CAVANAUGH TOCCI ASSOCIATES, INCORPORATED

327 F BOSTON POST ROAD, SUDBURY, MA 01776-3027 TEL: (978) 443-7871 · FAX: (978) 443-7873 E-MAIL: gtocci@cavtocci.com

SENIOR PRINCIPALS
WILLIAM J. CAVANAUGH, *FASA, Emeritus*
GREGORY C. TOCCI, *PE, FASA, PRESIDENT*

PRINCIPALS
DOUGLAS H. BELL
LINCOLN B. BERRY
TIMOTHY J. FOULKES, *FASA, INCE, Bd. Cert.*
MATTHEW J. MOORE, *CTS*

ADMINISTRATOR
DONNA L. RAFUS

SENIOR AND STAFF CONSULTANTS
ALEXANDER G. BAGNALL
ANDREW C. CARBALLEIRA
WILLIAM J. ELLIOT
AARON M. FARBO
JOHN T. FOULKES
MARK V. GIGLIO
BRION G. KONING
MICHAEL D. MAYNARD, *CTS*
CHRISTOPHER A. STORCH

MARKETING MANAGER
PATRICIA A. CASASANTO

ASSOCIATED CONSULTANTS
NICHOLAS BROWSE, *SMPTE*
STEWART RANDALL, *CTS-D*
MARTIN CALVERLEY, *CTS*

July 29, 2009

Mr. Brian LaValley, *Process Engineer*
Evergreen Solar, Inc.
259 Cedar Hill Street
Marlborough, MA 01752

Subject: Early morning sound measurements – July 25, 2009

Dear Brian,

This letter and attachments respond to Devens Enterprise Commission (DEC) request for a written report summarizing the sound measurement data collected in the vicinity of the Evergreen Solar manufacturing plant during early morning hours on July 25, 2009.

Attachments

Table 1 lists the A-weighted (dBA) energy-equivalent (L_{eq}) and ninetieth percentile (L_{90}) sound levels measured during early morning hours on July 25, 2009. Table 1 includes notes that identify the start time and end time of each measurement at each location, and includes comments regarding listening perceptions of the staff who conducted the measurements. These measurements were conducted by Brion Koning and Peter Tocci, Cavanaugh Tocci Associates, Inc.; and David Baker, CH2M-Hill using the measurement protocol in Appendix A. Evergreen equipment operating conditions at the time of measurement are provided in Table 2.

Simultaneous with our testing at the nearest residential location on Dunroven Farm, Douglas Sheadel, Modeling Specialties, consultant to the DEC, conducted his own sound measurements. Both our and his measurements were for a twenty-minute period beginning at approximately 2:15 AM, July 25. These were conducted simultaneously at the nearest residential location on Dunroven Farm, known as R1, very near to where both firms have installed continuous sound monitors. Measurements at this location, which is the most critical location as it is the closest residential location to Evergreen, were observed by Mr. Peter Lowitt and Mr. Neil Angus, Devens Enterprise Commission.

Figure 1 is an aerial photograph of the vicinity of the Evergreen Solar building and the nearest residential neighborhoods. We have annotated Figure 1 to show the location of the Evergreen Solar building, the locations where sound measurements were conducted, and the A-weighted L_{90} sound levels at each measurement location during early morning hours of July 25, 2009 (L_{90} data from Table 1).

Appendix A contains the Measurement Protocol used for the collection of data presented in this report. This will serve as the basis for measurement protocols for future measurements of sound produced by Evergreen Solar).

Appendix B contains graphs which present L_{90} third-octave band sound spectra and L_{90} octave band sound spectra (and corresponding A-weighted L_{90} sound level) for each measurement location.

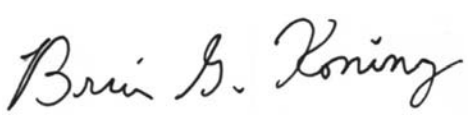
Evaluation

The sound levels measured during early morning hours on July 25, 2009 by Cavanaugh Tocci Associates, Inc. (Evergreen acoustical consultant) and Modeling Specialties (DEC acoustical consultant) show conformance with the 42-dBA interim nighttime sound level limit and the 38-dBA ultimate nighttime sound level limit established by DEC for this project. In addition, no measured one-third octave band spectra, after adjustment to remove sound produced by insects, exhibit a tonal character as defined by the DEC noise criteria. Also, sound in the 31 Hz and lower octave bands in all residential areas falls below 65 dB and thus conforms to the DEC low frequency noise critierion. Evergreen Solar is continuing to actively implement noise control recommendations developed by Cavanaugh Tocci Associates, Inc, and will continue to do so through the designated September 15, 2009 compliance deadline date.

Noise control implemented as of this report date, together with continuing implementation of noise controls, will ensure that Evergreen Solar sound levels will consistently comply with the DEC acoustical criteria during daytime and nighttime hours.

We trust that this interim report fulfills the DEC submittal requirements. We shall continue to provide consulting assistance to Evergreen Solar as new sound controls are implemented.

Sincerely,
CAVANAUGH TOCCI ASSOCIATES, INC.



Brion G. Koning, *Senior Consultant* Gregory C. Tocci, *Sr. Principal Consultant*

09067-EarlyMorning7-25-09Measurements-ReportDated-7-29-09h.doc

Figures and Tables

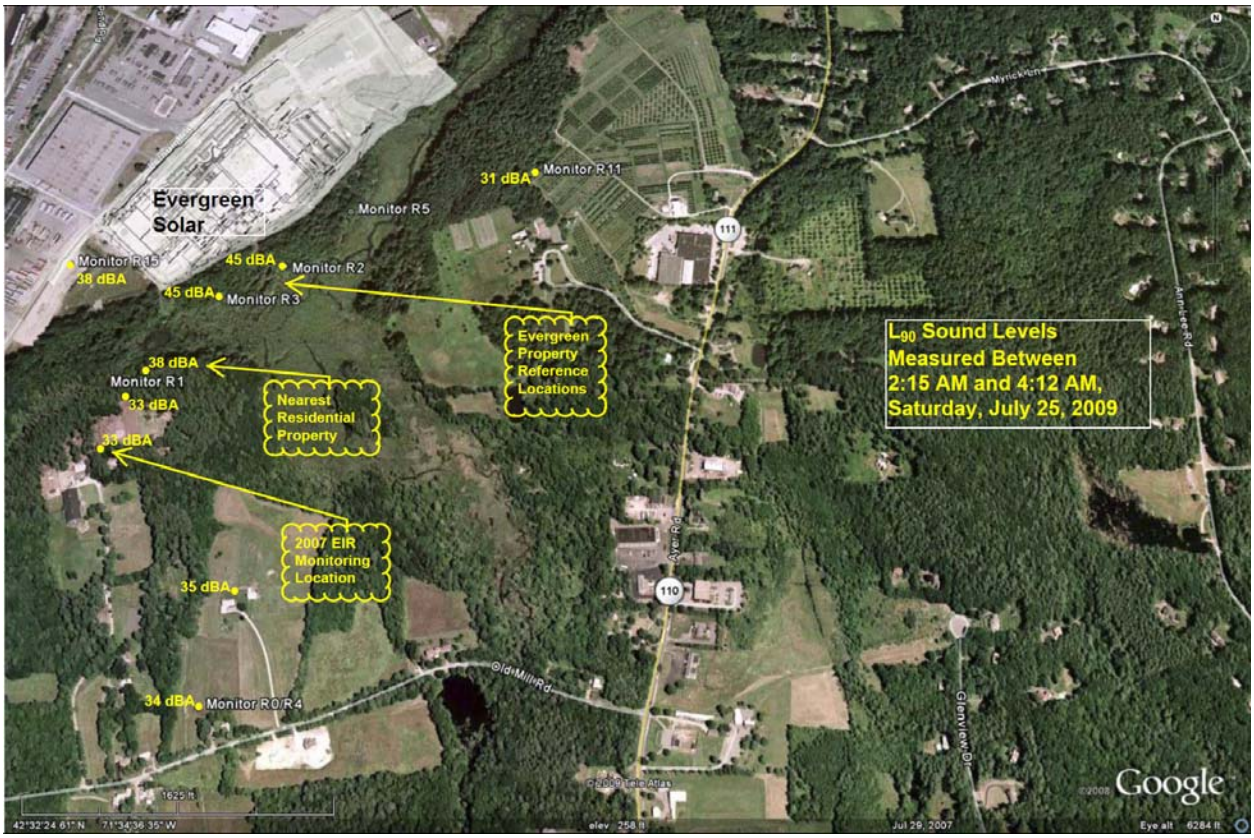


Figure 1. Aerial photo indicating A-weighted L90 sound levels at measurement locations—July 25, 2009
Evergreen Solar, Devens, Massachusetts

Table 1. A-weighted (dBA) Sound Levels Summary - Early Morning, Saturday, July 25, 2009

Overall Measurement Time Period: 2:15 AM to 4:15 AM

Time Interval	Duration	Measurement Location	Acoustic Events/Listening Perceptions	Leq (dBA)*	L90 (dBA)*
2:15-2:35 AM	20-minutes	62 Old Mill Road Dunroven Farm at Horse Trail Overlooking Cold Spring Brook	Train horn and locomotive and Barnum Road truck passby audible during portion of measurement. Evergreen Solar was audible in between transient acoustic events.	39.5	38.0
2:15-2:35 AM	20-minutes	62 Old Mill Road Dunroven Farm at Horse Corral Fence Closest to Cold Spring Brook	Train horn and locomotive and Barnum Road truck passby audible during portion of measurement. Evergreen Solar not audible/perceptible above background during measurement time interval.	36.7	32.8
2:15-2:35 AM	20-minutes	62 Old Mill Road Dunroven Farm near Vicinity of House and Garage	Train horn and locomotive and Barnum Road truck passby audible during portion of measurement. Evergreen Solar not audible/perceptible above background during measurement time interval.	37.3	32.8
3:25-3:45 AM	20-minutes	42 Old Mill Road Perry Residence Back Yard at Horse Corral Fence	Train horn and locomotive and Barnum Road truck passby audible during portion of measurement. Evergreen Solar not audible/perceptible above background during measurement time interval.	37.7	35.0
3:25-3:45 AM	20-minutes	48 Old Mill Road Arnold Residence at Septic System Leaching Field	Train horn and locomotive and Barnum Road truck passby audible during portion of measurement. Evergreen Solar not audible/perceptible above background during measurement time interval.	37.1	34.4
3:25-3:45 AM	20-minutes	327 Ayer Road Doe Apple Orchards Orchard Northwest Corner Closest to Evergreen Solar	Train horn and locomotive and Barnum Road truck passby audible during portion of measurement. Evergreen Solar not audible/perceptible above background during measurement time interval.	33.3	31.3
4:07-4:12 AM	5-minutes	Barnum Road approx. 100 yards West of Evergreen Solar Building	Truck passby on Barnum Road during measurement time interval Evergreen Solar audible and unknown other Devens sound sources audible during measurement	52.9 (truck)	38.4
4:07-4:12 AM	5-minutes	In Woods between VOC Equipment Compound and Cold Spring Brook	VOC equipment and cooling towers audible. No transient events audible.	45.4	45.0
4:07-4:12 AM	5-minutes	In Woods between Cooling Towers and Cold Spring Brook	VOC equipment and cooling towers audible. No transient events audible.	45.4	44.8

* By convention, sound levels are typically reported in decibels as whole numbers.
For this project, we have reported tenths of decibels in order to correspond with measurement data format reported by others

Equipment that operates at a constant speed	Quantity Available	Quantity Operating
SDX Fan	4	2
NOX Scrubber		
NOX Fan	4	2
NOX Pump	4	2
Acid Scrubber		
ASX Fans	4	2
ASX Discharge	2	2
VOC Scrubbers		
Process Fans	3	3
Combustion Blower	3	3
Discharge Stack	3	3
Laminator Exhaust	4	4
Boilers	4	2

Equipment that operates at a variable speed	Quantity Available	Quantity Operating	Fan Speed (as a % of Full Speed)	Comment
Cooling Tower				
Condenser water pumps	9	9	Ph 1 @ 87% Ph 2 @ 70%	Temperature & Humidity Dependent
Discharge Fans	9	9	Ph 1 @ 44% Ph 2 @ 37%	Temperature & Humidity Dependent

Table 2. Systems operating conditions during measurements—July 25, 2009
Dunroven Farm (R1 location)

Appendix A

Measurement Protocol

Nighttime Measurement Protocol

Evergreen Solar, Devens, MA
July 25, 2009

Purpose. To determine compliance with the July 27, 2009 and August 17, 2009 deadlines to reduce nighttime sound below 42-dBA and 38-dBA, respectively, and the 38-dBA ongoing nighttime sound level limit, for sound, as such limit was established by the Devens Enterprise Commission.

Instrumentation. ANSI S1.4 type 1 precision sound measurement instrumentation used in conformance with manufacturer recommended methods. Microphone to be outfitted with a windscreen. The instrument is to be calibrated before commencing and after the conclusion of sound measurements. Instrument to be tripod mounted.

Descriptor measured. The L_{90}(20-minute) slow response A-weighted sound level and un-weighted one-third octave sound level spectrum (12.5 – 12,500 Hz).

Measurement time period. Between 1:30 and 4:00 AM.

Weather conditions. No precipitation. Wind gusts less than 5 mph. No audible foliage sound. No fog, haze or temperature inversions.

Measurement location. Just north of the riding trail behind the Dunroven Farm at the point closest to Evergreen Solar's facility (the location known as "R1") and at several other locations on properties neighboring the Evergreen Solar facility.

Field notes. Keep a written record of conditions during all sound measurements.

Procedures.

- Survey the Evergreen Solar property to ensure that doors are closed and that unusual events are not occurring such as emergency service or construction.
- Contact the control room to ascertain that the facility is operating at normal capacity.*
- Survey the area around the facility and residential areas to identify any sources of sound other than the Evergreen Solar facility. Measure sound levels produced by these other sources in order to estimate sound power and directivity to the extent possible.
- At the conclusion of the measurements, confirm with the control room that no changes in facility operation occurred during sound measurements.

Data analysis. Download data into a PC. Use one-third octave L_{90} spectra to remove indigenous sound as appropriate. Compute the corresponding octave band spectra (16 – 8,000 Hz). Compute the corresponding A-weighted L_{90} sound level.

* For the so-called "worst case scenario" measurement required to be taken pursuant to Condition 9 of the DEC's July 14, 2009 Resolution, the operation of the facility will be as set forth in the Worst Case Operating Conditions Assessment to be provided separately to the DEC.

cta

Appendix B

Octave and Third-Octave Spectra
Early Morning, Saturday, July 25, 2009

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

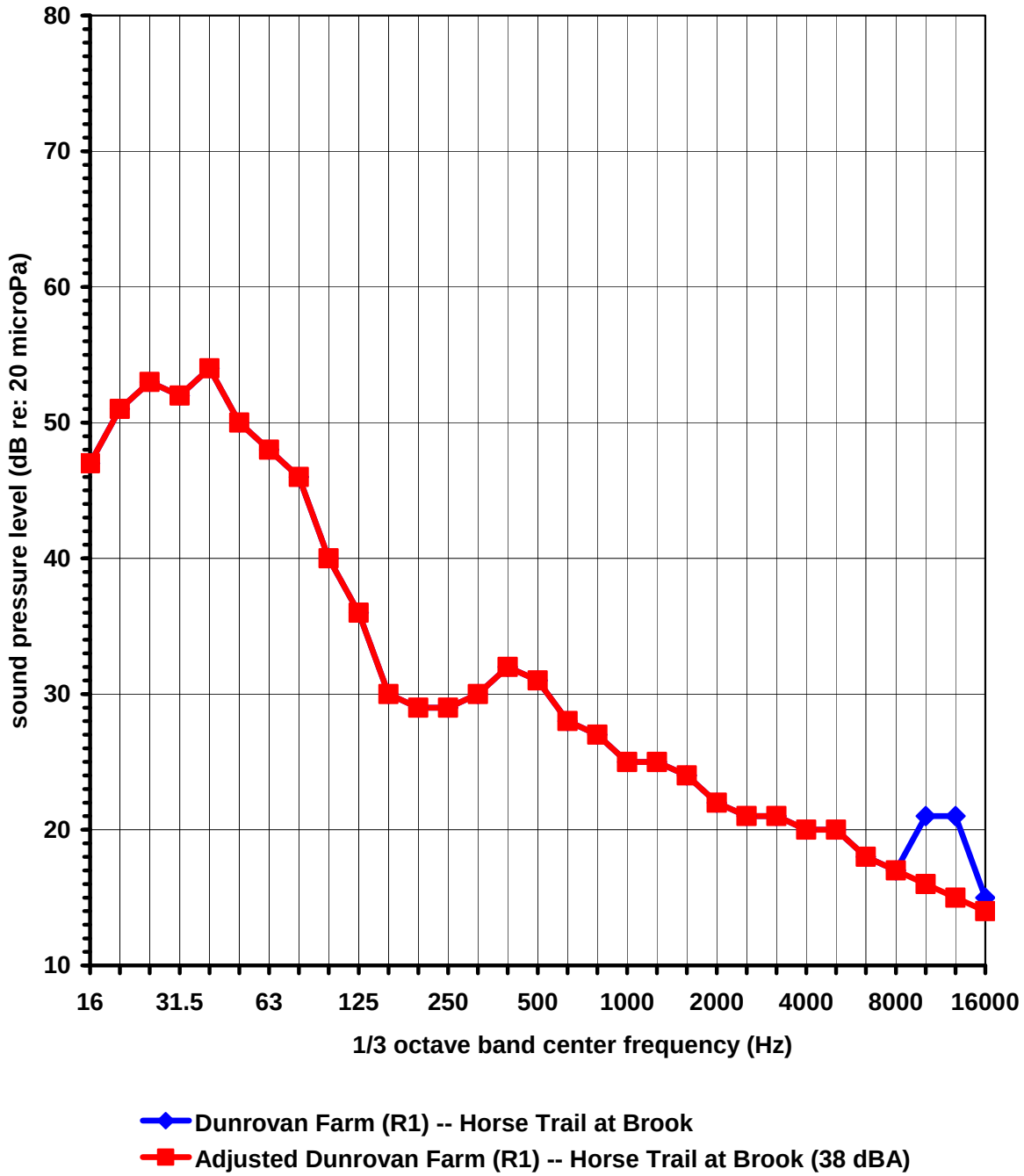


Figure B1.

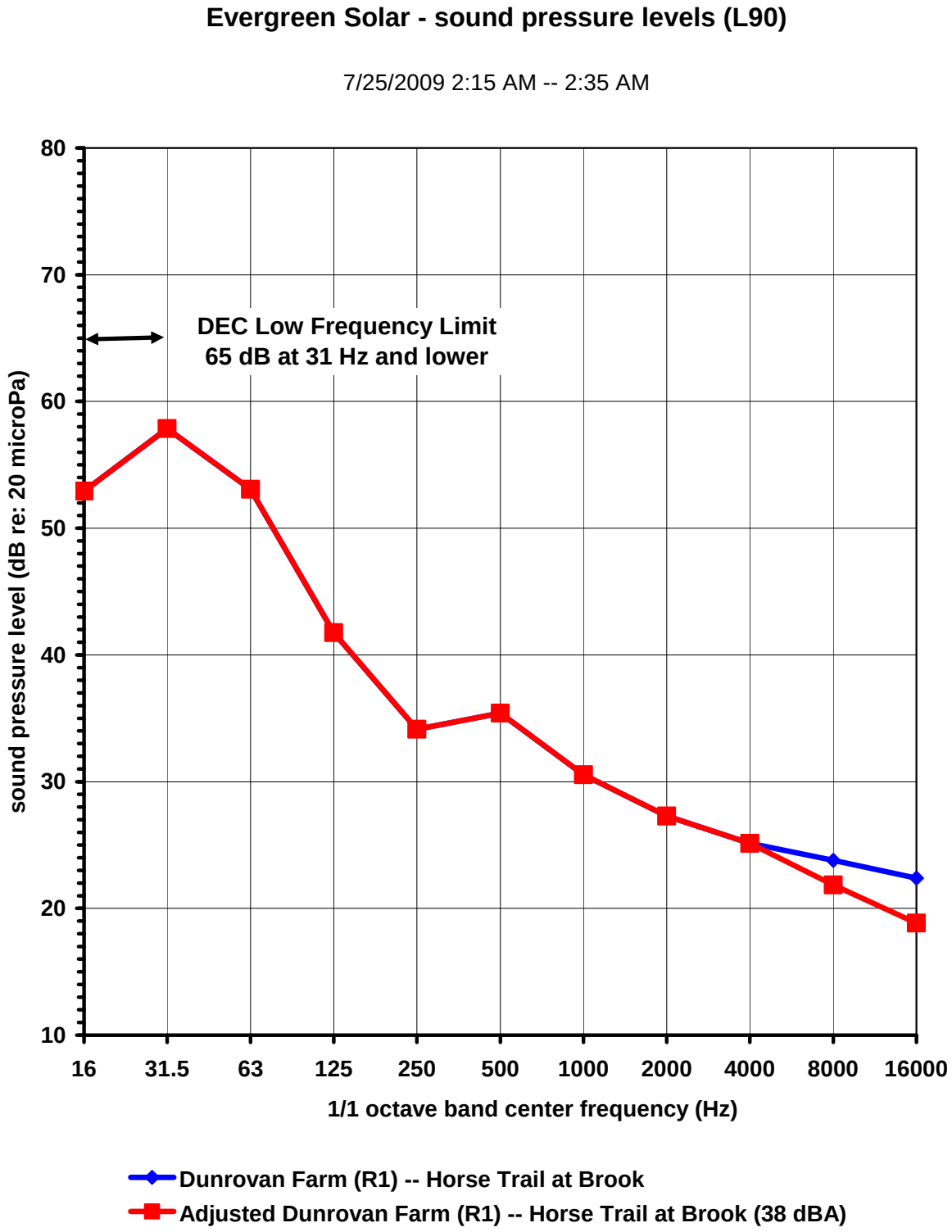

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
DEC Low Frequency Limit
65 dB at 31 Hz and lower
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/1 octave band center frequency (Hz)
Dunrovan Farm (R1) -- Horse Trail at Brook
Adjusted Dunrovan Farm (R1) -- Horse Trail at Brook (38 dBA)

Figure B2.

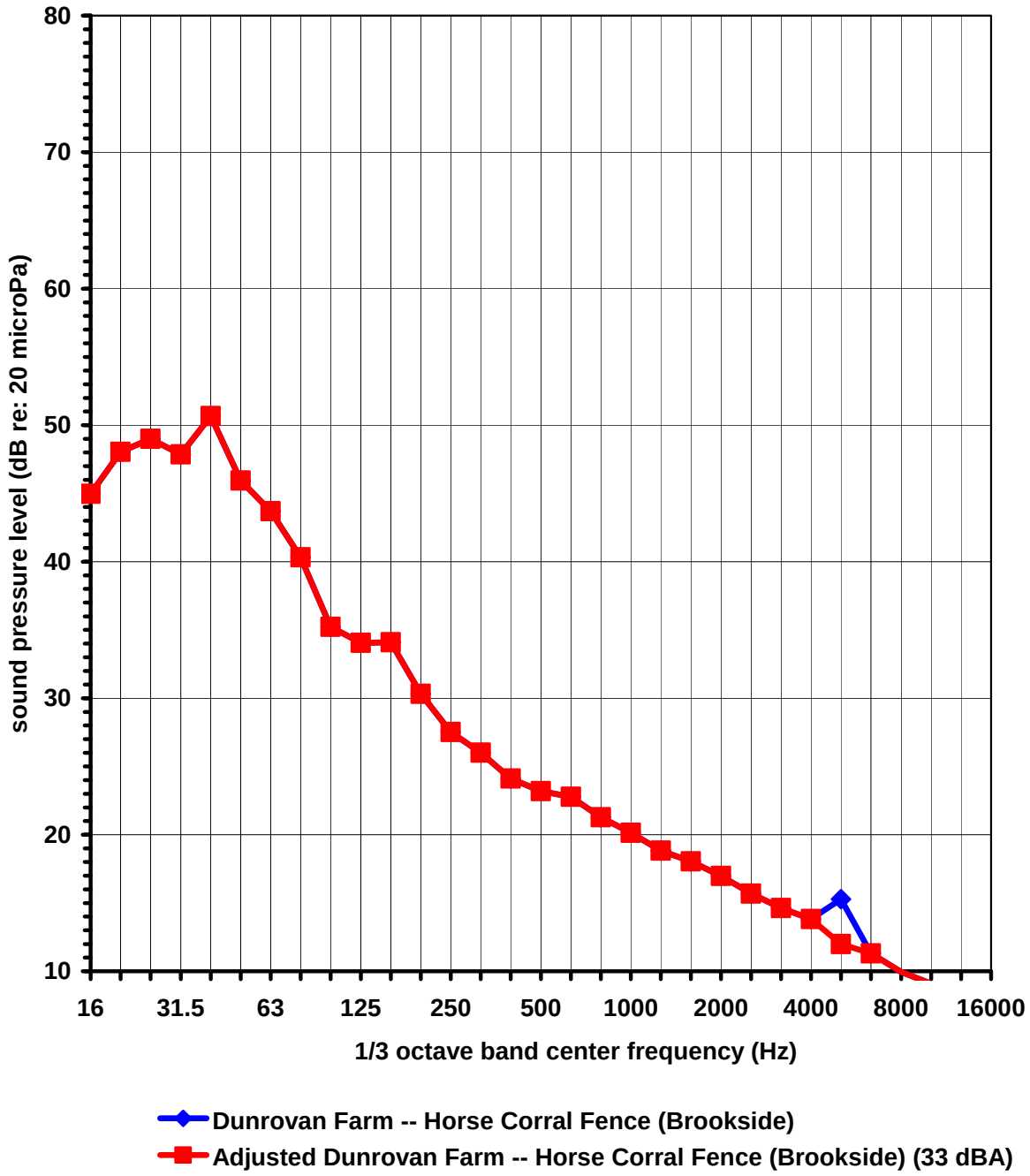

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/3 octave band center frequency (Hz)
Dunrovan Farm -- Horse Corral Fence (Brookside)
Adjusted Dunrovan Farm -- Horse Corral Fence (Brookside) (33 dBA)

Figure B3.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

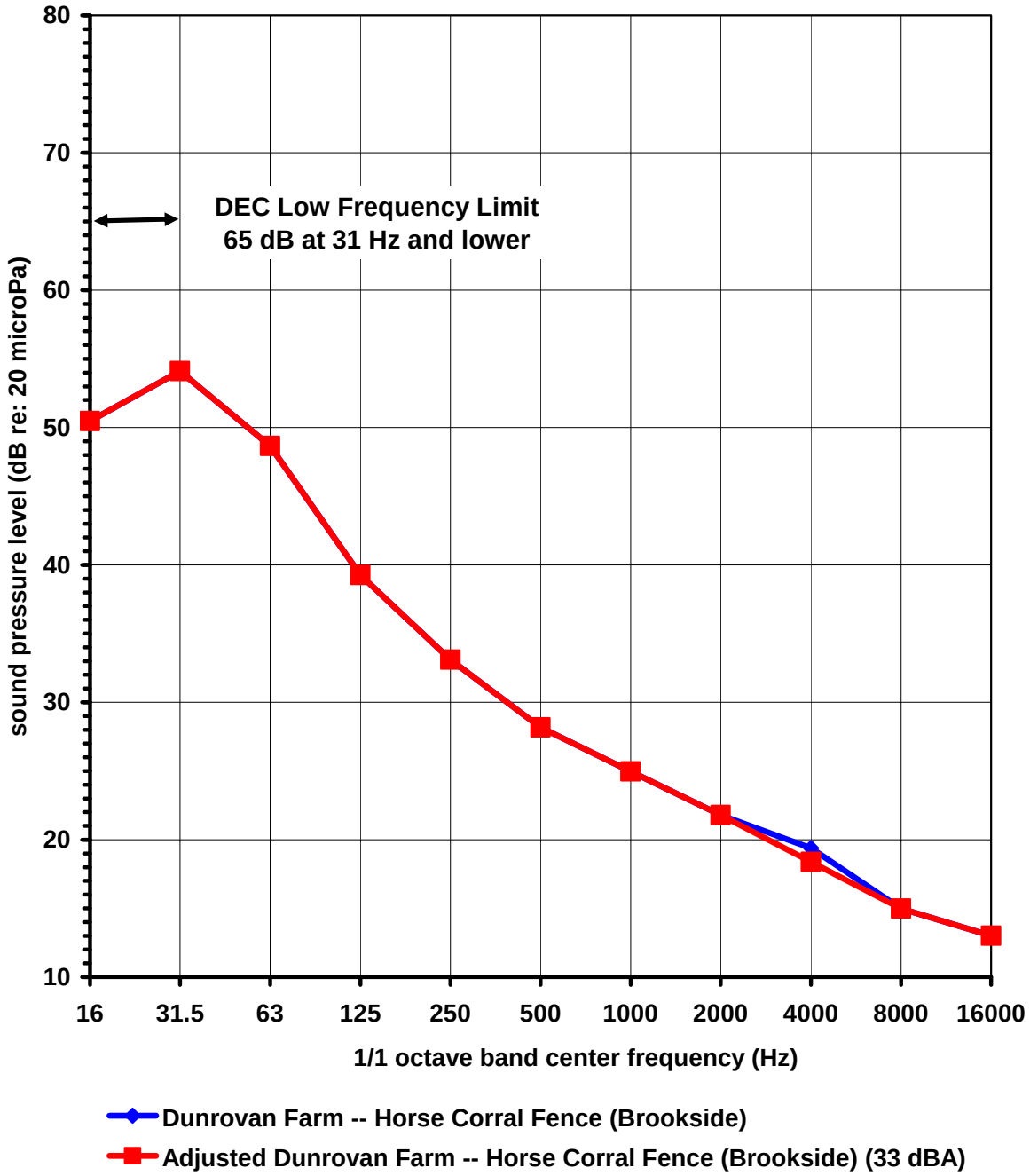


Figure B4.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

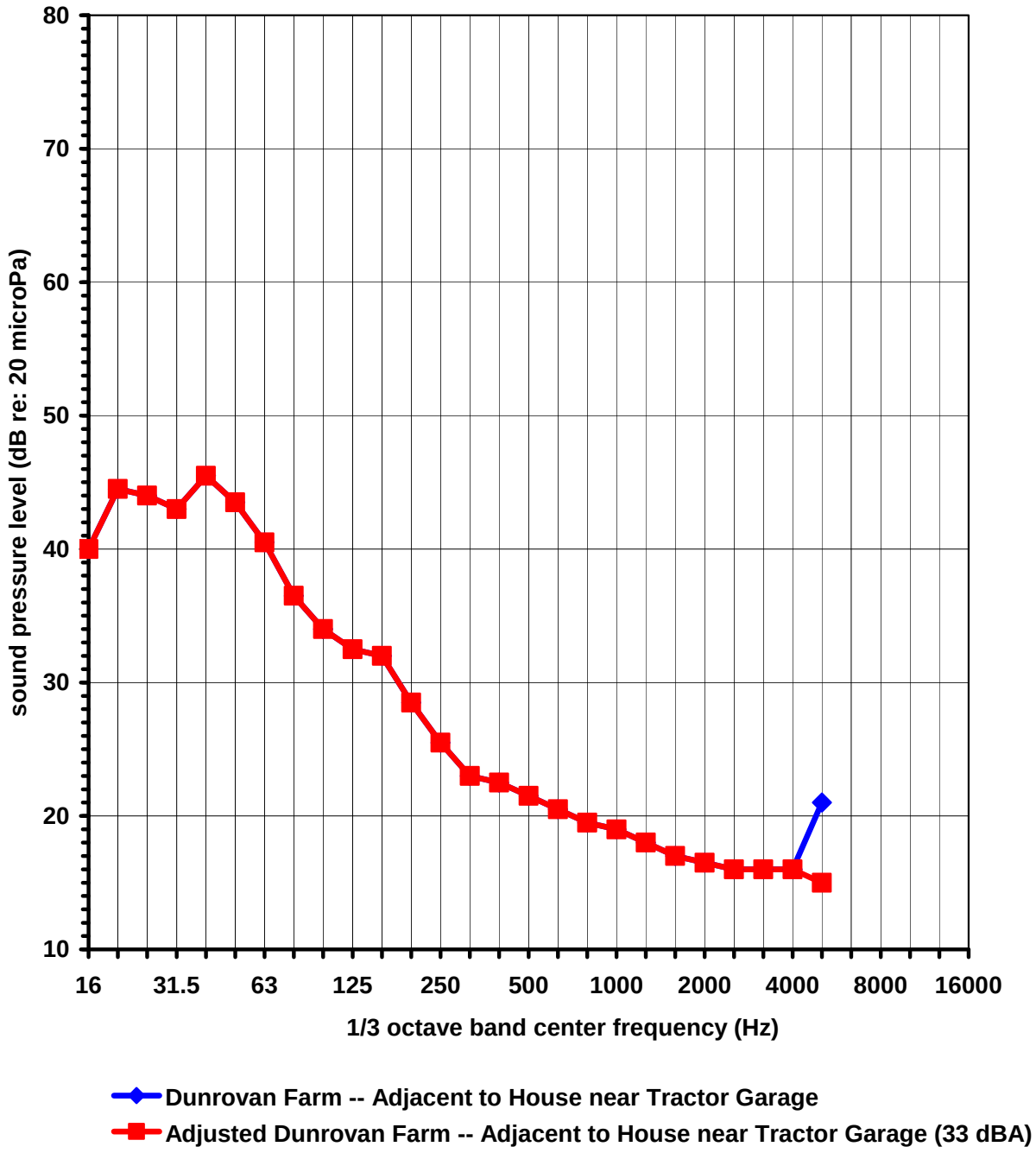


Figure B5.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

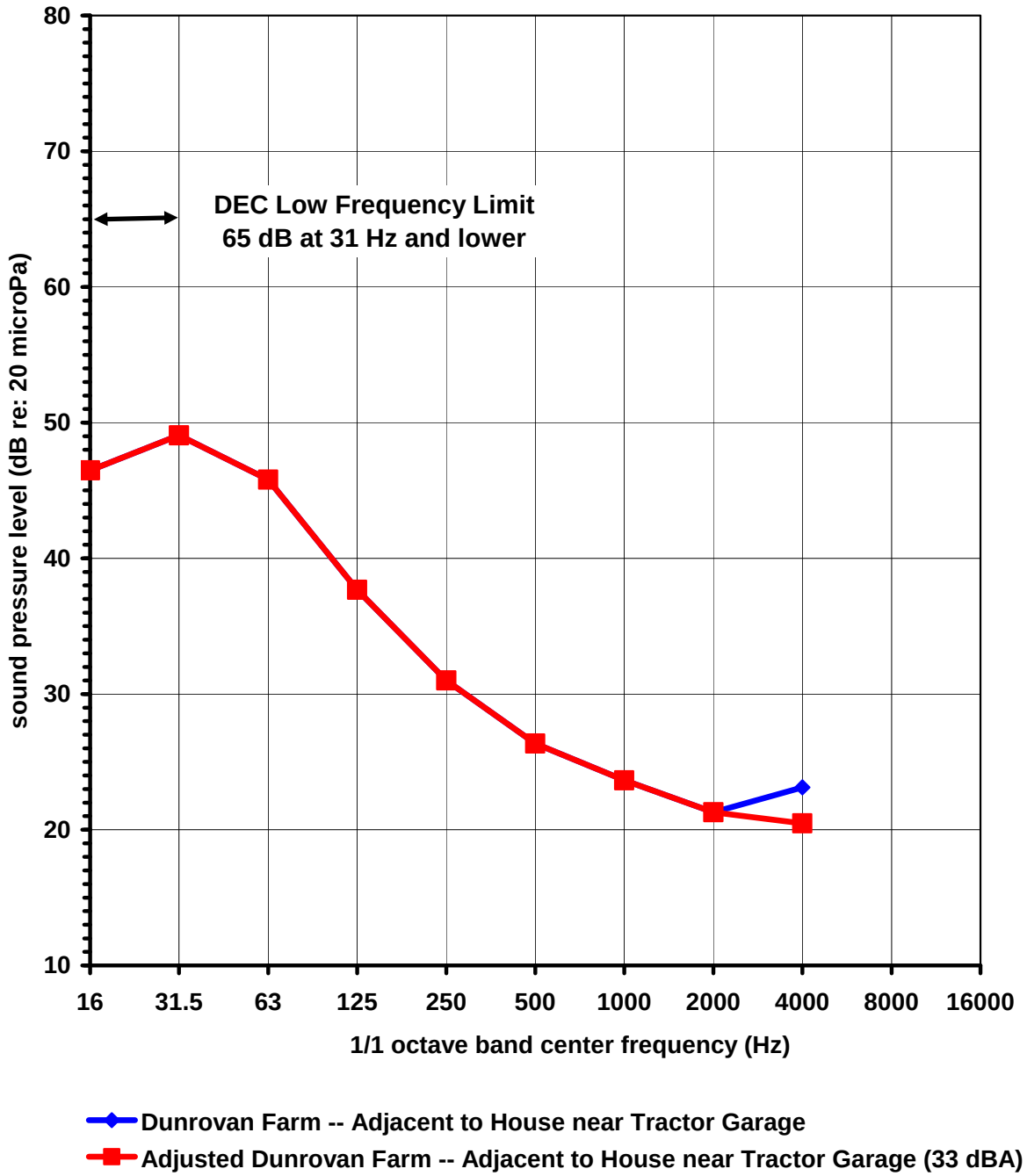


Figure B6.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

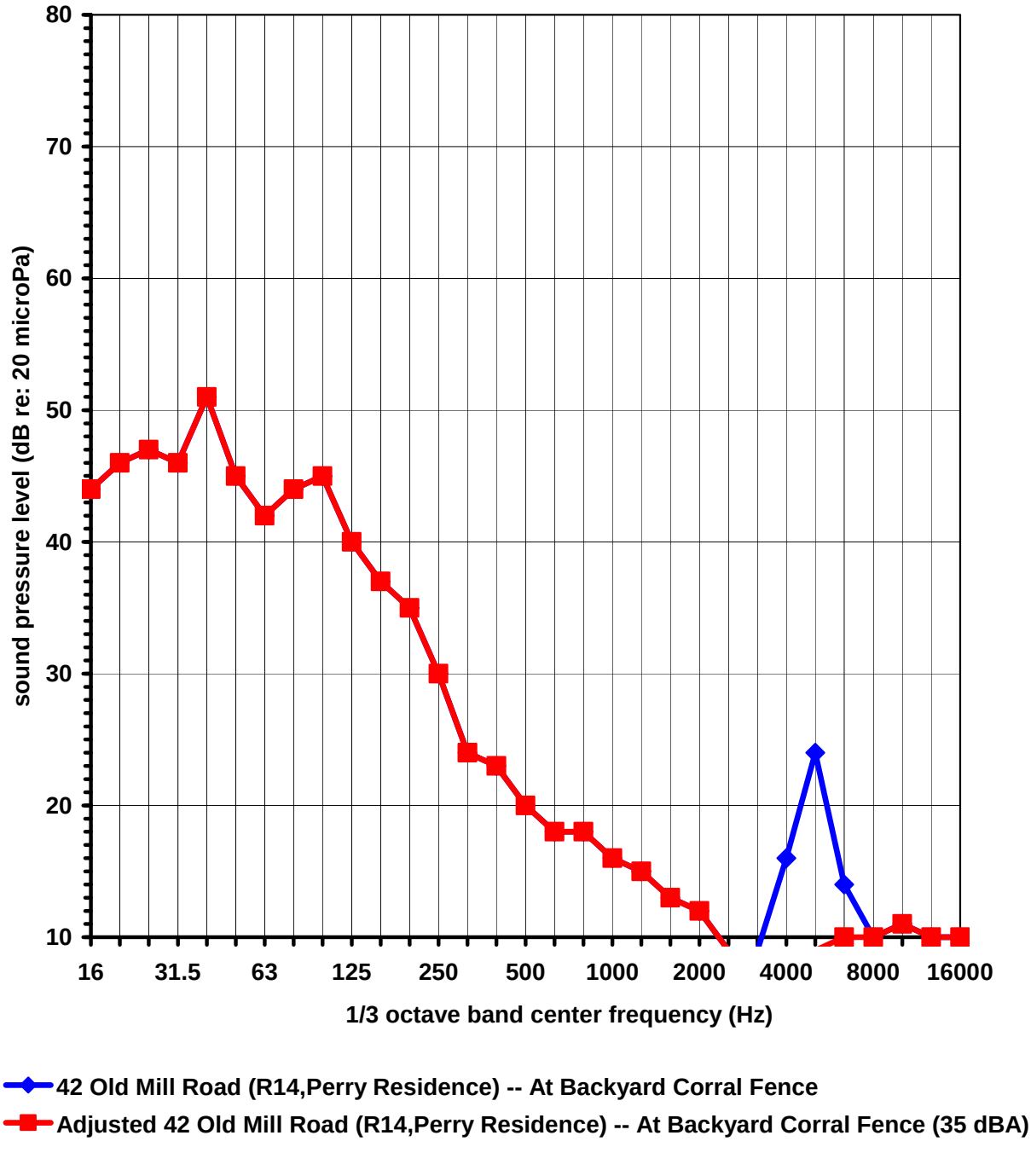


Figure B7.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

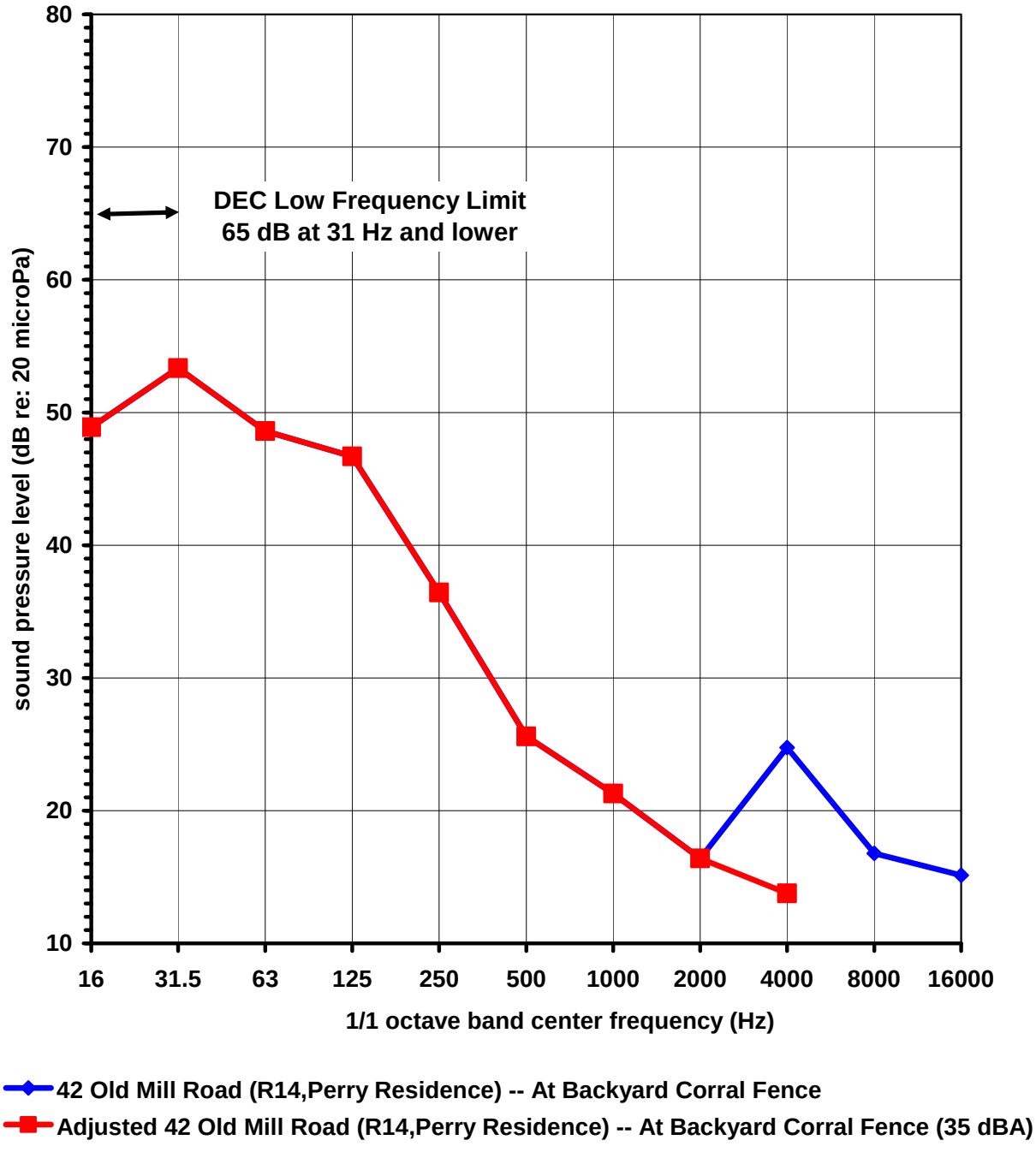


Figure B8.

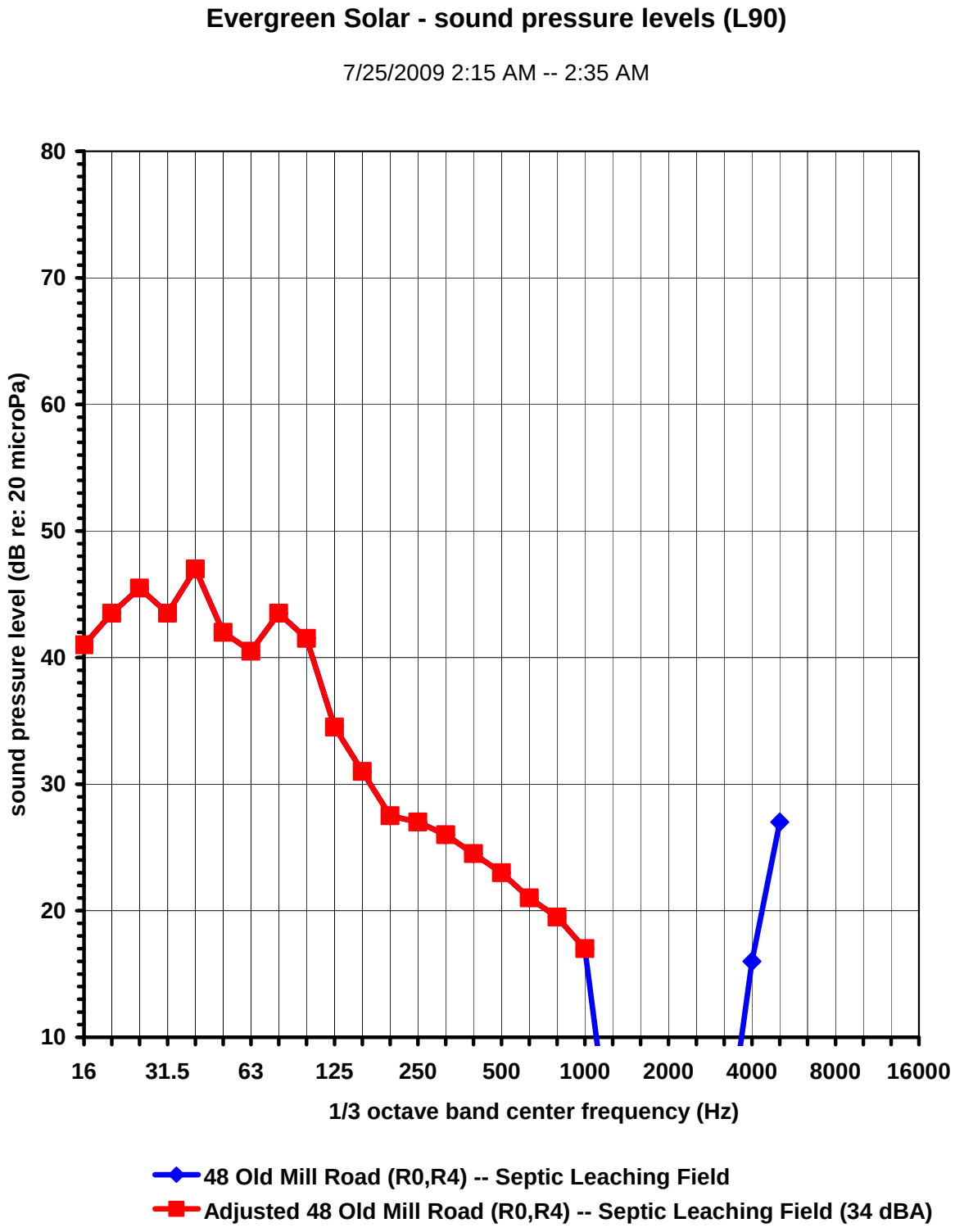

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/3 octave band center frequency (Hz)
48 Old Mill Road (R0,R4) -- Septic Leaching Field
Adjusted 48 Old Mill Road (R0,R4) -- Septic Leaching Field (34 dBA)

Figure B9.

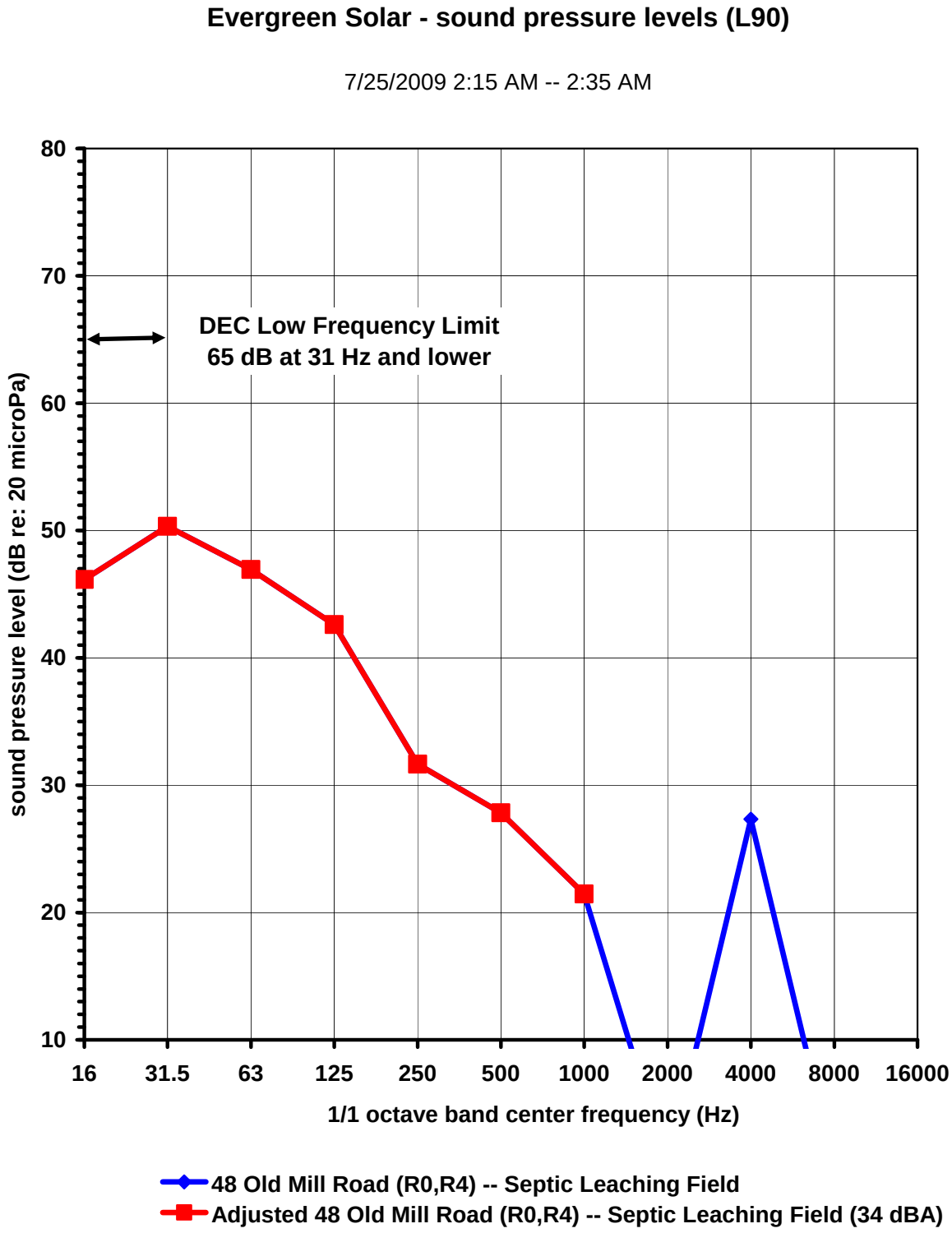

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
DEC Low Frequency Limit
65 dB at 31 Hz and lower
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/1 octave band center frequency (Hz)
48 Old Mill Road (R0,R4) -- Septic Leaching Field
Adjusted 48 Old Mill Road (R0,R4) -- Septic Leaching Field (34 dBA)

Figure B10.

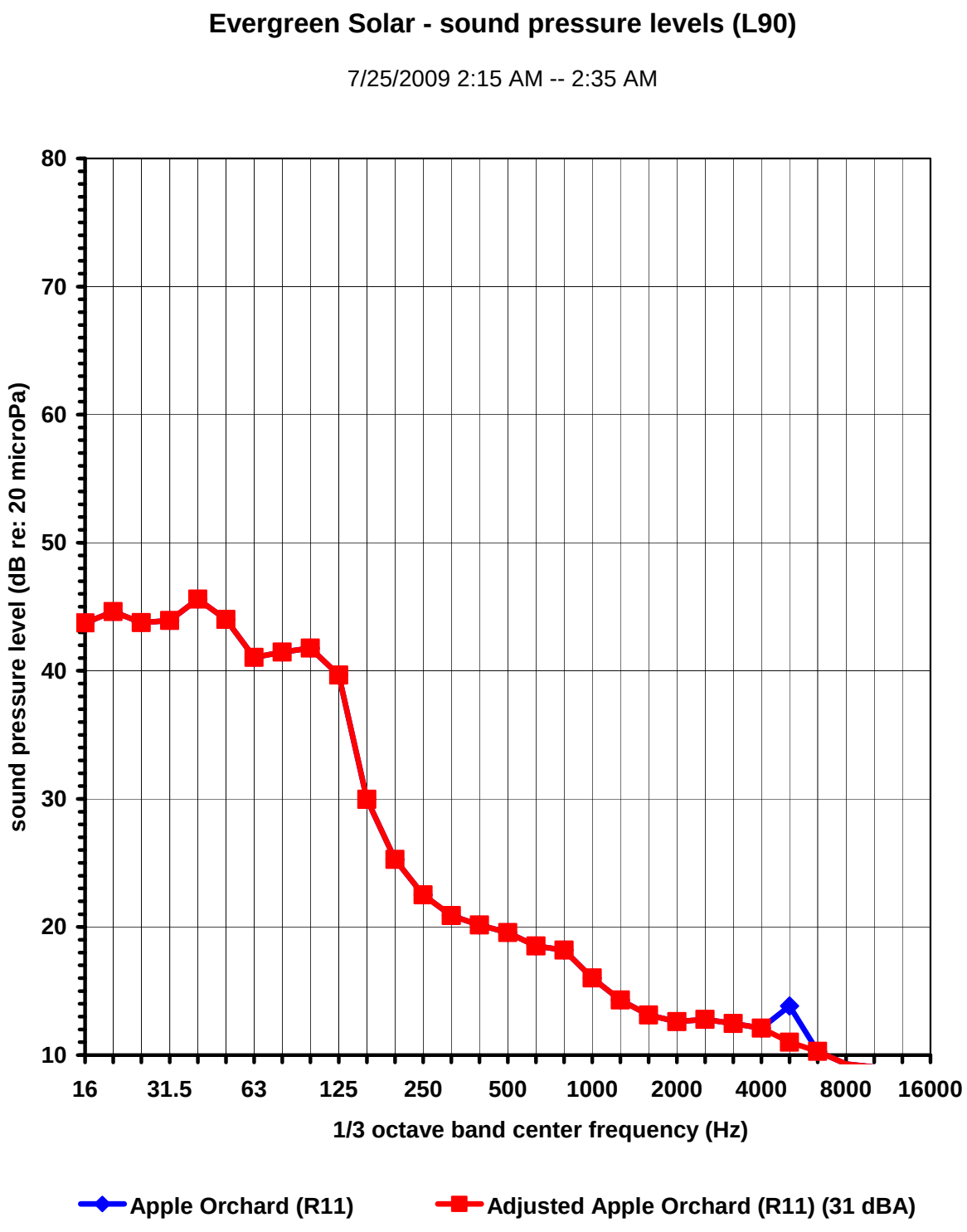

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/3 octave band center frequency (Hz)
Apple Orchard (R11)
Adjusted Apple Orchard (R11) (31 dBA)

Figure B11.

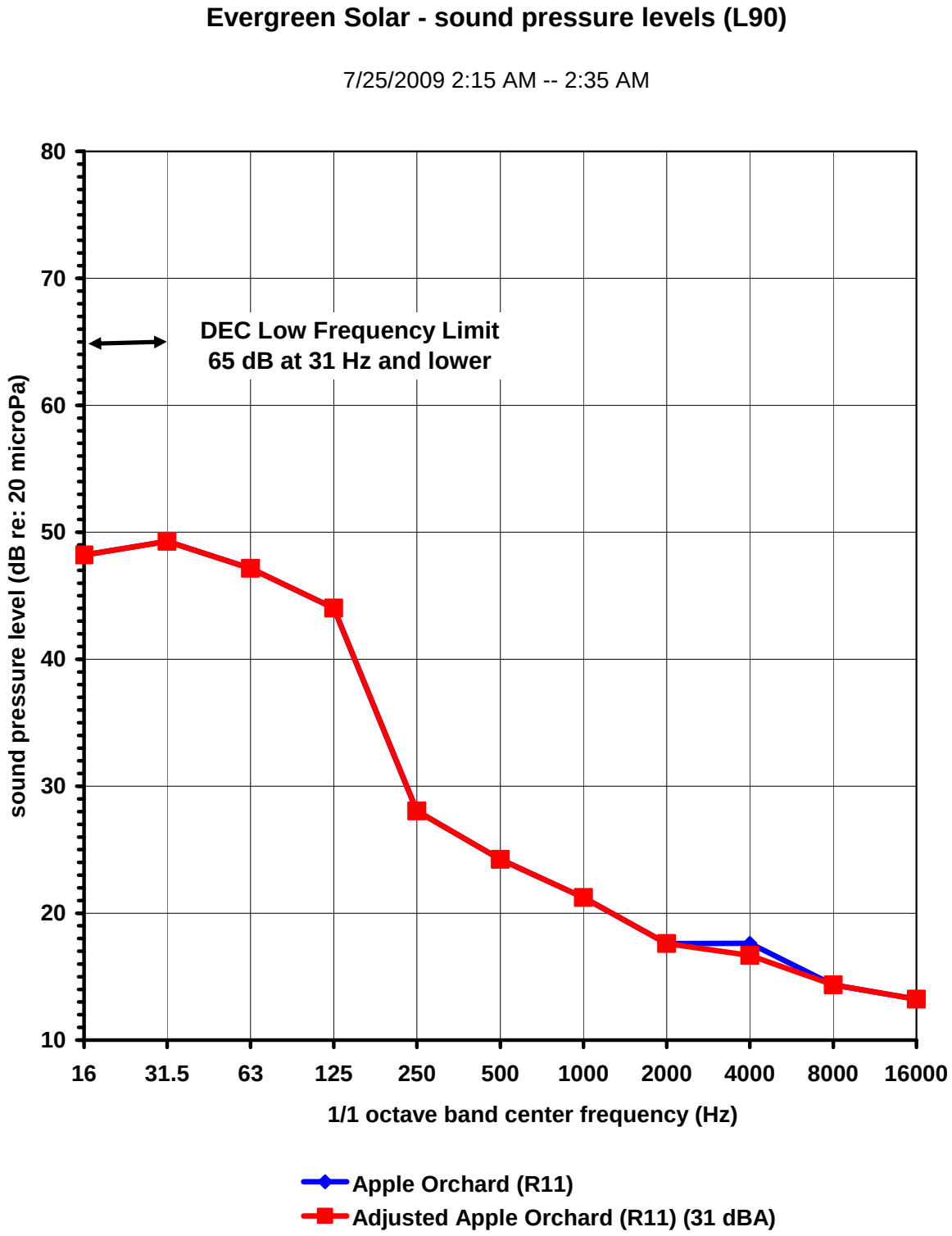

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
DEC Low Frequency Limit
65 dB at 31 Hz and lower
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/1 octave band center frequency (Hz)
Apple Orchard (R11)
Adjusted Apple Orchard (R11) (31 dBA)

Figure B12.

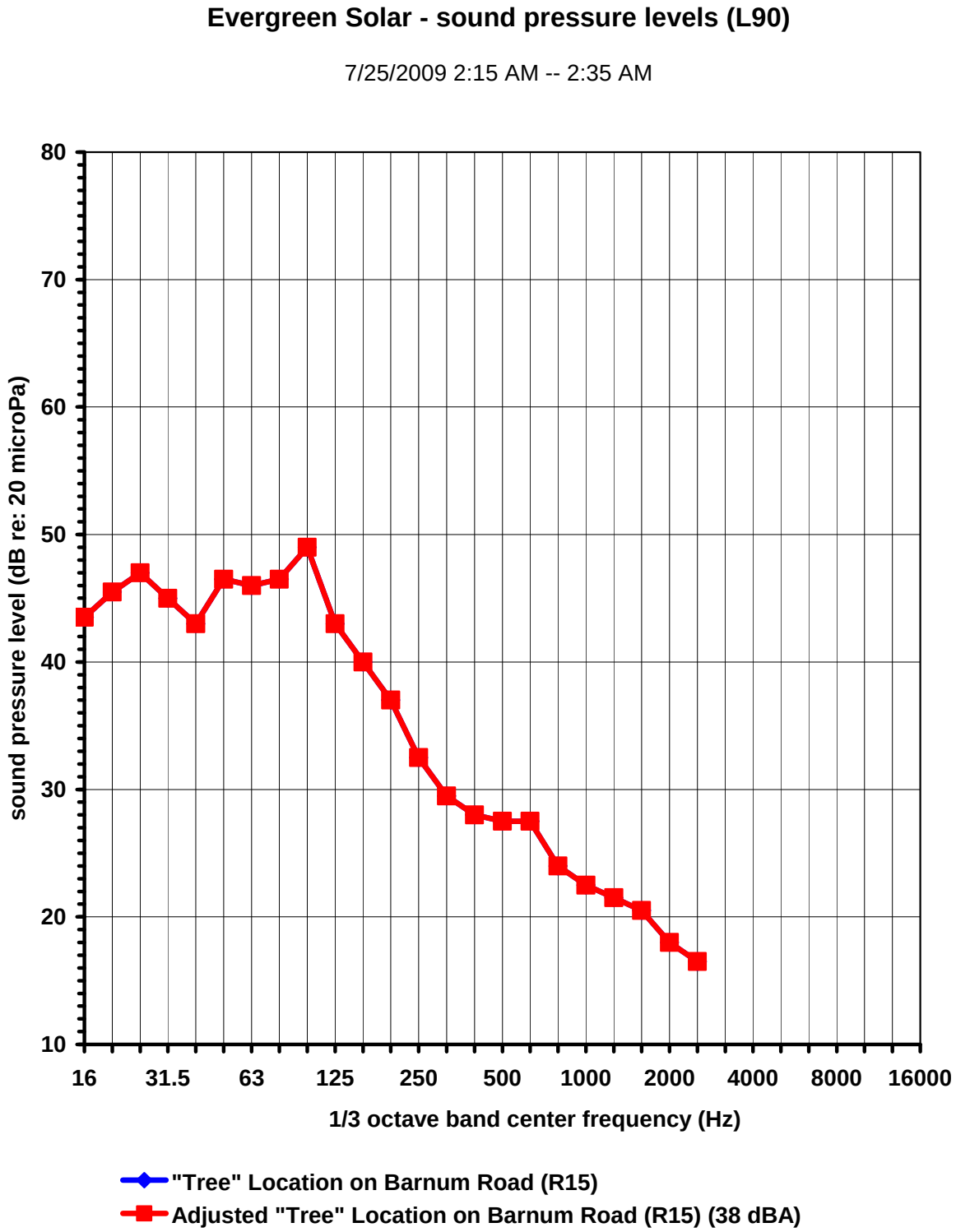

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/3 octave band center frequency (Hz)
"Tree" Location on Barnum Road (R15)
Adjusted "Tree" Location on Barnum Road (R15) (38 dBA)

Figure B13.

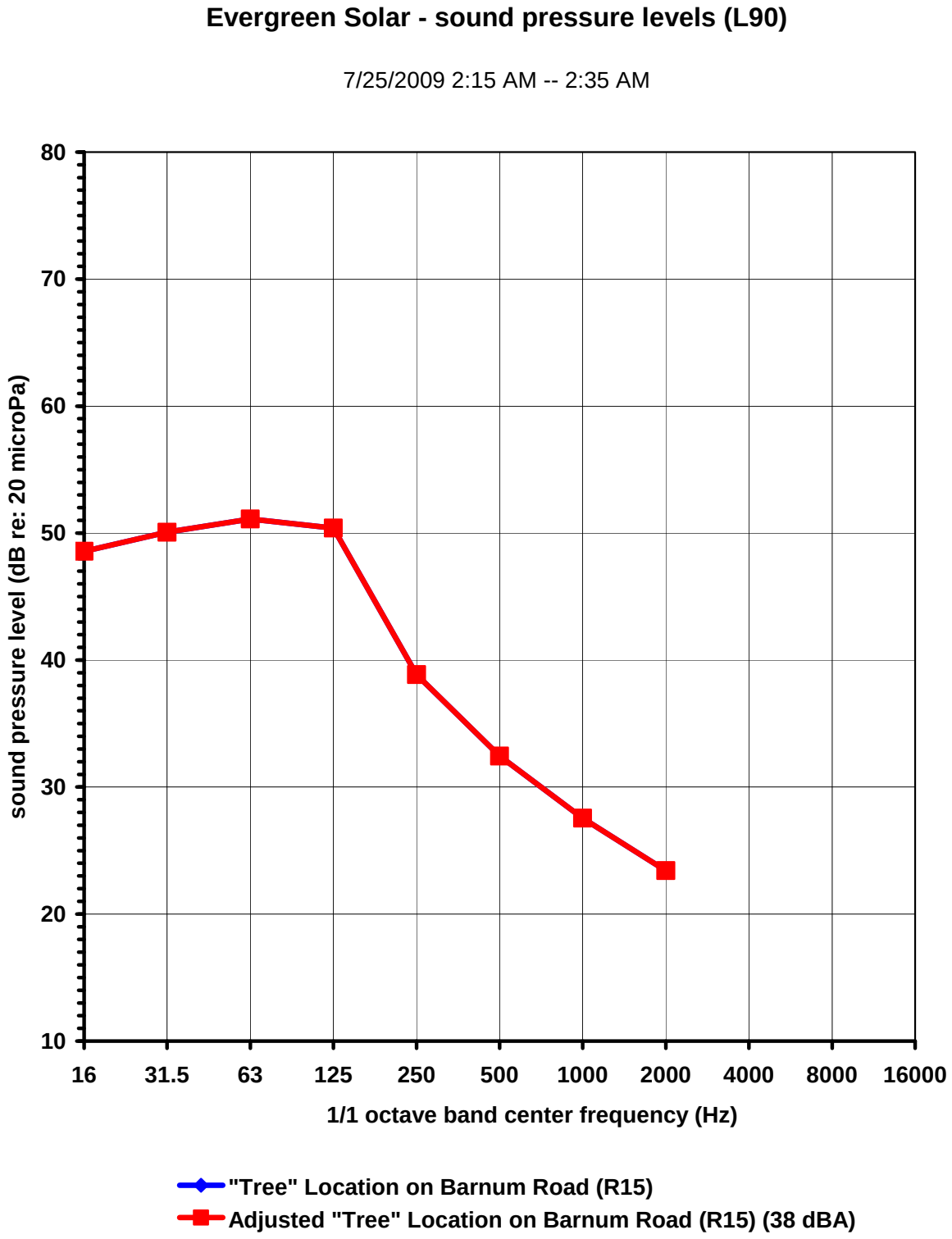

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/1 octave band center frequency (Hz)
"Tree" Location on Barnum Road (R15)
Adjusted "Tree" Location on Barnum Road (R15) (38 dBA)

Figure B14.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

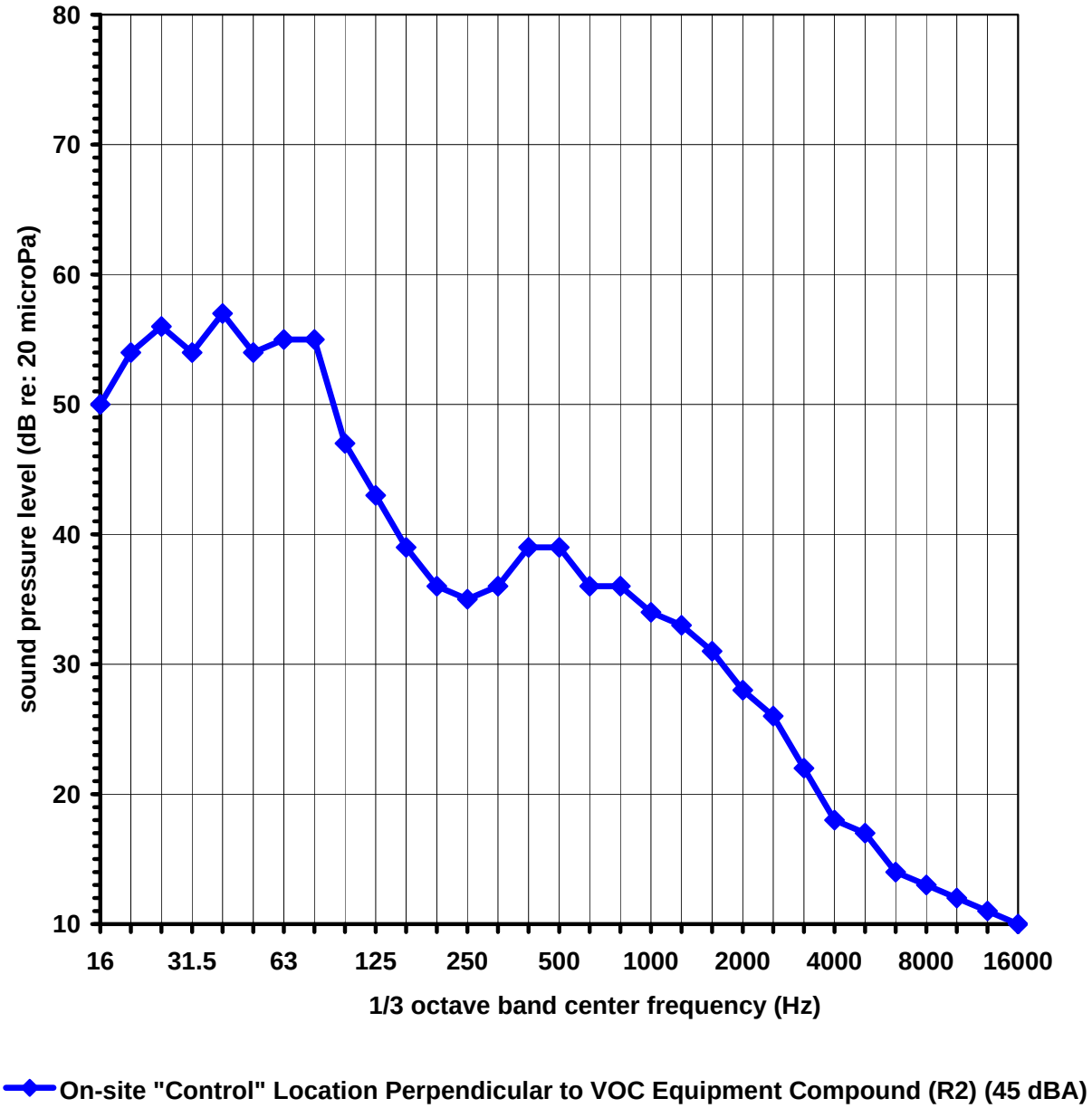


Figure B15.

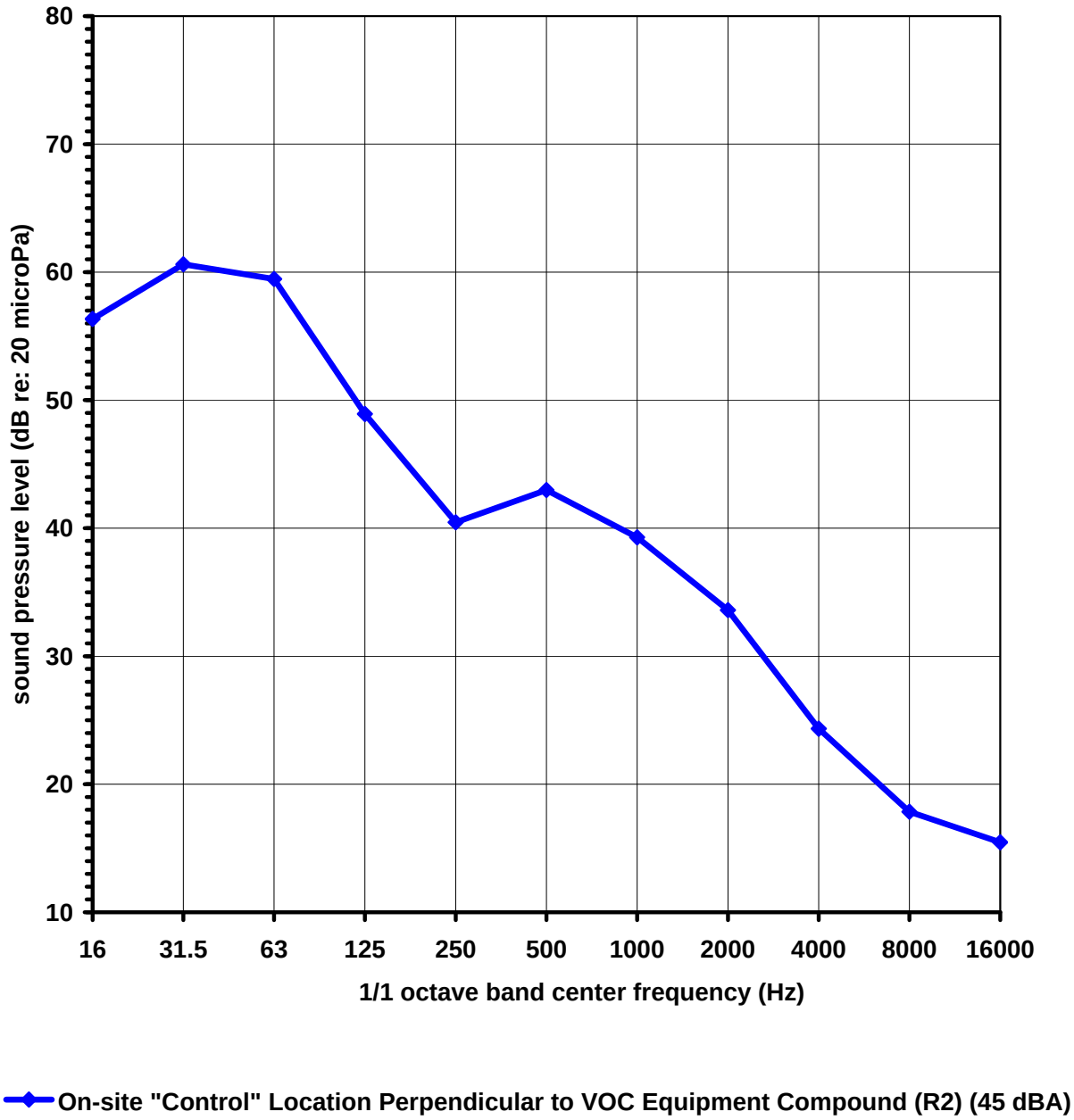

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/1 octave band center frequency (Hz)
On-site "Control" Location Perpendicular to VOC Equipment Compound (R2) (45 dBA)

Figure B16.

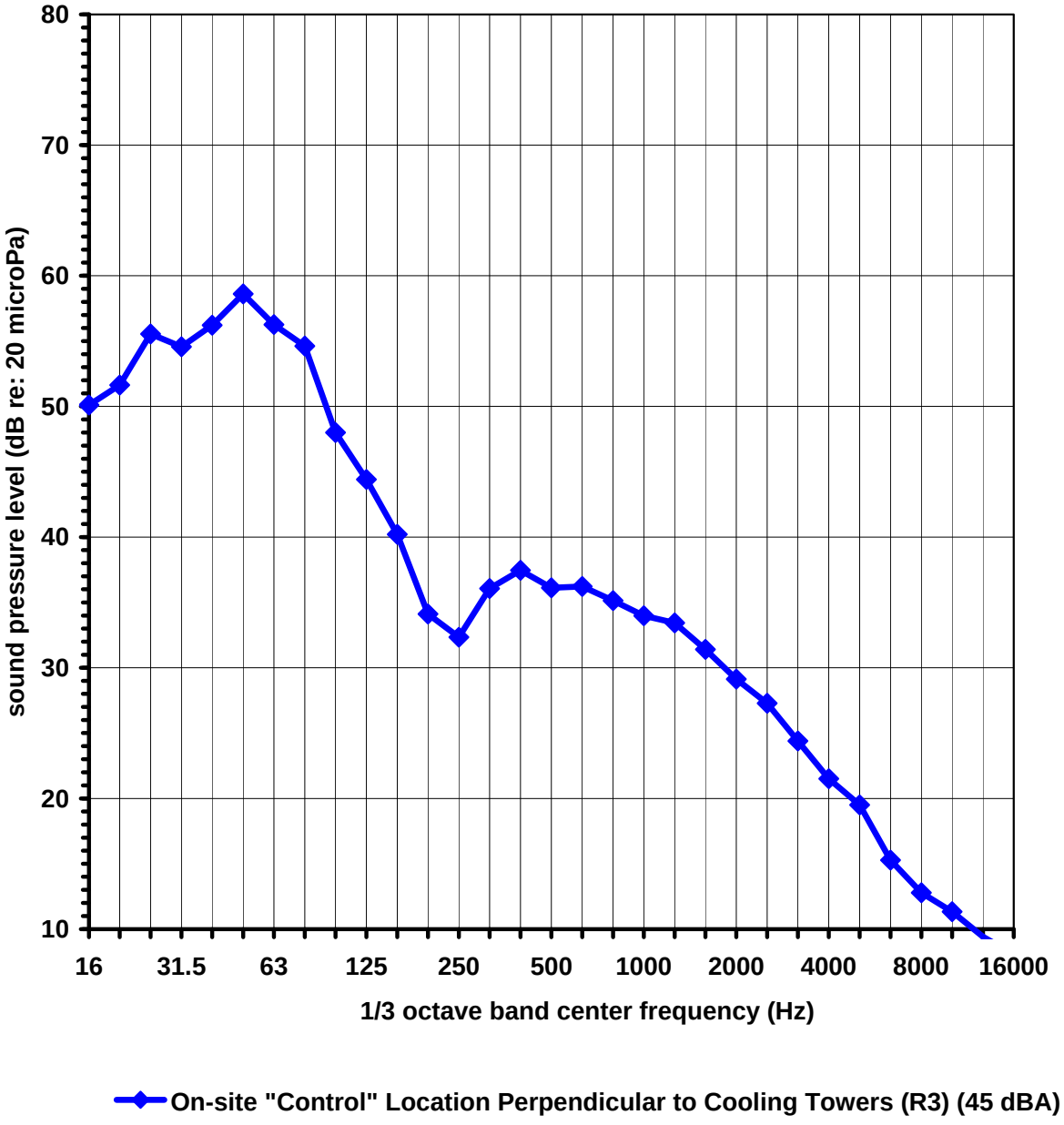

Evergreen Solar - sound pressure levels (L90)
7/25/2009 2:15 AM -- 2:35 AM
sound pressure level (dB re: 20 microPa)
80
70
60
50
40
30
20
10
16
31.5
63
125
250
500
1000
2000
4000
8000
16000
1/3 octave band center frequency (Hz)
On-site "Control" Location Perpendicular to Cooling Towers (R3) (45 dBA)

Figure B17.

Evergreen Solar - sound pressure levels (L90)

7/25/2009 2:15 AM -- 2:35 AM

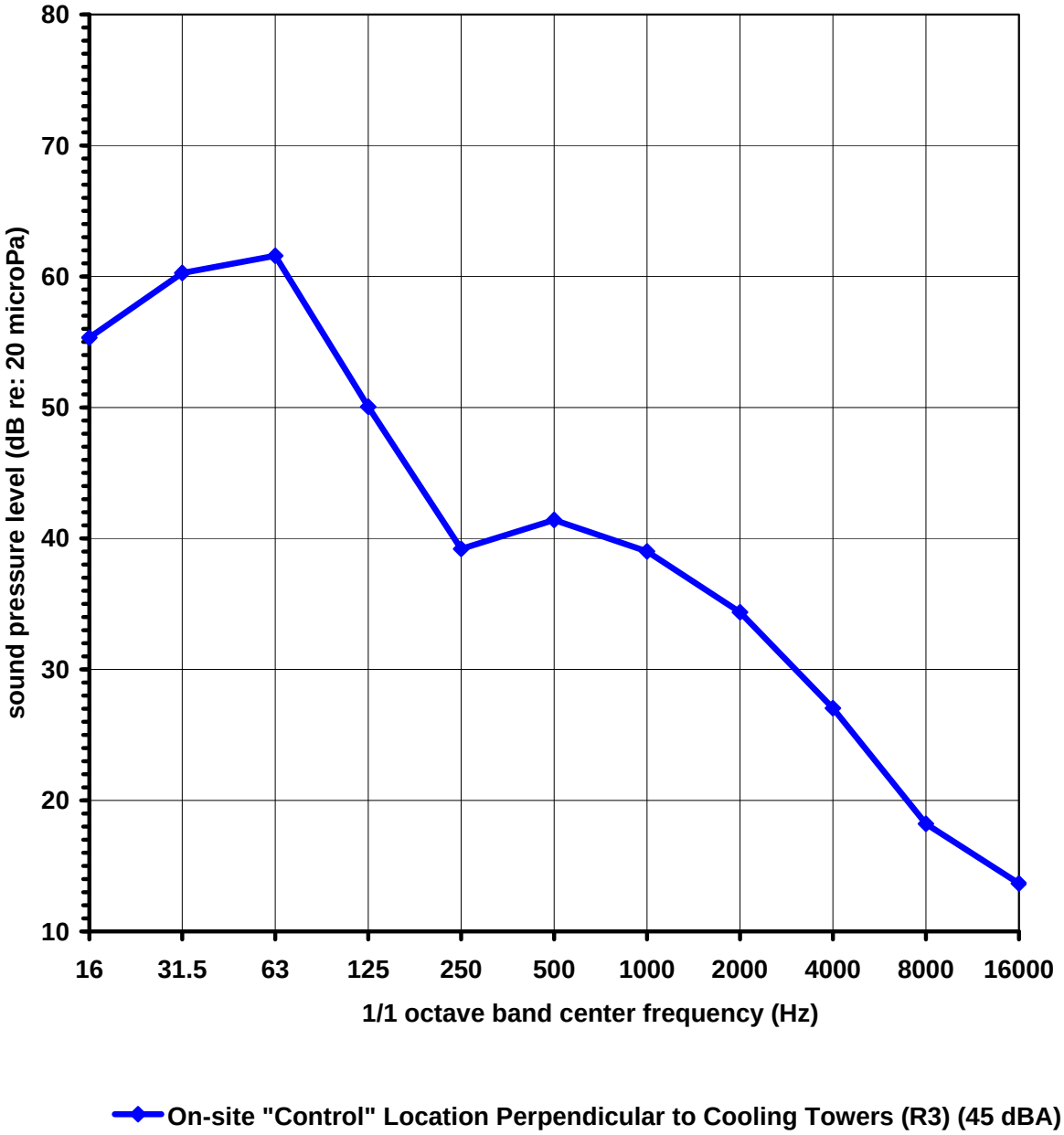


Figure B18.