Environmental Consulting & Technology, Inc.

January 13, 2014
ECT No. 101084-0300

Mr. Leonard Fagan
Vice President of Engineering
Energy Management, Inc.
P.O. Box 10129
Tallahassee, Florida 32302-2129

Re: Noise Measurement Results—Gainesville Renewable Energy Center; Gainesville, Florida

Dear Mr. Fagan:

Environmental Consulting & Technology, Inc. (ECT), is submitting this letter report that summarizes the background, methodology, and results of noise measurements conducted at the Gainesville Renewable Energy Center (GREC) facility and Turkey Creek residential subdivision.

BACKGROUND

The GREC facility is located north of Gainesville, Florida, and north of U.S. Highway 441 (U.S. 441), adjacent to the existing Gainesville Regional Utilities (GRU) Deerhaven power plant (Figure 1). GREC is a nominal 100-megawatt (MW) biomass-fueled electrical generating station. Construction of the plant was completed in the August/September 2013 time frame, and the plant commenced initial operation.

Initially, ECT was contracted to conduct noise measurements at several locations within the GREC facility and at several locations within the neighboring Turkey Creek residential subdivision prior to and during initial startup of the plant. The objective of conducting the noise measurements was to assess the impact of noise generated during initial operation of the plant as compared to noise levels without the plant in operation.

In December 2013, GREC installed noise control equipment in the main exhaust stack, and ECT subsequently conducted additional noise measurements both within the GREC facility and in the Turkey Creek residential subdivision. The objective of conducting these noise measurements was to assess the effect of the noise control equipment with the GREC facility and in the Turkey Creek residential subdivision.

METHODOLOGY

Noise measurements were conducted using either a Quest™ 1800, Quest™ 2800, or Larson Davis 831 integrating sound level meter with settings at sound pressure level (SPL) mode, A-weighting, slow response, and a decibel (dB) range typically set at 40 to

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100 dB. A wind screen was used to minimize the effect of noise due to the wind. The sound level meter was calibrated prior to use, and calibration was again verified at the conclusion of measurement activities. Attachment A contains copies of the calibration certificates for the sound level meters and calibrators. The Quest™ 2800 was equipped with an octave band filter, and instantaneous noise measurements were taken in 10 octave bands from 31.5 to 8,000 Hertz (Hz). The Larson Davis 831 model contains an internal frequency analyzer that can continuously measure and log data from the noise measurements in full octave bands and one-third octave bands.

Instantaneous noise measurements were recorded when the sound pressure levels reached a steady-state condition, i.e., when the sound pressure levels fluctuated within approximately 1 to 2 A-weighted decibels (dBA). Intermittent noise sources, such as vehicle traffic, that contributed to an increased instantaneous SPL were allowed to subside before recording the SPL.

On Monday, August 26, 2013, I met Mr. Bob Donahoe, Vice President, Environmental Services, American Renewables, at the main guard house at approximately 9 p.m. The Quest™ 2800 sound level meter was used to perform the noise measurements. Onsite noise measurements were taken at four onsite locations, which were selected to be in the same general area as the four locations of the 24-hour ambient noise measurements conducted in 2009. Five offsite locations were selected in the Turkey Creek residential subdivision. These noise measurement locations are described as follows and are graphically represented on Figure 2:

Measurement Location	Description
Onsite noise measurement locations	
1	East of the power block, slightly northeast of the cooling tower
2	North of the power block at the fence line
3	West of the guard house
4	Along railroad tracks adjacent to entrance from U.S. 441 along the southern fence line
Offsite noise measurement locations in Turkey Creek subdivision	
5	As shown on Figure 2
6	As shown on Figure 2
7	As shown on Figure 2
8	As shown on Figure 2
9	As shown on Figure 2

Although the plant was not in operation, the cooling tower recirculation pumps were operating, and a vacuum truck was operating in the general vicinity of the power block.

These noise sources were shut down temporarily while noise measurements were performed at all four onsite measurement locations.

Noise measurements were also conducted at five locations within the Turkey Creek residential subdivision located to the south of U.S. 441 (Figure 2). These locations were selected based on proximity to the plant or in the general proximity of a residential address that had filed or voiced a complaint regarding noise. The noise measurements concluded at approximately 10:30 p.m.

On Thursday, August 29, 2013, I met Mr. Donahoe at the main guard house at approximately 8 p.m. to take noise measurements at the four onsite locations and five offsite locations in the Turkey Creek residential subdivision. The Quest™ 1800 sound level meter was used to perform the noise measurements. The plant was operating at approximately 70-percent load combusting wood. There was minimal activity in the woodyard, as these operations typically cease at approximately 7:30 p.m. with only the woodyard reclaimer in operation. The noise measurements concluded at approximately 9:30 p.m.

On Wednesday, September 18, 2013, I met Mr. Donahoe at the main guard house at approximately 11 a.m. to take daytime noise measurements within the GREC facility power block area and woodyard while the plant was operating at approximately 100-percent load. Figure 3 provides a graphical representation of the noise measurement receptor locations. The GREC facility was producing 103.9 MW (net), and the woodyard, which typically operates between 7 a.m. and 7 p.m., was in operation. The purpose of these noise measurements was to obtain noise readings from various noise sources within the plant. To perform these measurements, ECT used a Quest™ 2800 sound level meter equipped with a Quest™ OB-50 octave band analyzer. Overall SPL readings were taken in units of dBA and C-weighted decibels (dBC). In addition, SPL readings were conducted for each of the nine octave bands, starting with the lowest octave band with a center frequency of 31.5 hertz (Hz) and increasing to the highest octave band with a center frequency of 8,000 Hz. The noise measurements concluded at approximately 1:30 p.m.

On Wednesday, September 18, 2013, Mr. Donahoe and I met at approximately 9:30 p.m. to take nighttime noise measurements at several fenceline receptors (identified as receptors A thru E on Figure 2) and at the five offsite locations in the Turkey Creek residential subdivision. In addition, a nighttime noise measurement was also performed between the reclaimer and the drag chains with the woodyard not in operation to assess the noise impact from the woodyard at this location. Noise measurements performed within the GREC facility, including the fenceline receptors, included instantaneous full octave band noise readings. Overall noise measurement readings, in units of dBA, were taken within the Turkey Creek residential subdivision.

On Monday, December 16, 2013, I met Mr. Paul Nist, Manager of Construction for American Renewables, at approximately 9 p.m. to conduct noise measurements at the same five offsite locations in the Turkey Creek residential subdivision where noise measurements were conducted on September 18, 2013. The purpose of these noise measurements was to assess the impact of the noise control equipment that was installed in the GREC exhaust stack to previous noise measurements in the Turkey Creek residential subdivision. Noise measurements were conducted at each of the five locations in Turkey Creek using a Larson Davis 831 sound level meter. Noise measurements were conducted continuously at each location for a 5-minute period with noise measurements recorded in full and one-third octave bands every 10 seconds. The overall equivalent sound pressure level measured in units of A-weighted decibels (LA_{eq}) was measured for the entire 5-minute period.

The results of the noise measurements conducted in the Turkey Creek residential subdivision are summarized in the following table and discussed in further detail in the following paragraphs:

Date:	08/26/13	08/29/13	09/19/13	12/16/13
Time:	10 p.m.	9 p.m.	12 a.m.	9 p.m.
Plant Status:	Not in Operation	Operational 70-Percent Load	Operational 100-Percent Load	
			Pre-Noise Control	Post-Noise Control
Location	Results (dBA)			
5	50	51	50 to 58	50
6	48	48	54 to 55	51
7	50	45	48 to 52	52
8	48	48	49 to 51	47
9	54	51	44 to 45	49

On Tuesday, December 17, 2013, I again met with Mr. Nist at the GREC facility at approximately 12:30 p.m. to conduct noise measurements on the roof of the boiler building adjacent to the top of the exhaust stack. Noise measurements were conducted using the Larson Davis 831 sound level meter and were taken continuously for a 15-minute period with noise measurements recorded in full and one-third octave bands every 10 seconds. The overall LA_{eq} was measured for the entire 15-minute period. Figure 4 presents a photograph of the access platform on the boiler building roof where noise measurements were conducted.

RESULTS

The noise measurement results from ***Monday, August 26, 2013***, with the plant not in operation are summarized in the following table and presented graphically in Figure 5:

Measurement Location	Noise Level (dBA)	Comments
Onsite Noise Measurement Locations		
1	57	
2	52	Crickets
3	47	Crickets
4	54	57 to 58 dBA passing car 60 to 61 dBA passing truck
Offsite Noise Measurement Locations in Turkey Creek		
5	50	Residence air conditioner running
6	48	
7	50	Residence air conditioner running
8	48	
9	54	Residence air conditioner running

The noise measurement results from ***Thursday, August 29, 2013***, with the plant operating at approximately 70-percent load are summarized in the following table and presented graphically in Figure 6:

Measurement Location	Noise Level (dBA)	Comments
Onsite noise measurement locations		
1	74	
2	60	
3	57	
4	51	57 to 60 dBA car traffic
Offsite noise measurement locations in Turkey Creek		
5	51	
6	48	
7	45	
8	48	
9	51	

The daytime noise measurement results from ***Wednesday, September 18, 2013***, with the plant operating at approximately 100-percent load and the woodyard in operation are summarized in the following table. These noise measurement locations were within the GREC facility power block area and woodyard:

Location	Description	Octave Band Center Frequency (Hz)									Results	
		31.5	63	125	250	500	1,000	2,000	4,000	8,000	dBA	dBC
F1	Approximately 6 ft from ID fan at grade	93	91	87	82	76	74	76	79	74	85	96
F2	Platform 123 ft above grade adjacent to DA vents	87	85	81	86	82	80	77	76	73	85	93
F3	Stack platform (Level 9, 156 ft above grade)	89	91	89	84	76	72	70	69	60	81	95
F4	Southwest corner platform (Level 9, 156 ft above grade)	90	90	81	77	73	71	69	65	56	78	93
F5	Fuel silo motor–east (70 ft above grade)	88	87	84	83	79	77	77	83	67	91	94
F6	Fuel silo motor–west (70 ft above grade)	88	86	81	85	78	74	77	79	70	85	93
F7	Platform adjacent to stacker/ reclaimer control booth	79	78	78	75	77	76	77	82	72	86	88
F8	Between drag chain and reclaimer at grade	84	80	80	73	70	70	72	77	60	80	87
F9	Platform; drag chains to hog screen building	77	91	96	76	77-78	76-80	83-84	96-97	77-80	92-99	99-100
F10	Woodyard dust collector at grade	83	83	86	84	85	84	78	75	65	87-88	92

The nighttime noise measurement results from ***Wednesday night, September 18, through Thursday morning, September 19, 2013***, with the plant operating at approximately 100-percent load and the woodyard not in operation are summarized in the following table and presented graphically in Figure 7. These noise measurement locations were at several fenceline receptors and at five offsite locations in the Turkey Creek residential subdivision:

Location	Description	Approximate Time	Octave Band Center Frequency (Hz)									Results	
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	dBA	dBC
F8	Between drag chain and reclaimer	10.01 p.m.	71	69	68	63	62	55	56	54	39	72	76
4	Fenceline		62	62	63	48	49	48	37	38	38	51	65
A	Fenceline		66	68	67	54	58	52	47	40	40	53-59	76
B	Fenceline	10:44 p.m.	63	62	56	53	49	47	42	43	46	55	71
C	Fenceline	10:50 p.m.	63	61	55	48	45	44	38	36	41	50	66
D	Fenceline		66	63	60	52	52	45	43	40	43	54	68
E	Fenceline		77	73	63	56	53	46	43	40	43	55-61	78
3	Fenceline	11:20 p.m.	66	64	57	50	54	47	41	45	44	53	70
5	Turkey Creek	12:00 a.m.										50-58	
6	Turkey Creek	12:10 a.m.										54-55	
7	Turkey Creek	12:15 a.m.										48-52	
8	Turkey Creek	12:20 a.m.										49-51	
9	Turkey Creek	12:30 a.m.										44-45	

Note: Plant operational at 103.9 MW net electrical output.
Quest™ Model 2800 with OB-50 octave band analyzer.

The noise measurements conducted on December 16, 2013, at the five offsite locations in the Turkey Creek residential subdivision with the plant operating at 100-percent load and after noise control equipment was installed in the main boiler exhaust stack are summarized in the following table and presented graphically in Figure 8:

Measurement Location	Approximate Time	Noise Level (dba)
5	9:15 p.m.	50
6	9:30 p.m.	51
7	9:45 p.m.	52
8	9:55 p.m.	47
9	10:10 p.m.	49

The noise measurements conducted on December 17, 2013, on the roof of the boiler building with the plant operating at 100-percent load and after noise control equipment was installed in the main boiler exhaust stack are summarized in the following table and presented graphically in Figure 9:

Location	Description	Approximate Time	Octave Band Center Frequency (Hz)									Results	
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	dBA	dBC
Boiler building roof	Adjacent to top of exhaust stack	1:30 p.m.	80	71	70	62	53	51	47	36	27	63	87

Ambient noise levels can be affected on a daily basis by a number of causes, including time of day, day of the week, weather conditions, insect or animal noise, vehicular traffic, etc. While every attempt was made to reduce any impact from intermittent noise sources, ECT noted several conditions that may have affected these ambient noise measurements. First, when noise measurements were taken on Monday, August 26, without the plant in operation, insect noises that evening seemed predominant. During the noise measurements on Thursday, August 29, insect noises did not seem as predominant. During noise measurements on both evenings, residential air conditioners were in operation and contributed to the noise measurements at the Turkey Creek residential subdivision locations. During noise measurements on Monday, December 16, there was no perceivable noise from either insects or residential air conditioners. Both the noise from insects, including crickets, and the noise generated from residential air conditioners are normal noise sources in residential locations. These, however, should be considered, when comparing noise measurements at the same location but on different dates or times.

If you have any questions regarding these noise measurements, please contact me at 352/332-0444 or bkarl@ectinc.com.

Sincerely,

ENVIRONMENTAL CONSULTING & TECHNOLOGY, INC.

William F. Karl, P.E.
Senior Engineer

WFK/dlm

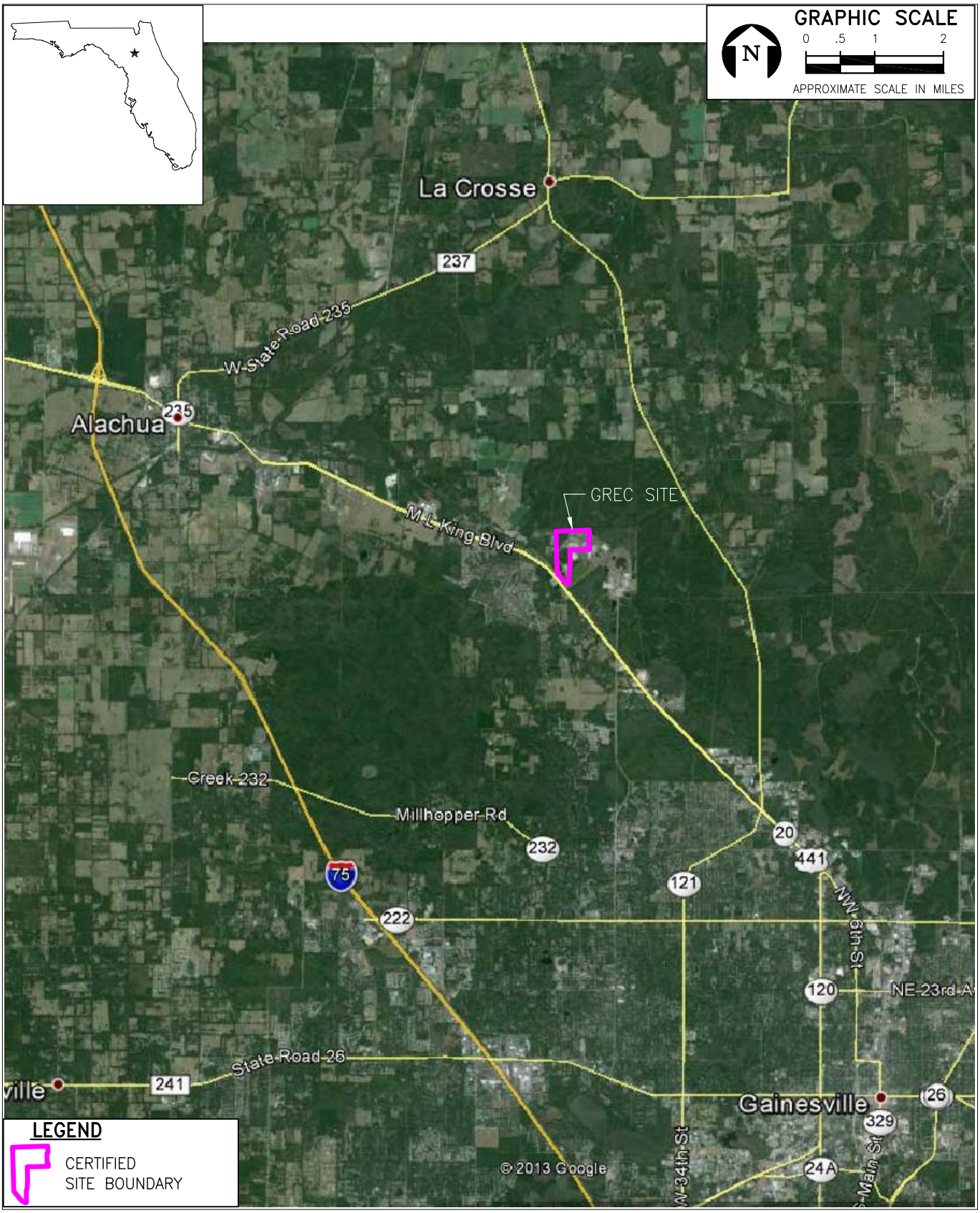

FIGURE 1.

GREC SITE LOCATION MAP

Source: Google Earth, 2012; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

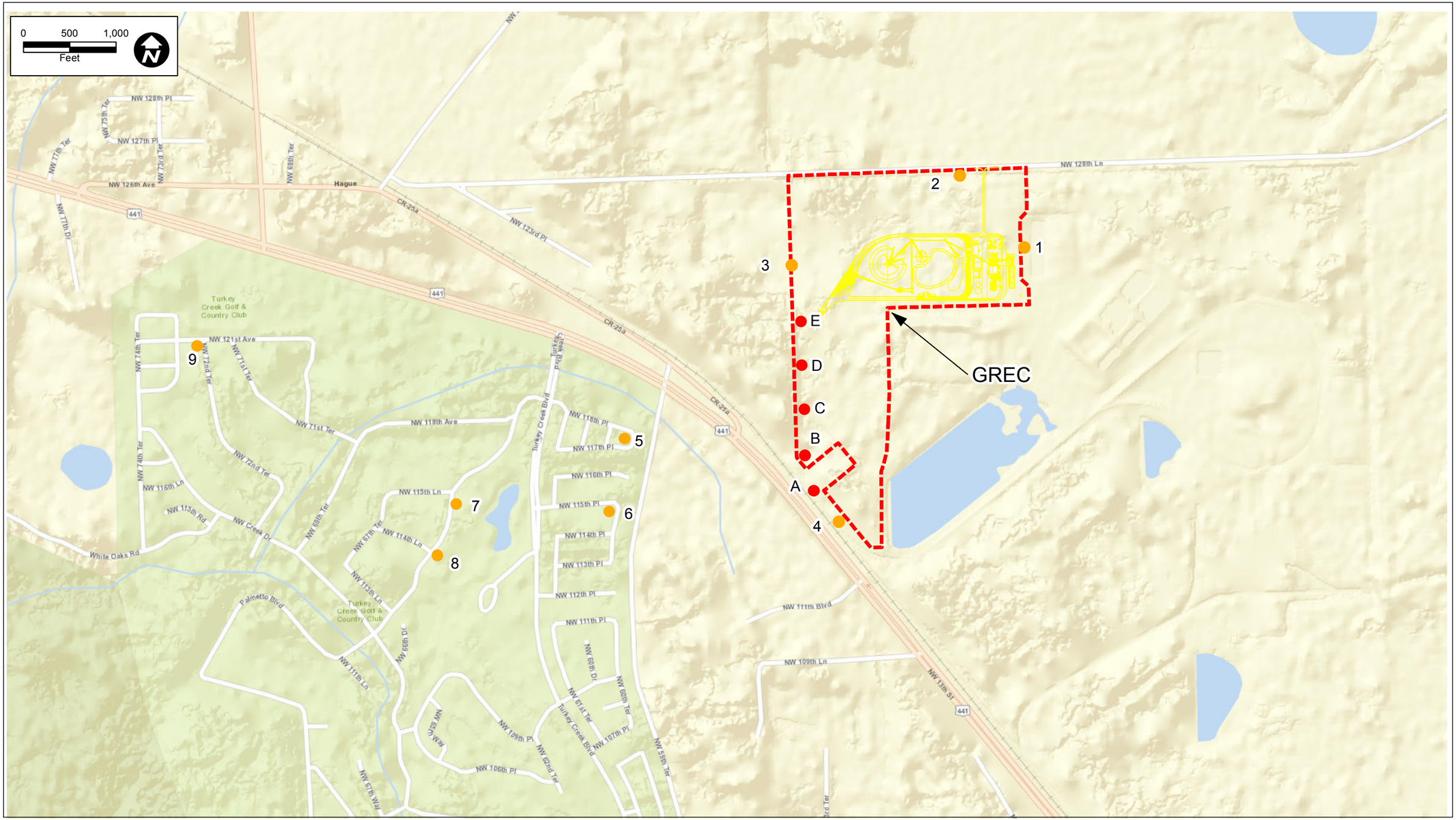

FIGURE 2.
GAINESVILLE RENEWABLE ENERGY CENTER
FENCELINE AND OFFSITE NOISE RECEPTORS

Sources: ECT, 2013.

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GRAPHIC SCALE
0 30 60 120
SCALE IN FEET

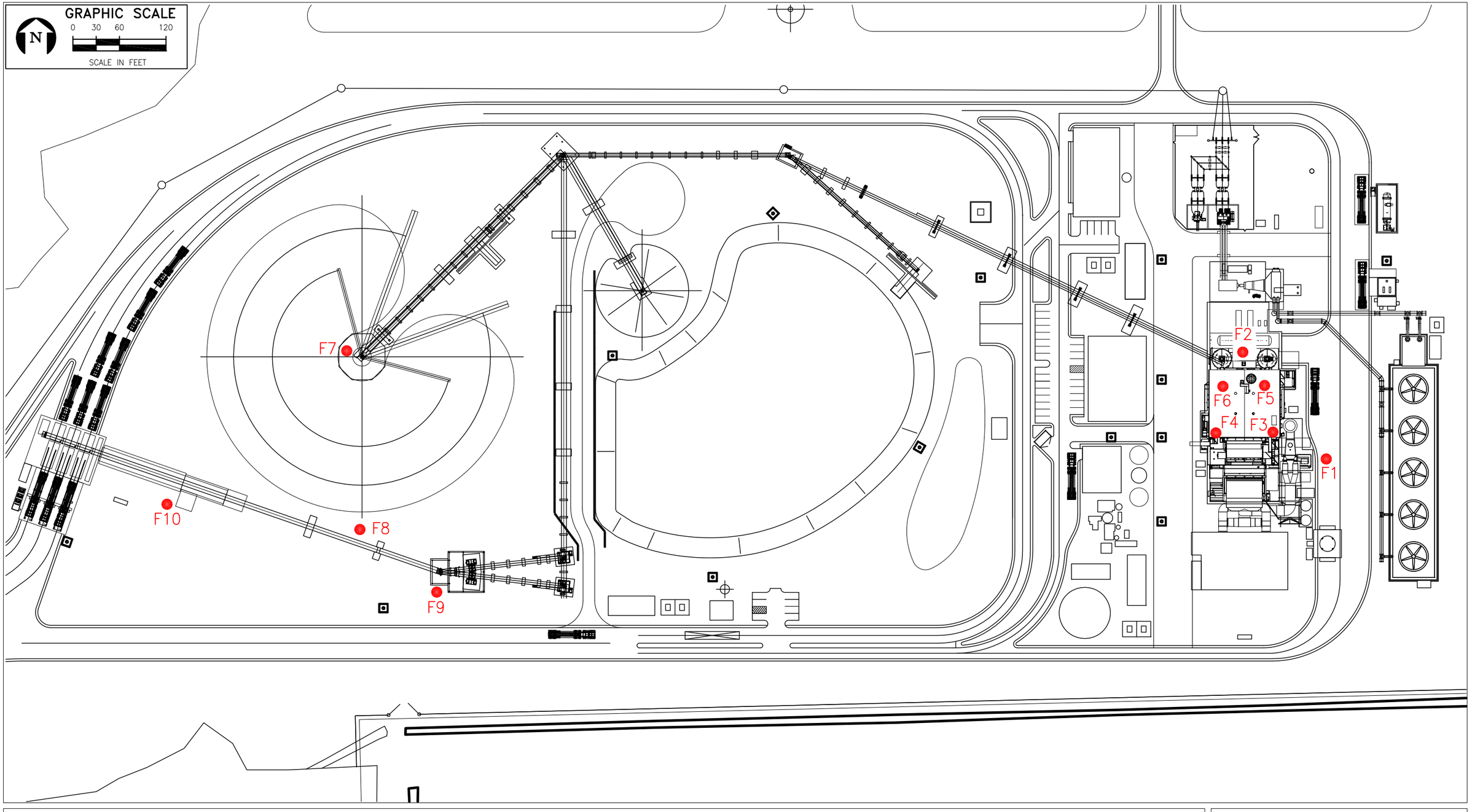


FIGURE 3.

GAINSVILLE RENEWABLE ENERGY CENTER

POWER BLOCK AND WOODYARD NOISE RECEPTORS

Source: Zachary, 2009; EDA, 2009, Genesis, 2009; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

FIGURE 4.

PHOTOGRAPH SHOWING BOILER BUILDING ROOF NOISE RECEPTOR LOCATION

Source: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

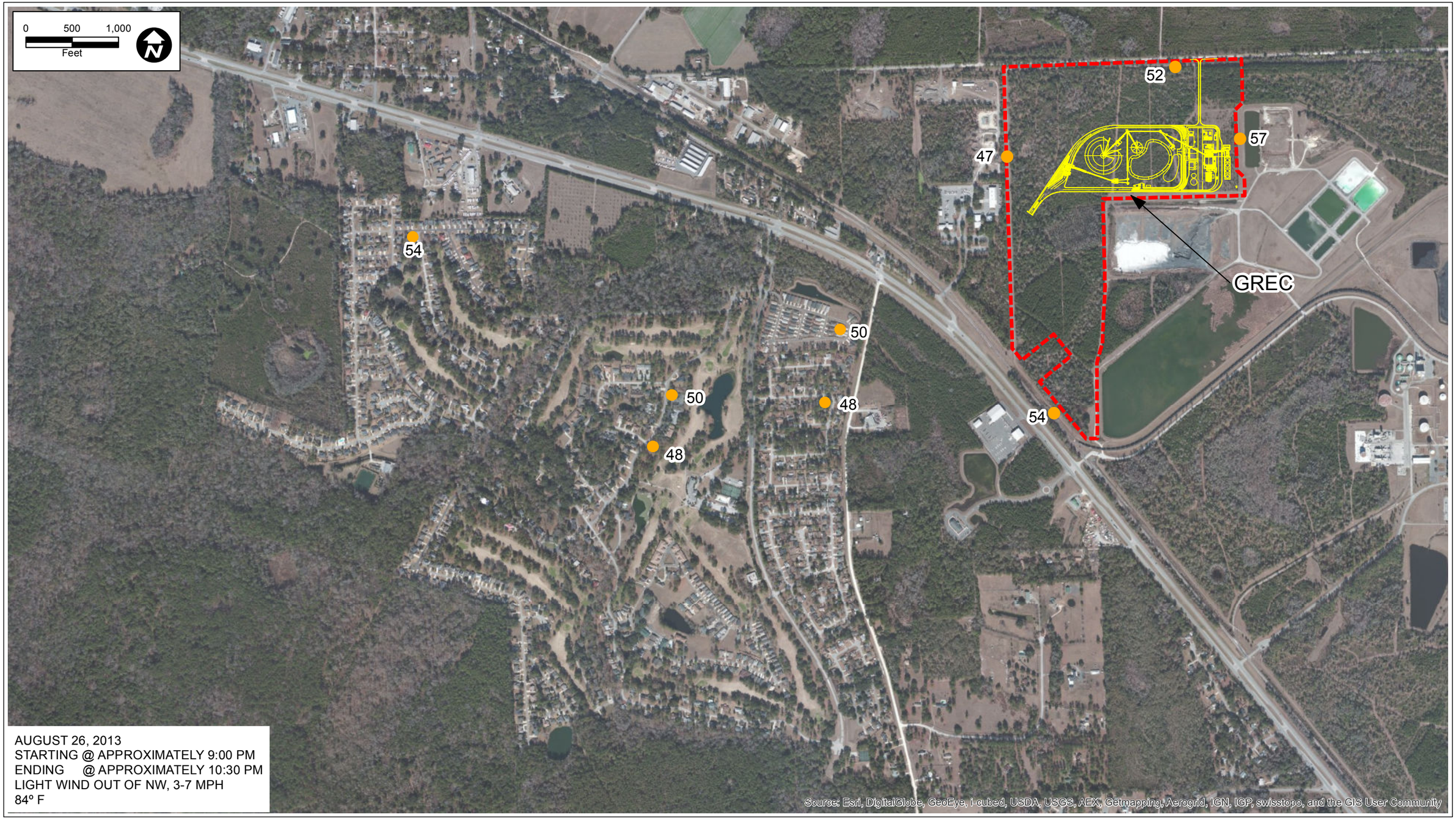


FIGURE 5.
GAINESVILLE RENEWABLE ENERGY CENTER
NOISE READINGS WITHOUT PLANT IN OPERATION

Sources: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

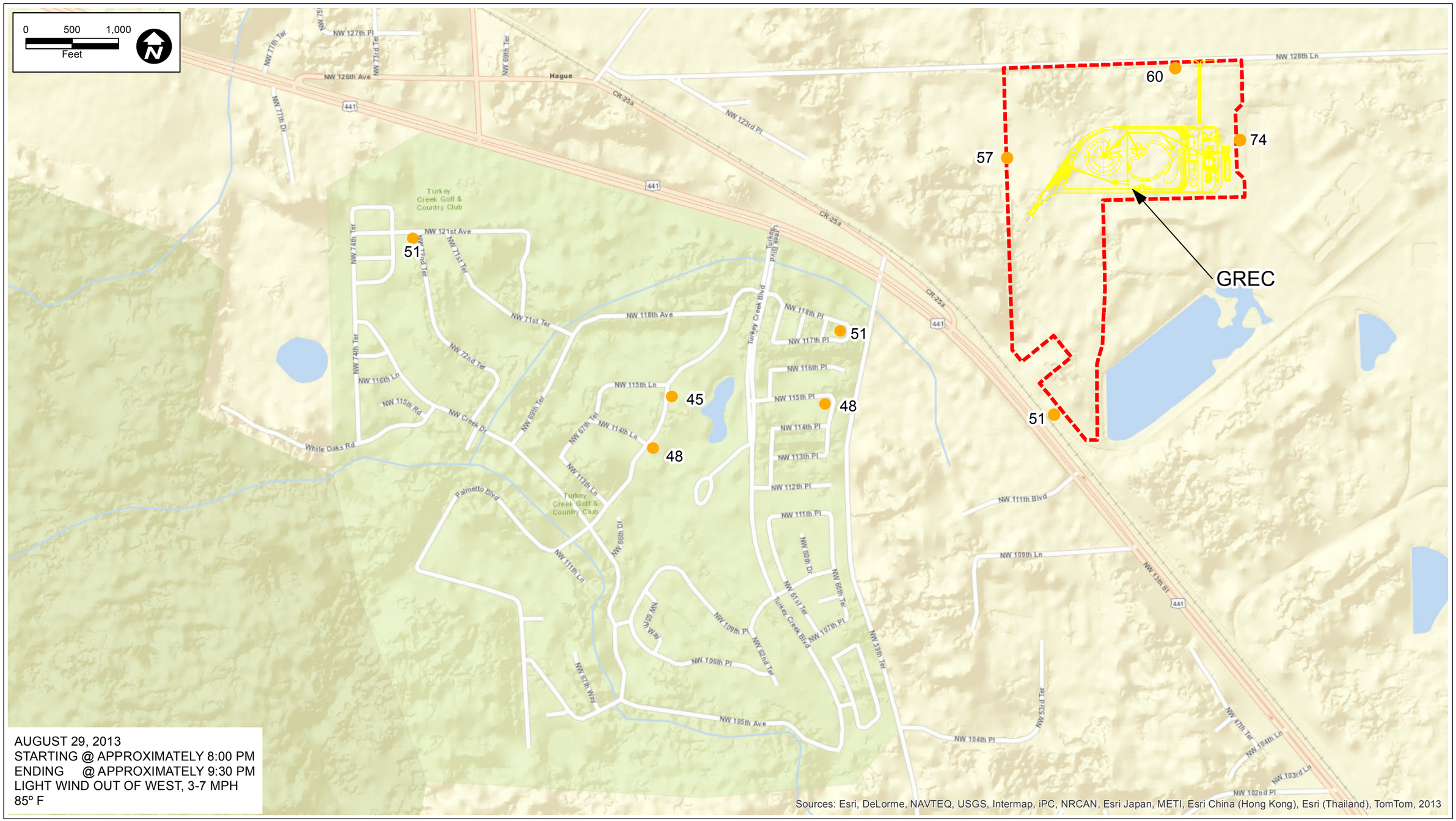


FIGURE 6.
GAINESVILLE RENEWABLE ENERGY CENTER
NOISE READINGS WITH PLANT IN OPERATION (70% LOAD)

Sources: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

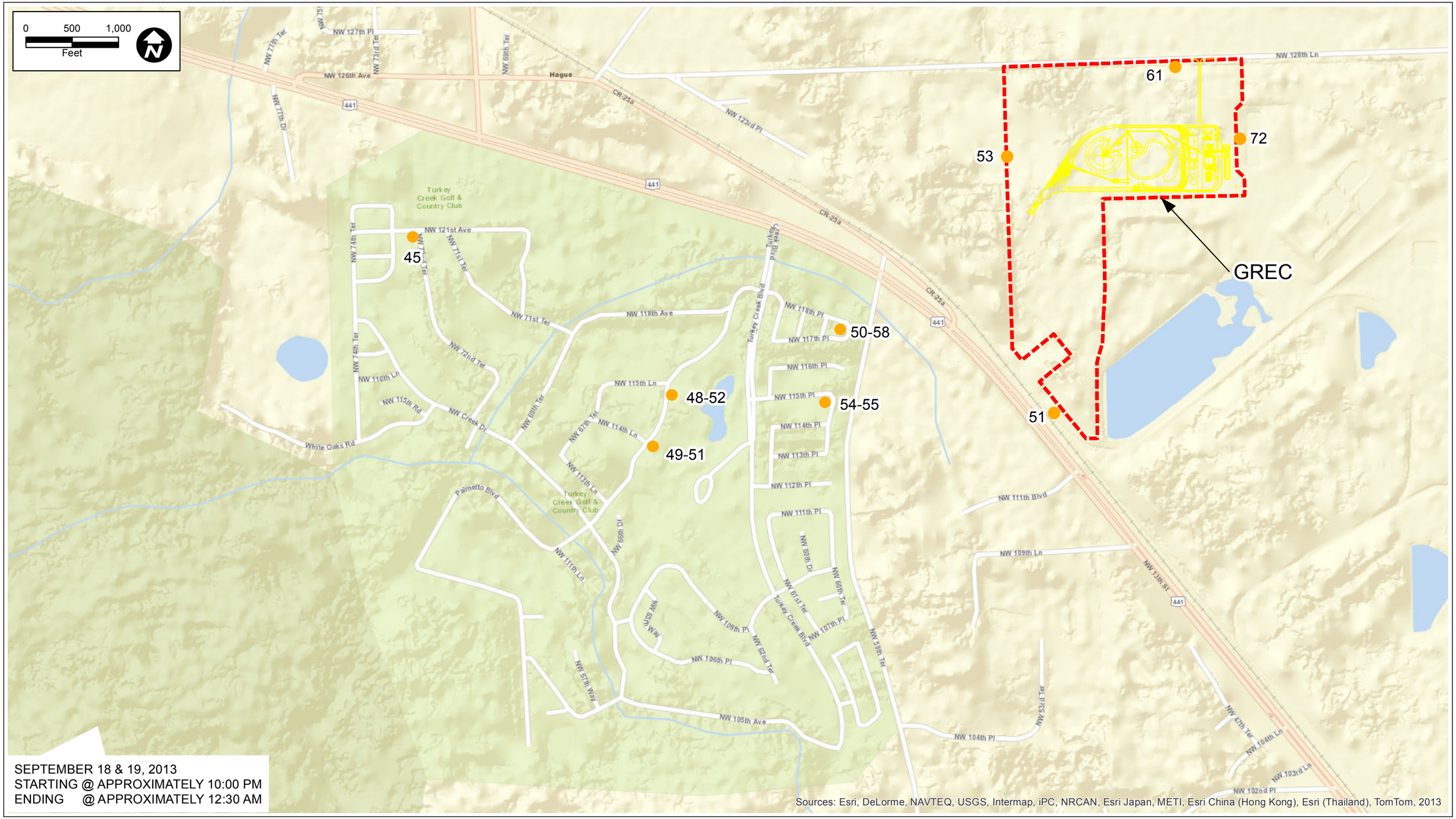
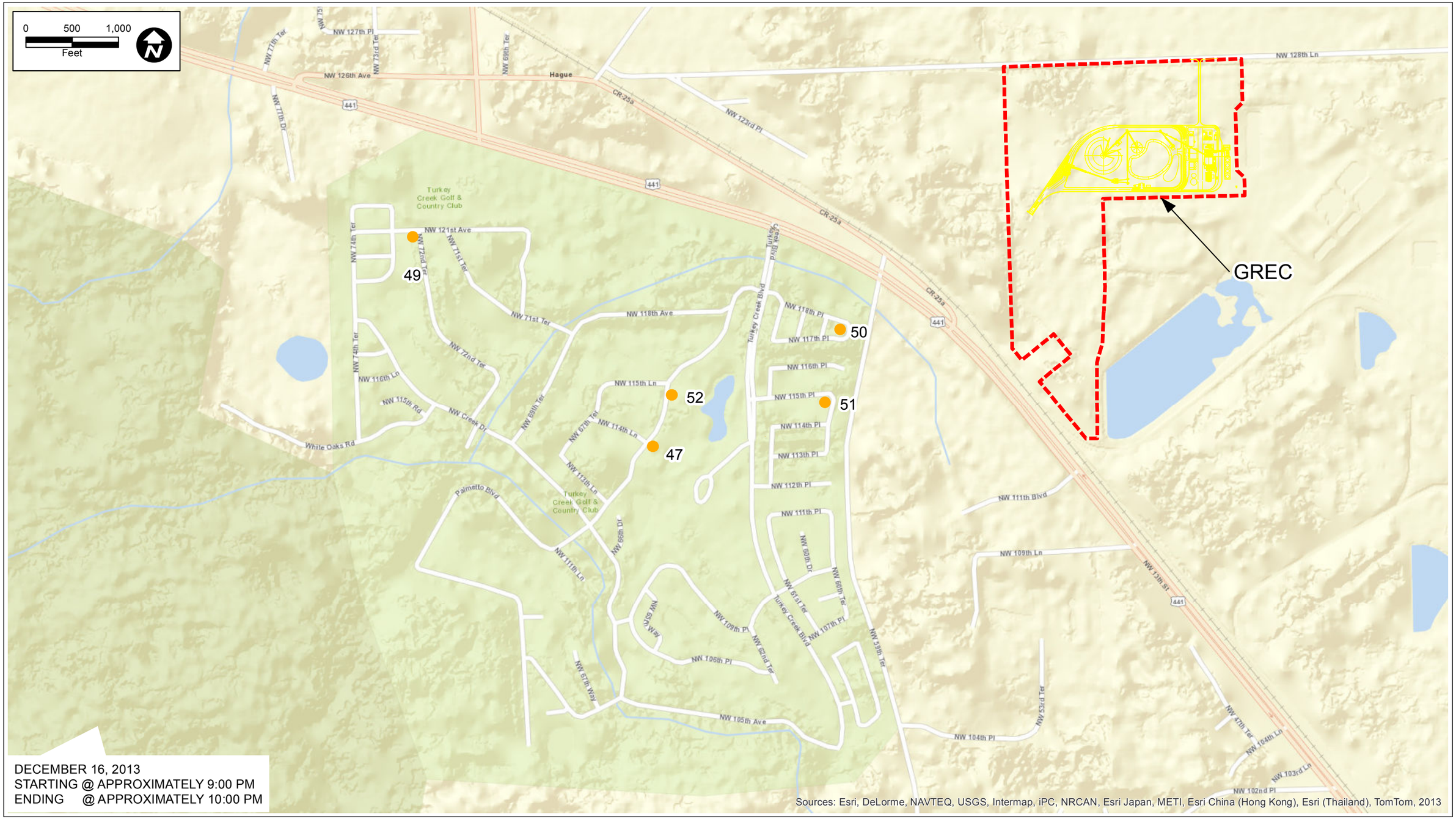


FIGURE 7.
GAINESVILLE RENEWABLE ENERGY CENTER
NOISE READINGS WITH PLANT IN OPERATION (100% LOAD)

Sources: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.



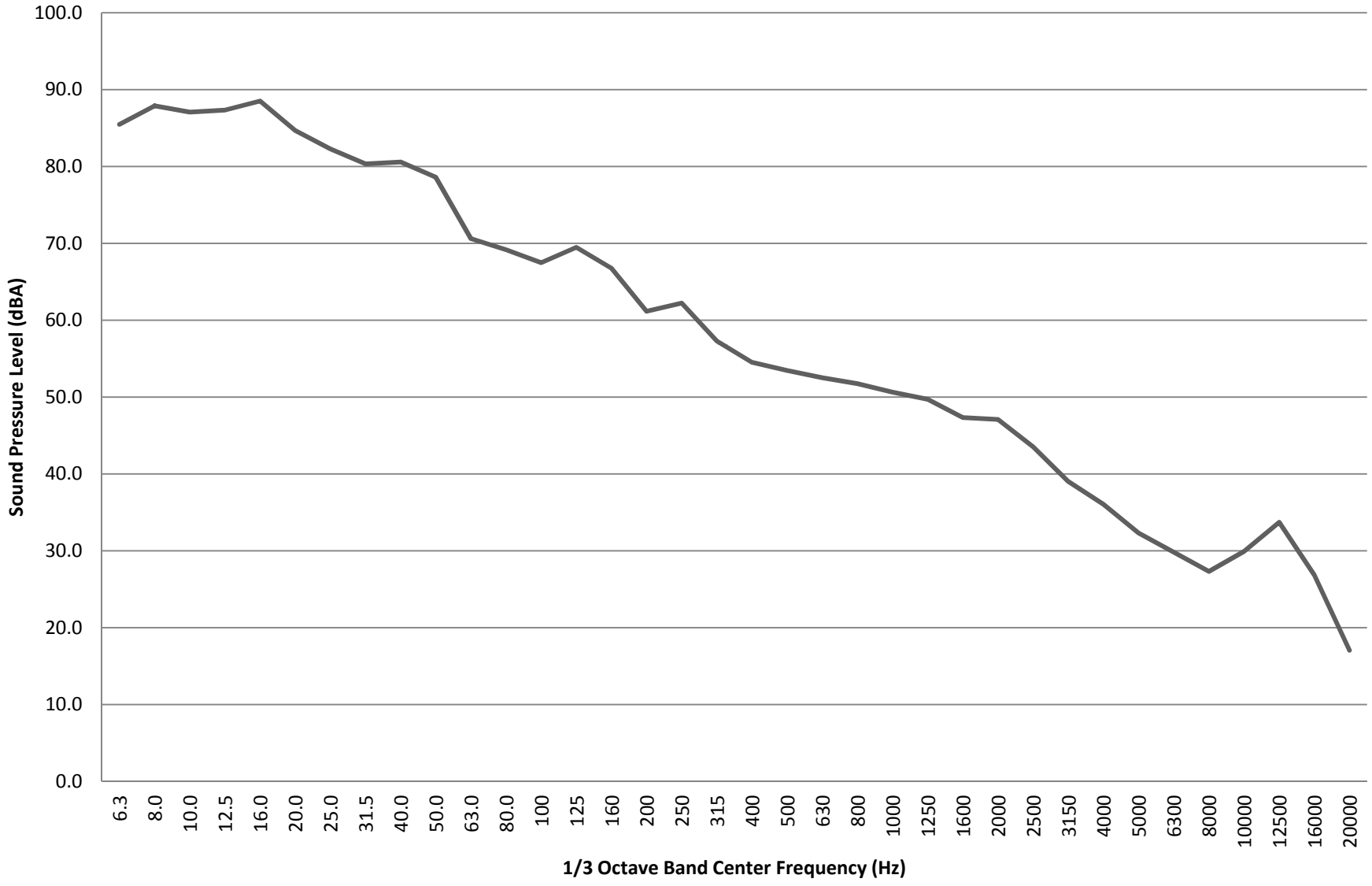
DECEMBER 16, 2013
STARTING @ APPROXIMATELY 9:00 PM
ENDING @ APPROXIMATELY 10:00 PM

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

FIGURE 8.
GAINESVILLE RENEWABLE ENERGY CENTER
NOISE READINGS WITH PLANT IN OPERATION (100% LOAD) AFTER INSTALLATION OF NOISE CONTROL EQUIPMENT

Sources: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.



Overall dBA = 63

FIGURE 9.

NOISE MEASUREMENT ON BOILER BUILDING ROOF
DECEMBER 17, 2013

Source: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

ATTACHMENT A

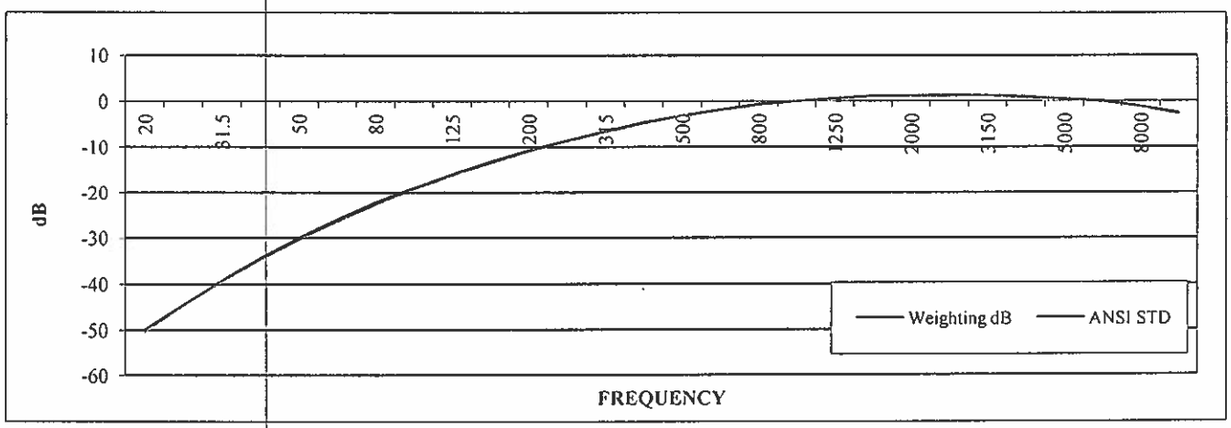
CIH EQUIPMENT COMPANY, INC.

CERTIFICATE OF CALIBRATION

Sound Level Meter Type 1

Manufacturer:	Quest	**Calibration Date:**	November 21, 2012
Model Number:	1800	**Date Due:**	November 21, 2013
Serial Number:	HP2070024	**Temperature:**	73.9 °F
Service Order:	12439	**Relative Humidity:**	46 %
Reference Number:	12439-1800-HP2070024	**Barometric Pressure:**	29.88 inHG

Frequency (HZ)	Meter Actual Display (dB)	Meter Weighting dB	ANSI STD	Tolerance	Relative Difference
20	64.1	-49.9	-50.5	± 2.5	0.6
25	69.5	-44.5	-44.7	± 2	0.2
31.5	74.8	-39.2	-39.4	± 1.5	0.2
40	79.7	-34.3	-34.6	± 1.5	0.3
50	84.0	-30.0	-30.2	± 1	0.2
63	88.1	-25.9	-26.2	± 1	0.3
80	91.9	-22.1	-22.5	± 1	0.4
100	95.1	-18.9	-19.1	± 1	0.2
125	98.0	-16.0	-16.1	± 1	0.1
160	100.9	-13.1	-13.4	± 1	0.3
200	103.3	-10.7	-10.9	± 1	0.2
250	105.5	-8.5	-8.6	± 1	0.1
315	107.5	-6.5	-6.6	± 1	0.1
400	109.4	-4.6	-4.8	± 1	0.2
500	110.9	-3.1	-3.2	± 1	0.1
630	112.2	-1.8	-1.9	± 1	0.1
800	113.4	-0.6	-0.8	± 1	0.2
1000	114.0	0.0	0.0	± 1	0.0
1250	114.6	0.6	0.6	± 1	0.0
1600	115.1	1.1	1.0	± 1	0.1
2000	115.1	1.1	1.2	± 1	-0.1
2500	115.2	1.2	1.3	± 1	-0.1
3150	115.2	1.2	1.2	± 1	0.0
4000	114.9	0.9	1.0	± 1	-0.1
5000	114.5	0.5	0.5	± 1.5	0.0
6300	114.0	0.0	-0.1	+ 1.5 to - 2	0.1
8000	112.9	-1.1	-1.1	+ 1.5 to - 3	0.0
10000	111.3	-2.7	-2.5	+ 2 to -4	-0.2



STANDARDS

Manufacturer	Description	Model No.	Serial No.	Certificate No.	Due Date
RION	Sound Calibrator	NC-72	502474	25691	3/8/2013
Stanford Research	Function Generator	DS360	33001	A1199700	8/30/2013

CIHE Calibration Laboratory certifies that the instrument specified above meets the manufacturer's specifications and was calibrated using standards and instruments also listed below where the accuracy is traceable to National Institute of Standards and Technology (NIST), and the calibration systems and records are in compliance to ANSI S1.4-1983

The reported uncertainty of measurement is stated as the combined standard uncertainty multiplied by a coverage factor k = 2. The measured value and the associated expanded uncertainty represent the interval (y±U), which contains the value of the measured quantity with a probability of approximately a 95% confidence interval. The uncertainty was estimated following the guidelines of the ISO 17025 and the GUM. U = ±0.37dB

Calibrated By: _____ Date: 11/21/12

Jon Duncan - Calibration Technician

1806 South Highland Ave • Clearwater, FL 33756-1762 • USA • PH: (727) 584-5063 • FX: (727) 581-5921
Toll Free: (888) 873-2443 • Website: http://www.cihequipment.com

ATTACHMENT A

Silver Star Services, LLC

CERTIFICATE OF CALIBRATION

SOUND LEVEL METER TYPE 2

Manufacturer:	Quest	**Calibration Date:**	February 27, 2013
Model Number:	2800	**Date Due:**	February 27, 2014
Serial Number:	HS8030026	**Temperature:**	74.8 °F
		Relative Humidity:	47%
		Barometric Pressure:	29.79 inHG

Frequency (HZ)	Actual Display (dB)	Dosimeter Weighting dB	ANSI STD	Tolerance
20	51.6	-50.5	-50.5	± 3
25	52.7	-49.4	-44.7	± 3
31.5	61.9	-40.2	-39.4	± 3
40	67.2	-34.9	-34.6	± 2
50	72.3	-29.8	-30.2	± 2
63	75.9	-26.2	-26.2	± 2
80	78.7	-23.4	-22.5	± 2
100	81.4	-20.7	-19.1	± 1.5
125	86.0	-16.1	-16.1	± 1.5
160	89.4	-12.7	-13.4	± 1.5
200	92.1	-10.0	-10.9	± 1.5
250	94.8	-7.3	-8.6	± 1.5
315	95.1	-7.0	-6.6	± 1.5
400	97.0	-5.1	-4.8	± 1.5
500	98.7	-3.4	-3.2	± 1.5
630	100.1	-2.0	-1.9	± 1.5
800	101.2	-0.9	-0.8	± 1.5
1000	102.1	0.0	0	± 1.5
1250	103.4	1.3	0.6	± 1.5
1600	104.6	2.5	1	± 2
2000	103.7	1.6	1.2	± 2
2500	102.9	0.8	1.3	± 2.5
3150	103.2	1.1	1.2	± 2.5
4000	103.1	1.0	1	± 3
5000	101.8	-0.3	0.5	± 3.5
6300	104.7	2.6	-0.1	± 4.5
8000	99.7	-2.4	-1.1	± 5
10000	91.4	-10.7	-2.5	+ 5 to -μ

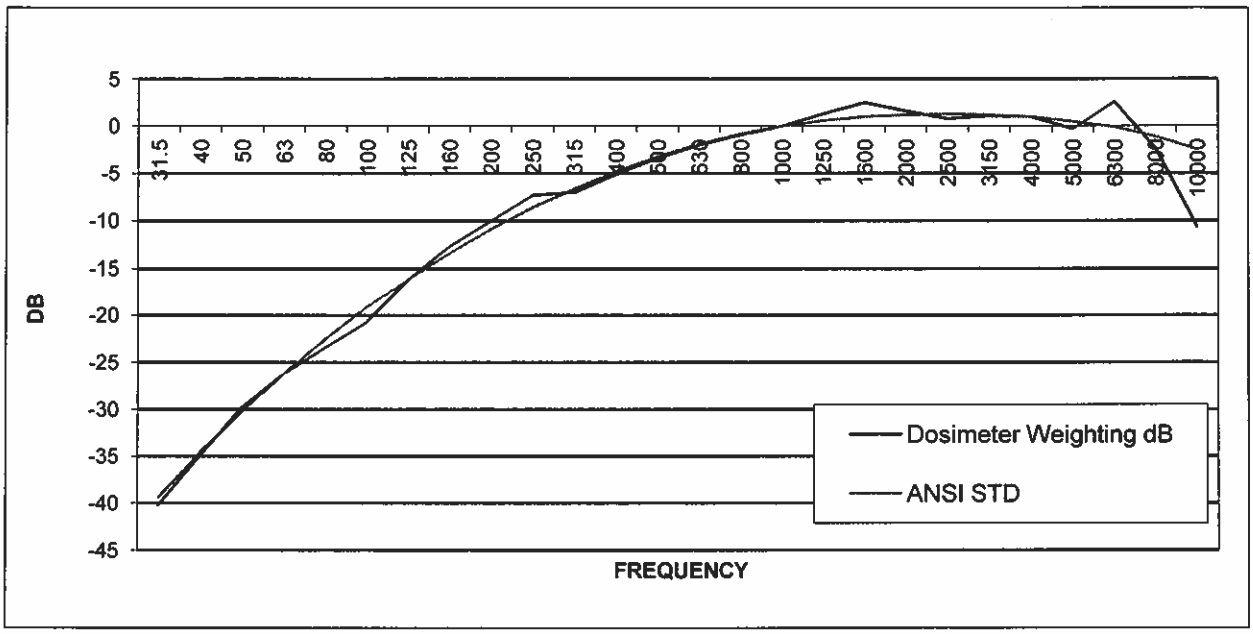
ATTACHMENT A

Silver Star Services, LLC

CERTIFICATE OF CALIBRATION

SOUND LEVEL METER TYPE 2

Manufacturer:	Quest	**Calibration Date:**	February 27, 2013
Model Number:	2800	**Date Due:**	February 27, 2014
Serial Number:	HS8030026	**Temperature:**	74.8 °F
		Relative Humidity:	47%
		Barometric Pressure:	29.79 inHG



STANDARDS

Manufacturer	Description	Model No.	Serial No.	Certificate No.	Due Date
RION	Pistonphone	NC-72	502474	28194	2/28/2014
INSTEK	Oscilloscope	GDS820C	2625A26619	03J0198	10/20/2013

Silver Star Services certifies that the instrument specified above meets the manufacturer's specifications and was calibrated using standards and instruments listed below whhere the accuracy is traceable to National Institute of Standards and Technology (NIST), and the calibration systems and records are in compliance to ANSI S1.25– 1991.

Calibrated By: _____ Date: 02/27/13

1810 S Highland Ave., Clearwater, FL 33756
Phone (727) 581-5924 • Website: www.silverstarforhire.com

ATTACHMENT A

Silver Star Services, LLC

CERTIFICATE OF CALIBRATION

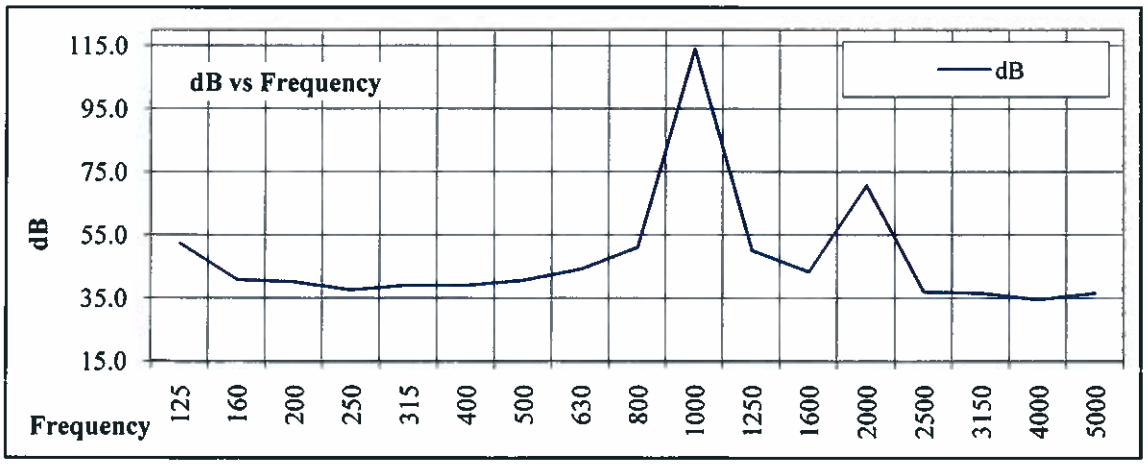
Acoustical Calibrator

Manufacturer:	Quest	**Calibration Date:**	November 2, 2012
Model Number:	QC-10	**Date Due:**	November 2, 2013
Serial Number:	QE4020029	**Temperature:**	72.3 °F
Service Order:	SSS	**Relative Humidity:**	50 %
Reference Number:	SSS-QC10-QE4020029	**Barometric Pressure:**	29.93 inHG

Frequency (HZ)	Linear dB
125	52.2
160	40.7
200	40.1
250	37.5
315	39.0
400	38.9
500	40.5
630	44.1
800	51.0
1000	114.0
1250	50.0
1600	43.2
2000	70.7
2500	36.9
3150	36.5
4000	34.5
5000	36.5

Center Frequency
997.8 Hz

THD
0.005 %



STANDARDS

Manufacturer	Description	Model No.	Serial No.	Certificate No.	Due Date
RION	Sound Calibrator	NC-72	502474	25691	3/8/2013
Stanford Research	Function Generator	DS360	33001	A1199700	8/30/2013
Fluke	Multimeter	8840A/AF	AF407041	A1199701	8/30/2013
GRAS	Microphone	40AE	18833	25690	3/8/2013
E-MU	DAQ	EM8740A	8740050000648H	N/A	11/15/2012
Virtins Technology	Spectrum Analyzer	Pro v3.2	B0D1DD6C	N/A	11/8/2012

Silver Star Services certifies that the instrument specified above meets the manufacturer's specifications and was calibrated using standards and instruments listed below whhere the accuracy is traceable to National Institute of Standards and Technology (NIST), and the calibration systems and records are in compliance to ANSI S1.25– 1991.

Calibrated By: _____ Date: 11/02/12

1810 S Highland Ave., Clearwater, FL 33756
Phone (727) 581-5924 • Website: www.silverstarforhire.com

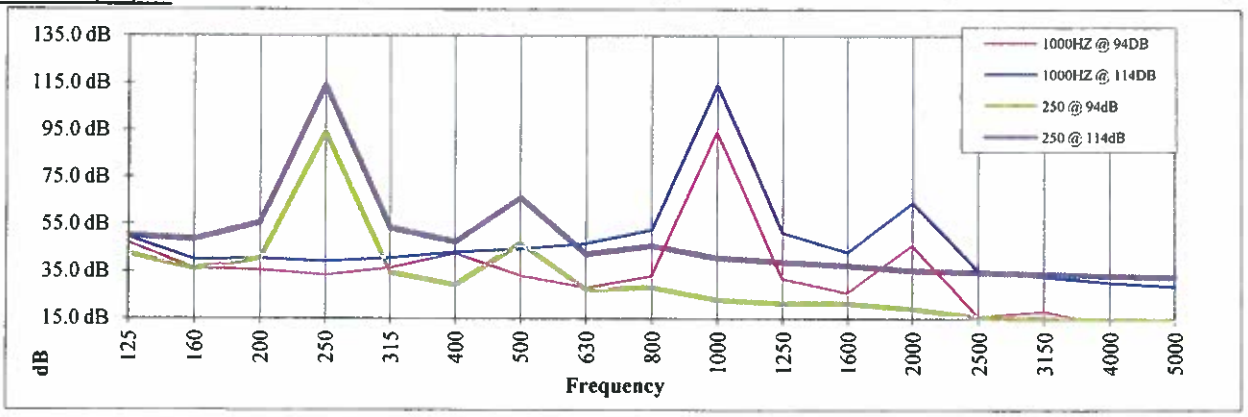
ATTACHMENT A

CERTIFICATE OF CALIBRATION

Acoustical Calibrator

Manufacturer:	Quest	**Calibration Date:**	November 21, 2012
Model Number:	QC-20	**Date Due:**	November 21, 2013
Serial Number:	QF2080023	**Temperature:**	74.1 °F
Service Order:	12439	**Relative Humidity:**	47.0 %
Reference Number	12439-QC20-QF2080023	**Barometric Pressure:**	29.88 inHG

Frequency (HZ)	1000 @ 94dB Weighting dB	1000 @ 114dB Weighting dB	250 @ 94dB Weighting dB	250 @ 114dB Weighting dB
125	47.0 dB	49.4 dB	42.4 dB	50.0 dB
160	36.3 dB	39.9 dB	35.9 dB	48.4 dB
200	35.4 dB	40.4 dB	40.4 dB	55.7 dB
250	33.3 dB	39.2 dB	94.0 dB	114.0 dB
315	36.4 dB	40.7 dB	34.4 dB	53.2 dB
400	42.7 dB	43.2 dB	29.4 dB	47.6 dB
500	33.1 dB	44.5 dB	46.8 dB	66.2 dB
630	27.9 dB	46.7 dB	27.3 dB	42.3 dB
800	33.0 dB	52.4 dB	28.1 dB	45.7 dB
1000	94.0 dB	114.0 dB	22.9 dB	40.8 dB
1250	31.9 dB	51.4 dB	21.4 dB	39.0 dB
1600	25.8 dB	43.2 dB	21.4 dB	37.5 dB
2000	46.1 dB	64.2 dB	19.2 dB	35.4 dB
2500	16.0 dB	35.1 dB	15.6 dB	34.7 dB
3150	18.1 dB	33.0 dB	15.0 dB	34.0 dB
4000	12.5 dB	30.4 dB	14.5 dB	33.3 dB
5000	11.8 dB	28.8 dB	14.3 dB	32.7 dB
Center Frequency	1005.62 Hz	1005.62 Hz	252.38 Hz	252.39 Hz
Distortion(%)	0.004 %	0.001 %	0.003 %	0.002 %



STANDARDS

Manufacturer	Description	Model No.	Serial No.	Certificate No.	Due Date
RION	Sound Calibrator	NC-72	502474	25691	3/8/2013
Stanford Research	Function Generator	DS360	33001	A1199700	8/30/2013
Fluke	Multimeter	8840A/AF	AF407041	A1199701	8/30/2013
GRAS	Microphone	40AE	18833	25690	3/8/2013
E-MU	DAQ	EM8740A	8740050000648H	N/A	3/15/2013
Virtins Technology	Spectrum Analyzer	Pro v3.2	B0D1DD6C	N/A	3/15/2013

CIHE Calibration Laboratory certifies that the instrument specified above meets the manufacturer's specifications and was calibrated using standards and instruments listed above where the accuracy is traceable to National Institute of Standards and Technology (NIST). and the calibration systems and records are in compliance to ANSI S1.40-1984

Calibrated By: _____ Date: 11/21/12

Jon Duncan - Calibration Technician

1806 South Highland Ave • Clearwater, FL 33756-1762 • USA • PH: (727) 584-5063 • FX: (727) 581-5921
Toll Free: (888) 873-2443 • Website: http://www.cihequipment.com

ATTACHMENT 1

Certificate of Calibration and Conformance

This document certifies that the instrument referenced below meets published specifications per Procedure PRD-P263; ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Manufacturer:	Larson Davis	Temperature:	74.3	°F
Model Number:	831		23.50	°C
Serial Number:	1708	Rel. Humidity:	34	%
Customer:	TMS Rental	Pressure:	993	mbars
Description:	Sound Level Meter		993	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 6-Nov-13 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/12/2014	2013-17614

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Tim Rarden Signature:

The Modal Shop, Inc.
3149 East Kemper Road
Cincinnati, OH 45241
Phone: (513) 351-9919
(800) 860-4867
www.modalshop.com

ATTACHMENT 1

THE MODAL SHOP INC.
A PCB GROUP CO.

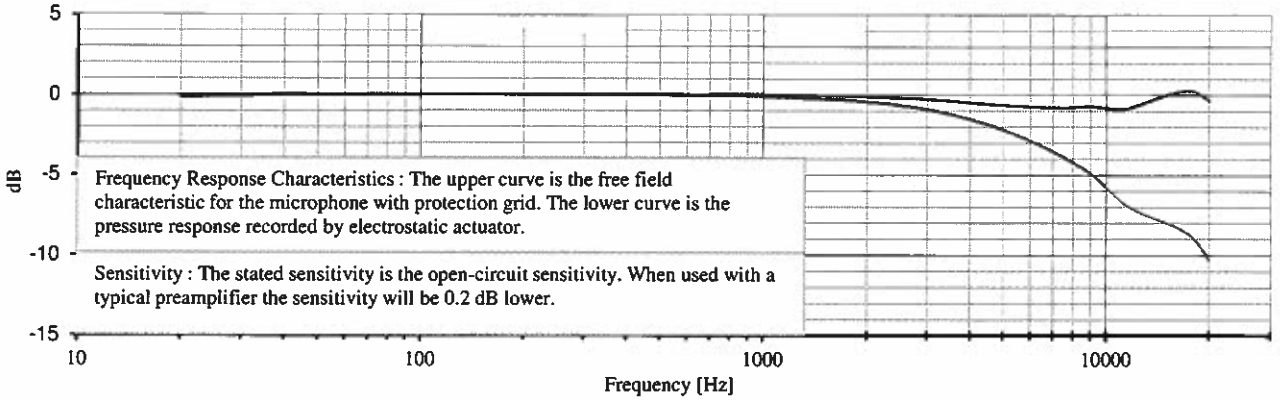
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

~Certificate of Calibration~

Manufacturer:	PCB	**Asset ID:**	49581
Model Number:	377B02	**Customer:**	Rental
Serial Number:	LW137375	**Calibration Date:**	Sep 30, 2013 10:19:40
Description:	Free-Field Microphone	**Due Date:**	

Sensitivity:	**250 Hz**	**1 kHz**		**Temperature:**	74 (23)	°F (°C)
	-25.92	-26.03	dB re. 1V/Pa	**Humidity:**	51	%
	50.56	49.93	mV/Pa	**Ambient Pressure:**	995.7	mbar

Cal. Results: In Tolerance **Polarization Voltage:** 0 VDC



Traceability: The calibration is traceable through 683/281794-12.

Notes: Calibration results relate only to the items calibrated.
This certificate may not be reproduced, except in full, without written permission.
This calibration is performed in compliance with ISO 9001, ISO 17025 and ANSI Z540.
Measurement uncertainty (250 Hz sensitivity calibration) at 95% confidence level: 0.30 dB.
Calibrated per procedure PRD-P204.

User Note : As Found / As Left

Frequency Response with reference to level at 250 Hz

Frequency (Hz)	Upper (dB)	Frequency (Hz)	Upper (dB)	Frequency (Hz)	Upper (dB)	Frequency (Hz)	Upper (dB)
20	-0.15	**630**	0.00	**4500**	-0.58		
25	-0.08	**800**	0.02	**5000**	-0.63		
31.5	-0.04	**1000**	0.01	**5600**	-0.70		
40	0.01	**1120**	0.00	**6300**	-0.76		
50	0.00	**1250**	-0.01	**7100**	-0.80		
63	0.00	**1400**	-0.03	**8000**	-0.77		
80	0.01	**1600**	-0.06	**9000**	-0.71		
100	0.01	**1800**	-0.09	**10000**	-0.82		
125	0.01	**2000**	-0.11	**11200**	-0.88		
160	0.01	**2240**	-0.16	**12500**	-0.60		
200	0.00	**2500**	-0.19	**14000**	-0.21		
250	0.00	**2800**	-0.24	**16000**	0.17		
315	0.01	**3150**	-0.31	**18000**	0.24		
400	0.00	**3550**	-0.40	**20000**	-0.32		
500	0.01	**4000**	-0.49				

ACCREDITED

Technician: Wayne Underwood

Approval: Edward A. Kilcullen

Reference Equipment Used:

Manuf.	*Model*	*Serial*	*Cal. Date*	*Due Date*
GRAS	40AG	77606	9/16/2013	9/16/2014

ATTACHMENT 1

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2013-171893

Instrument Model CAL200, Serial Number 10098, was calibrated on 28MAR2013. The instrument meets factory specifications per Procedure D0001.8190, IEC 60942:2003.

New Instrument
Date Calibrated: 28MAR2013
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900	0661	12 Months	06APR2013	2012-157399
PCB	1502B02FJ15PSIA	1428	12 Months	10APR2013	3416909125.00
Larson Davis	2559	2506	12 Months	11JUN2013	19157-1
Hewlett Packard	34401A	3146A10352	12 Months	28AUG2013	5778699
Larson Davis	PRM902	0480	12 Months	07SEP2013	2012-163567
Larson Davis	MTS1000/2201	0111	12 Months	07SEP2013	SM070912-3
Larson Davis	PRM915	0112	12 Months	08OCT2013	2012-164811

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Environmental test conditions as shown on calibration report.

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Signed: Scott Montgomery
Technician: Scott Montgomery

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2008 Certified

ATTACHMENT 1

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Larson Davis CAL200 Acoustic Calibrator, SN: 10098
Certificate of Measured Output

Performance at Reference Conditions

Nominal Level (dB SPL):	94	114
Measured Level (dB SPL):	**94.01**	**114.02**
Expanded Uncertainty (dB):	0.153	0.152
Level Error Limit (dB):	±0.35	±0.35
Nominal Frequency (Hz):	1000	1000
Measured Frequency (Hz):	**1000.2**	**1000.2**
Expanded Uncertainty (Hz):	0.2	0.2
Frequency Error Limit (Hz):	±10.0	±10.0
Measured Distortion (%):	0.38	0.33
Expanded Uncertainty (%):	0.25	0.25
Distortion Limit (%):	2.0	2.0

The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity.

Environmental Conditions

Temperature (°C):	25	25
Relative Humidity (%):	32	32
Static Pressure (kPa):	101.1	101.1

Reference Microphone

Model: Larson Davis 2559
Serial Number: 2506
Open Circuit Sensitivity: 12.336 mV/Pascal
Uncertainty: 0.130 dB

Influence of Static Pressure

Nominal Level (dB SPL): 114

Nominal Pressure (kPa)	Pressure (kPa)	Level Change (dB)	Frequency Change (Hz)	Distortion (%)
108.0	108.0	-0.04	-0.00	0.32
101.3	101.2	0.00	0.00	0.33
92.0	91.9	0.04	-0.00	0.34
83.0	82.9	0.04	0.00	0.35
74.0	74.0	-0.00	-0.01	0.37
65.0	65.1	-0.13	-0.01	0.40
Expanded Uncertainty:	1.0	0.04	0.20	0.25
Limit:		±0.30	±10.0	2.0

Reference microphone corrections applied.

Environmental Conditions

Temperature (°C):	25
Relative Humidity (%):	25

Reference Microphone

Model: Larson Davis 2559
Serial Number: 2506

Static pressure was measured with a calibrated Motorola pressure sensor MPX2100AP.
Temperature and humidity was measured with a calibrated Fluke 1620A sensor.
Expanded uncertainty of environmental measurements: 0.3 °C, 3 %RH, 1.0 kPa
Uncertainty values are given at 95% confidence level (k = 2).

A Sound Level Meter can be calibrated to a level (L) defined as: L = measured level + pressure sensitivity
or if a Sound Level Meter is calibrated using the nominal level, the adjustments to data (X) are defined as:
X = measured level - nominal level - pressure sensitivity