

# Behrens and Associates, Inc.

*Environmental Noise Control*



December 22, 2009

Chesapeake Energy Corporation  
100 Energy Way  
Eules, TX 76102

Attention: Laura Wallace

Subject: Bear Creek Drill Site Eules Noise Management Plan

Dear Mrs. Wallace:

The following Noise Abatement Study was developed for your Bear Creek drill site per the requirements of the City of Eules. Chesapeake Energy has scheduled a typical drilling rig to drill this well. Based on measured operational and ambient sound levels, the noise levels generated by gas well drilling, fracing, and production operations at this location will be in compliance with the requirements of Eules's Gas Well Permit Requirements.

## **Site Location and Conditions**

The Bear Creek well is located off the Highway 360 Service Road approximately 1/5 of a mile north of East Mid Cities Road in Eules, Texas. The nearest off-site noise receptor to the site is a commercial building located approximately 330 feet to the northwest of the wellhead.

## **Ambient Sound Level Survey**

A 72-hour pre-drilling sound level survey was performed for the Bear Creek drill site per the requirements of the City of Eules from Thursday, December 17, to Saturday, December 19, 2009, to measure and document the pre-drilling ambient sound levels at the site.

## **Sound Measurement Instrumentation**

A Type 1 Bruel & Kjaer 2238 Mediator Sound Level Meter was programmed, calibrated, and deployed at the site. The metering system was installed on a t-post located at the site approximately 5 feet above ground level in a metal enclosure for security purposes. The attached site map indicates the ambient measurement location at the site.

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## **Measurement Results**

The measured sound level data collected at the proposed drill site is attached in both a graphed and tabular form, as well as the calculated average daytime and nighttime allowable City of Euless Drilling Noise Levels. Daytime allowable hourly average noise levels of 71.8 dBA and nighttime levels of 69.8 dBA have been established from our measurement results.

## **Noise Impact Potential**

**DRILLING:** The typical primary noise sources generated by gas well drilling operations include the drilling rig engines, compressors, generators, mud pumps, and ancillary support equipment. Drilling sound levels vary from drill site to drill site depending on the type of drilling rig (top drive, rotary table, etc.) and depending on the drilling rig orientation. An operational noise level survey using a Type 1 Bruel & Kjaer 2238 Mediator Sound Level Meter was completed for a typical drilling rig on September 26, 2007. The operational average sound levels were measured and documented on all four sides of the drilling rig while drilling. Operational noise levels on the generator side of the rig represent the highest sound level impact potential at a distance. A layout of a typical drilling rig with measured operational sound levels is included in the attachments of this report. The typical drilling rig will be using self-contained mud tanks at this site. The daytime and nighttime drilling sound levels will be in compliance at this site without the installation of temporary sound walls during gas well drilling operations.

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**FRACING:** The high level noise generated by gas well fracing operations are produced from the truck mounted engines which drive the high pressure pumps. Support equipment such as sand trucks, water pumps and generators have a small contribution to the over-all noise levels of the operations. Off-site fracing noise levels typically do not vary from operator to operator, but the off-site transmission of the noise can be affected by the topography of the frac site. Typical Barnett Shale fracing operations have been measured to establish anticipated noise level impacts at distances from the fracing site. The noise surveys were completed with a Type 1 Bruel & Kjaer Model 2238 Sound Level Analyzer programmed to measure and document maximum sound levels. Fracing operational sound levels were measured and documented on all four sides of the fracing operation at flat, open sites. A graph indicating the measured fracing sound levels at distance is included in the attachments of this report. The daytime and nighttime fracing sound levels will be in compliance at this site without the installation of temporary sound walls during fracing operations.

**GAS WELL PRODUCTION:** Although a gas wellhead compressor is not planned for this gas well, the noise impact generated by a typical 95 horse power wellhead compressor positioned on the pad was evaluated. Chesapeake Energy has numerous wellhead gas compressors operating in the Barnett Shale. We have completed a number of operational noise level surveys of these wellhead compressors and have documented the highest measured unmitigated wellhead compressor noise levels, which are shown in the graph indicating the measured wellhead compressor operational sound levels at distance. If a typical gas wellhead compressor is utilized on this site, the daytime and nighttime production sound levels will be in compliance at this site without the installation of sound walls during gas well production operations.

Very truly yours,

Donald Behrens  
President

Attachments

# Behrens and Associates, Inc.

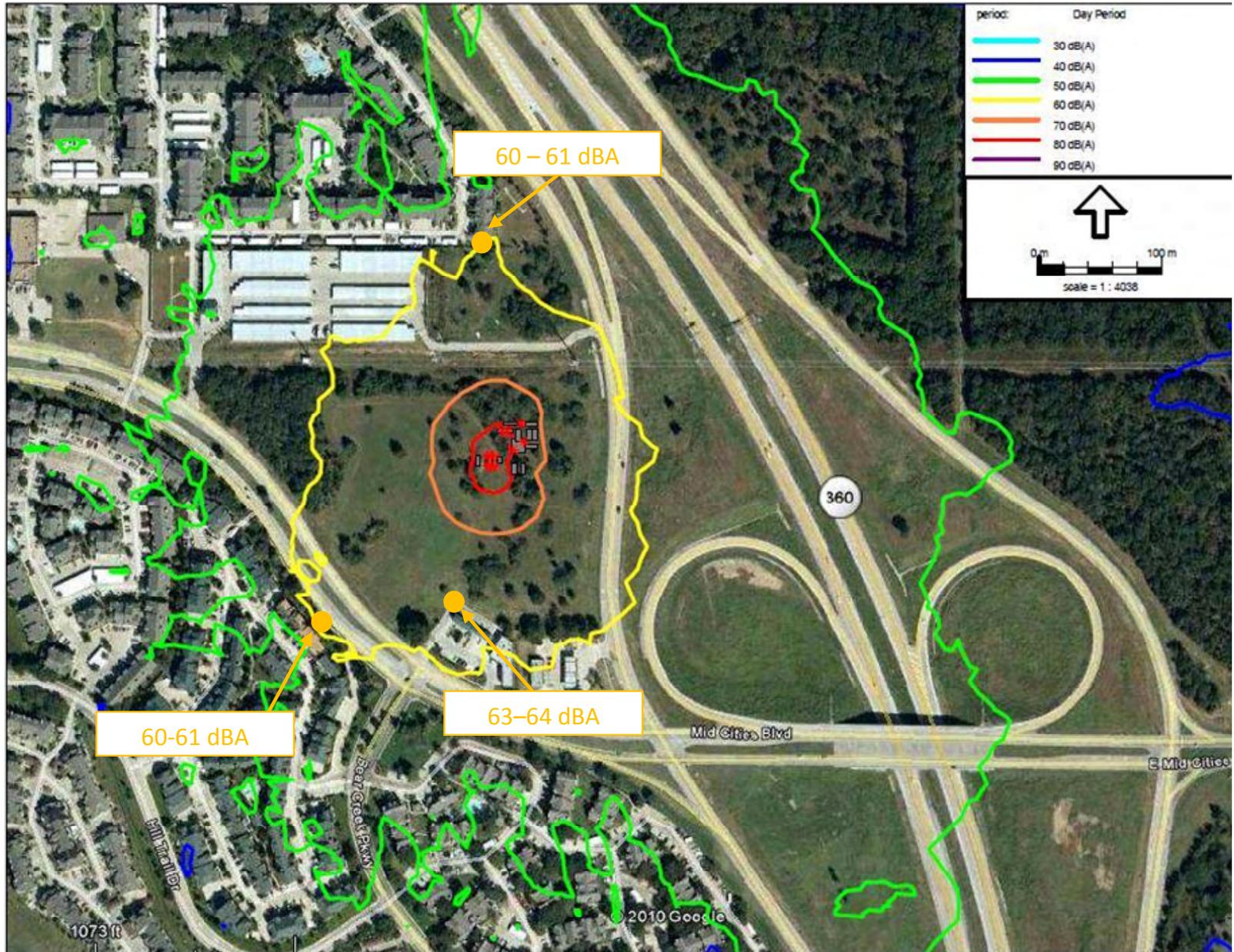
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Bear Creek Unmitigated Isomap

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Bear Creek Unmitigated Isomap

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Bear Creek Site Data December 17 - 19, 2009	
Time	Leq
<b>Thu 17-Dec</b>	61.6
1:00 AM	62.2
2:00 AM	57.4
3:00 AM	58.3
4:00 AM	60.2
5:00 AM	66
6:00 AM	68.2
7:00 AM	68.5
8:00 AM	66.8
9:00 AM	66.7
10:00 AM	65.3
11:00 AM	65.5
12:00 PM	66.5
1:00 PM	66
2:00 PM	66.2
3:00 PM	66.6
4:00 PM	69.8
5:00 PM	70.9
6:00 PM	71
7:00 PM	70.1
8:00 PM	70
9:00 PM	68.8
10:00 PM	67.9
11:00 PM	66.3
<b>Fri 18-Dec</b>	64.6
1:00 AM	62
2:00 AM	60.2
3:00 AM	61.1
4:00 AM	64.2
5:00 AM	66.6
6:00 AM	69.7
7:00 AM	69.7
8:00 AM	66.7
9:00 AM	65.1
10:00 AM	64.4
11:00 AM	65.1
12:00 PM	64.9

Bear Creek Site Data December 17 - 19, 2009	
Time	Leq
1:00 PM	66.9
2:00 PM	68
3:00 PM	67.6
4:00 PM	68.7
5:00 PM	69
6:00 PM	69.4
7:00 PM	69.2
8:00 PM	70.9
9:00 PM	70.4
10:00 PM	67.8
11:00 PM	63.3
<b>Sat 19-Dec</b>	61.9
1:00 AM	61.8
2:00 AM	59
3:00 AM	58.1
4:00 AM	58.9
5:00 AM	62.9
6:00 AM	64.9
7:00 AM	67.3
8:00 AM	65.5
9:00 AM	65.4
10:00 AM	64.5
11:00 AM	65.9
12:00 PM	65.1
1:00 PM	65.3
2:00 PM	65.9
3:00 PM	66.7
4:00 PM	67.5
5:00 PM	67.6
6:00 PM	67.4
7:00 PM	66.6
8:00 PM	66.7
9:00 PM	66.8
10:00 PM	68
11:00 PM	67.1

72-Hour Average:	66.8 dBA
Daytime Allowable Average:	71.8 dBA
Nighttime Allowable Average:	69.8 dBA

## Bear Creek Drill Site Ambient Sound Level Data

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09/26/07, 10:00 A.M.

Drilling Rig: A Typical

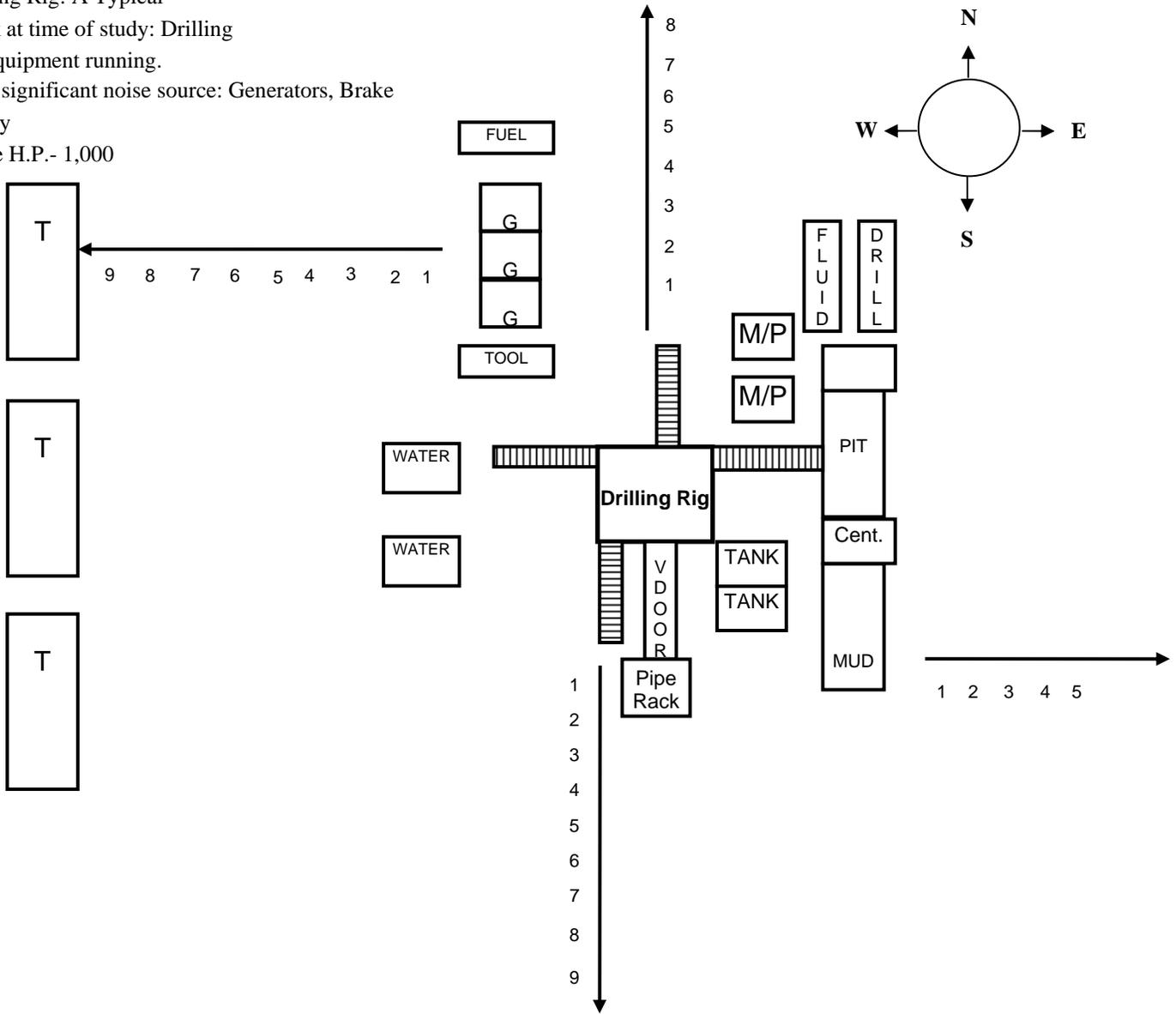
Work at time of study: Drilling

All equipment running.

Most significant noise source: Generators, Brake

Rotary

Brake H.P.- 1,000

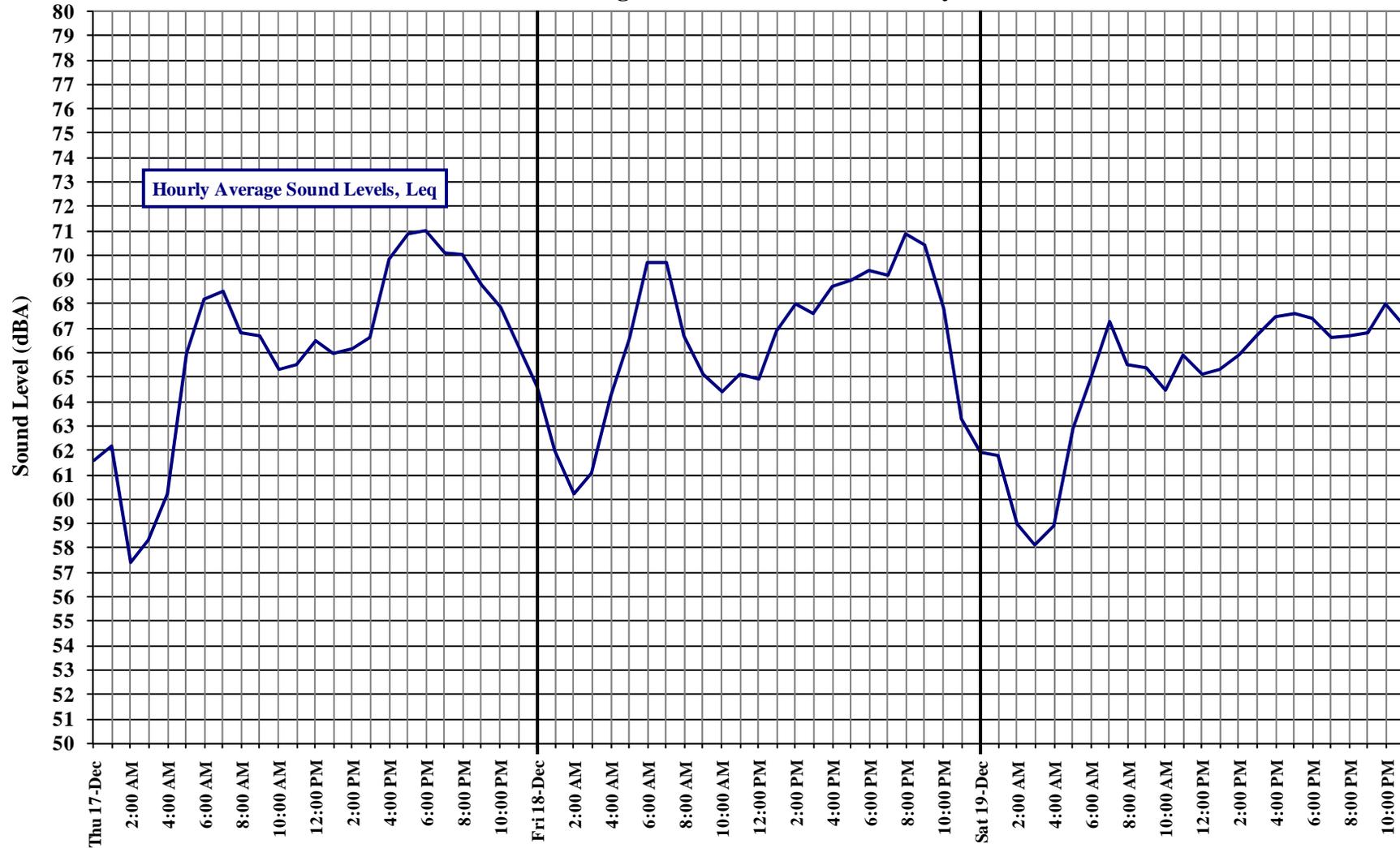


	Distance From Drilling Rig in Feet	Sound Level in dBA			
		North	East	South	West
1	25'	80.7	74.0	71.9	88.8
2	50'	78.3	71.2	71.2	83.8
3	75'	76.8	67.9	70.5	82.0
4	100'	73.2	68.1	69.2	79.7
5	200'	68.5	63.7	60.5	67.9
6	300'	64.9	57.4	59.9	67.7
7	400'	63.8	55.3	56.1	64.0
8	500'	60.1	54.7	52.8	61.2
9	600'	58.5	51.0	53.1	56.4

**A Typical Drilling Operational Noise Level**



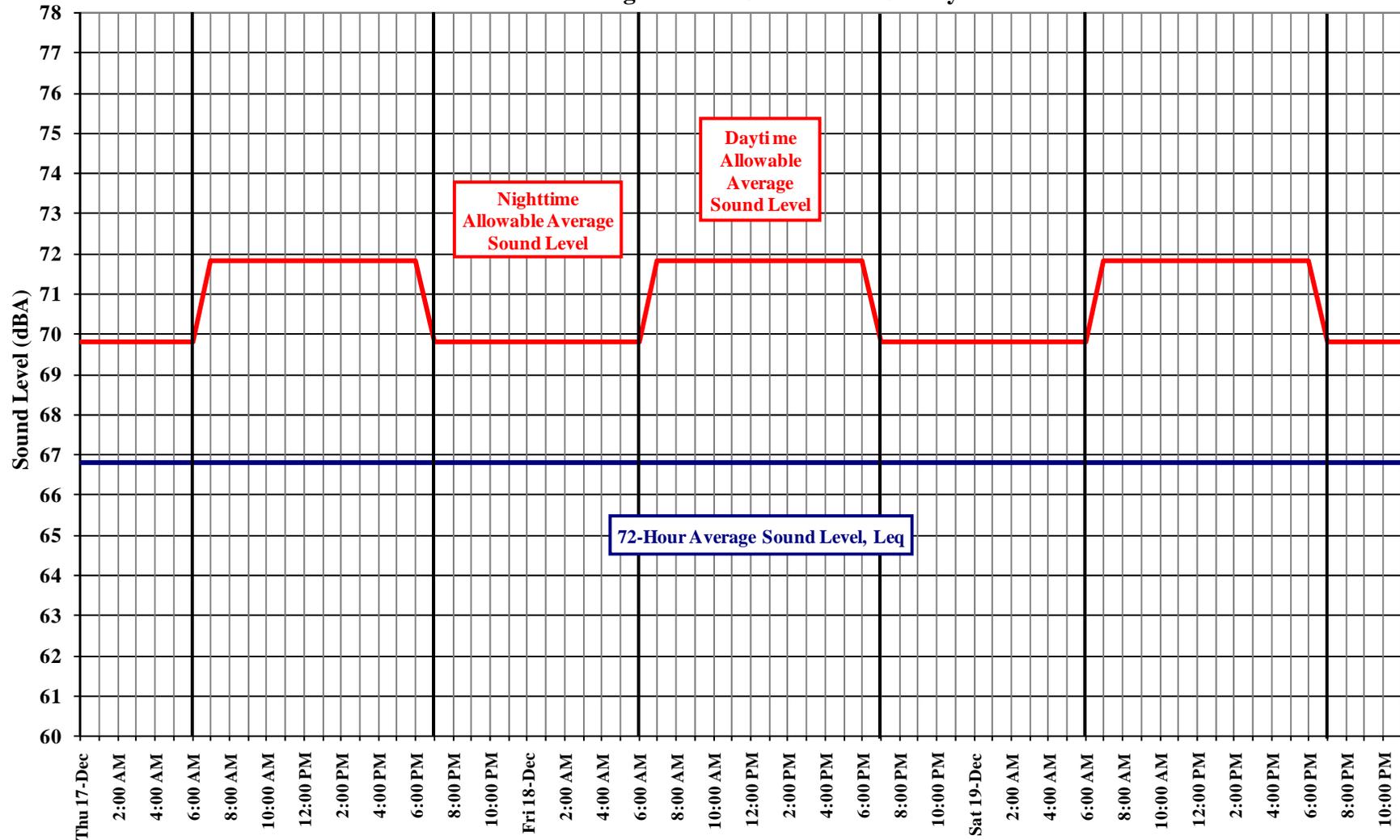
## Chesapeake Energy Corporation Bear Creek Drill Site Pre-Drilling Ambient Sound Level Survey



December 17 - December 19, 2009



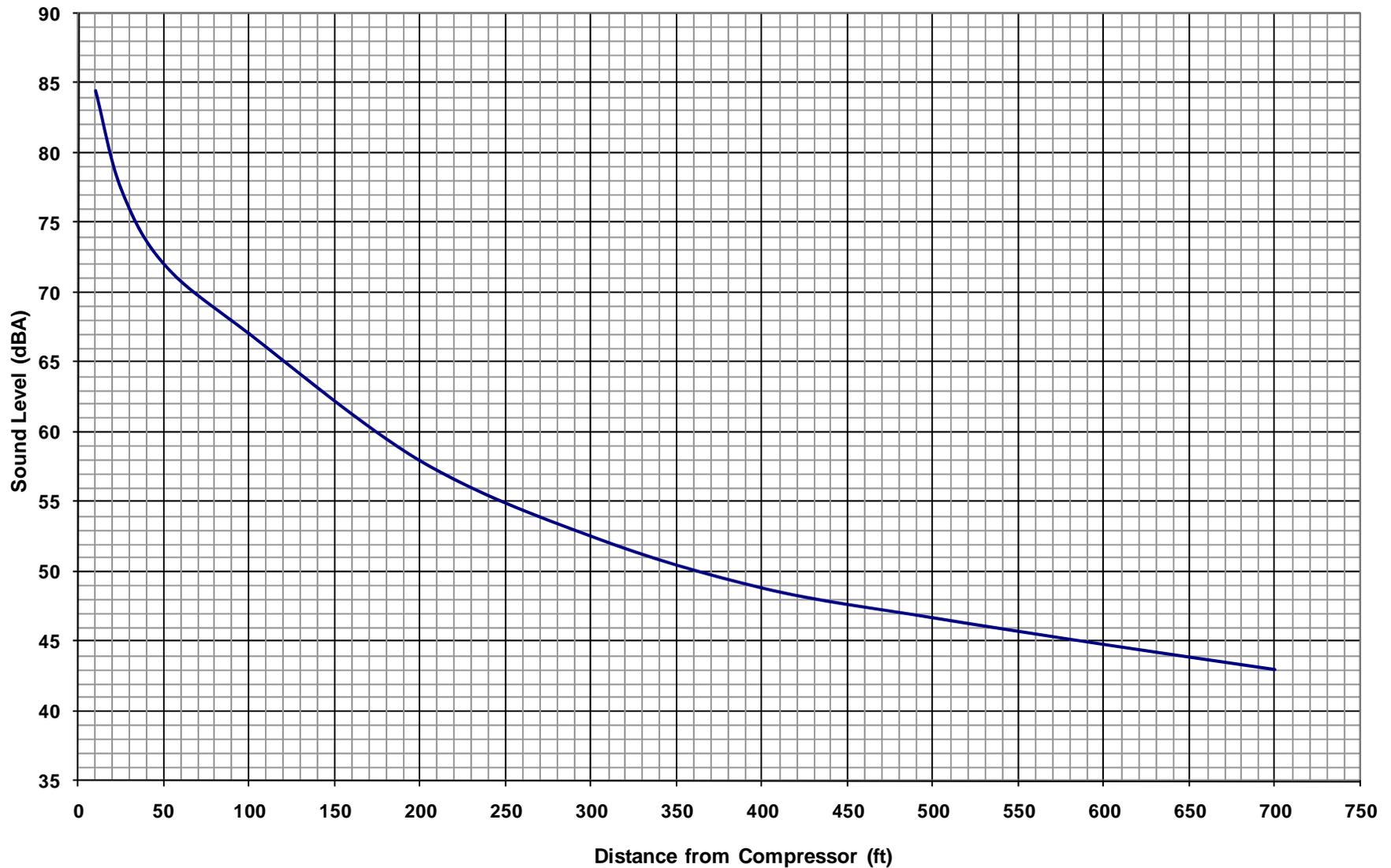
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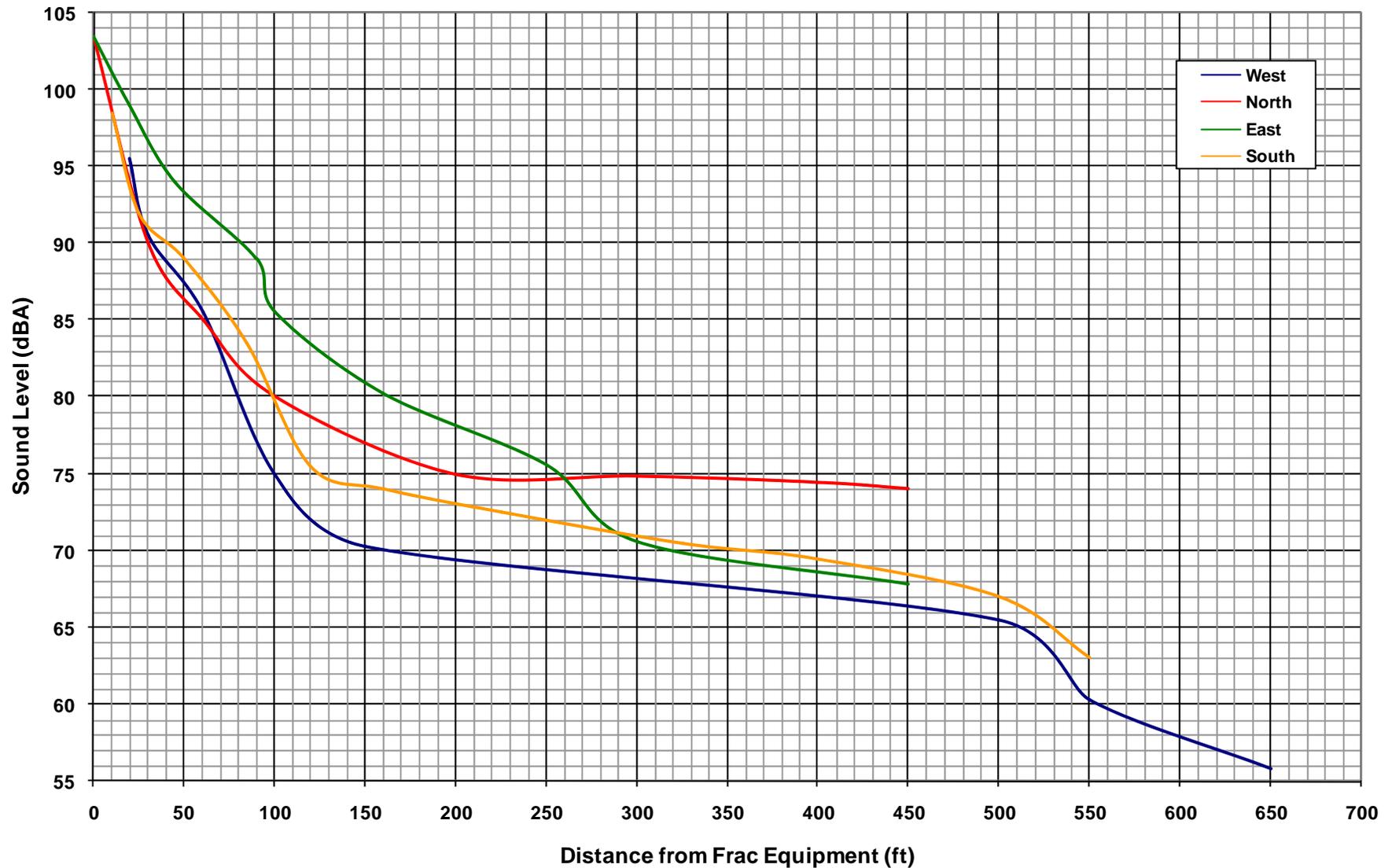


## Barnett Shale Measured Well Head Compressor Survey Sound Level Attenuation with Distance Chart





## Barnett Shale Measured Fracing Noise Impact Survey Sound Level Attenuation with Distance Chart





## Effect of Wind on Sound Levels

