/6/2010	7/15/2010	11/2/2010	3/15/2011	8/4/2011	11/18/2011	1/17/2012	5/23/2012	8/23/2012	11/7/2012
Run Times (GHD panel)											
Genset (hrs)	1,681.4	2,112.1	3,779.8	5,935.8	9,013.8	12,042.7	14,407.8	15,836.3	18,848.2	20,679.0	21,344.0
Main Heat Zone (hrs)	680.1	850.8	888.0	934.7	1,192.1	1,234.4	1252.3	1,273.9	1,338.2	1,428.1	2,369.3
Heat Zone 1 (hrs)	1,017.8	1,111.2	1,112.1	1,112.1	1,112.1	1,112.1	1,112.1	1,112.1	1,112.1	1,112.1	1,112.1
Heat Zone 2 (hrs)	2,264.5	5,015.3	6,954.4	8,911.3	11,633.7	14,708.7	17,002.5	18,443.1	21,460.3	23,132.5	24,306.8
Heat Zone 3 (hrs)	1,116.1	2,720.7	3,116.9	4,030.3	6,972.3	8,754.2	9,933.8	11,111.6	11,116.1	11,116.1	11,116.1
Heat Zone 4 (hrs)	342.9	622.7	681.5	725.2	2,427.5	3,401.3	3,812.5	4,978.2	6,813.4	6,835.3	7,701.5
Barn Heat (hrs)	4.8	211.3	938.0	1,011.5	1,111.3	1,111.3	1,111.3	1,111.3	1,111.3	1,111.3	1,111.3
Engine Blower (hrs)	2,000.4	2,000.4	2,000.7	2,000.7	2,000.8	2,000.6	2,000.1	2,000.9	2,000.9	2,000.9	2,000.9
Turbo Cooler (hrs)	2,080.3	5,028.0	7,420.5	10,061.1	13,158.8	16,538.2	19,078.2	20,519.1	23,557.9	25,574.4	26,242.2
Effl. Mix Pit (hrs)	178.7	244.8	371.4	670.3	835.8	835.8	835.8	835.8	835.8	835.8	838.0
Sludge Pump (hrs)	1,919.4	3,695.0	3,695.0	3,695.0	3,695.0	3,695.0	3,695.0	3,695.0	3,695.0	3,695.0	3,695.0
Crankcase Blower (hrs)	2,090.9	2,404.3	2,404.3	2,404.3	2,404.3	2,404.3	2,404.3	2,404.3	2,404.3	2,404.3	3,072.1
Gen-Tec Panel											
Engine Power (kW)	439-442	455.0	500.0	498-502	495-503	464.0	455.0	430.0	546.0	-	-
Fluke											
	* Measure power on one conductor, and multiply by 4										
Engine Power (kW)	360.0	-									
	* Measured on 110 A, others were 130 A, 112 A, and 117 A										
Sage Flow Meters											
Engine Flow (cfm)	Serial #: 47135	149.5	163.0	174.5	170.7	176.5	170.6	174.0	219.0	207.0	-
Flare Flow (cfm)	Serial #: 47136 Serial #: 46206	2.5	4.1	37.0	33.1	21-85	3.6	19.8	9.0	13.4	-
	*Meter displaying error code										
Total Flow (cfm)	183.0	183.0	-	-	-	-					
Carbon Catcher											
Engine Flow (cfm)	148.0	171.0	175.0	171.0	177.0	194.0	187.0	218.0	205.0	-	209.0
Engine Flow (cf)	10,441,270	38,246,790	61,599,125	87,724,934	116,999,085	151,874,530	179,875,898.0	196,471,221.0	233,762,445.0	258,902,260.0	266,506,527.0
Flare Flow (cfm)	3.0	5.0	40.0	35.0	22.0	4.0	19.0	9.0	13.0	1.0	2.0
Flare Flow (cf)	581,058.0	2,010,347.0	3,119,640.0	6,607,808.0	12,567,770.0	17,920,021.0	21,224,274.0	23,565,932.0	27,163,378.0	29,383,328.0	30,682,108.0
Total Flow (cfm)	151.0	-	-	-	-	-	-	-	-	-	-
Total Flow (cf)	13,011,861.0	-	-	-	-	-	-	-	-	-	-
Engine Power (kW)	439.0	451.0	-	-	-	-	-	-	-	-	-
Engine Power (kWh)	894,644	2,223,351	3,341,763	4,593,169	6,027,898	7,650,065	8,990,863.0	9,795,596.0	11,520,526.0	12,607,416.0	12,935,894.0
Temperatures											
Tank		180	177	165	165	179	166.0	170.0	171.0	76.0	159.0
Main Heat Zone (F)		150	139	142	132	149	134.0	139.0	154.0	71.0	139.0
Heat Zone #1 (F)		102	103	96	99	104	99.0	101.0	102.0	113.0	102.0
Heat Zone #2 (F)		103	104	102	100	103	99.0	101.0	104.0	114.0	103.0
Heat Zone #3 (F)		104	104	103	100	103	102.0	102.0	103.0	111.0	103.0
Heat Zone #4 (F)		104	103	103	101	103	102.0	102.0	103.0	102.0	102.0
One Time Measurements											
Parasitic Loads											
House Panel (kW)	2.3										
Pump Panel (kW)	23.5										
VFD - Dump Radiator (kW)	2.1										
Hot water circulation pump (kW)	0.1										
Circuit Breaker #7 (kW)	3.7										
CHP Power - Gen-Tec Panel (kW)	0.1										
Vent Fans (kW)	1.6										
House Panel (A)	4-5										
Pump Panel (A)	30.0										
VFD - Dump Radiator (A)	2.0										
Hot water circulation pump (A)	-										
Circuit Breaker #7 (A)	8.0										
CHP Power - Gen-Tec Panel (A)	0.1										
Vent Fans (A)	2.0										