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March 16, 2017

Great Western Operating Company  
1801 Broadway, Suite 500  
Denver, Colorado 80202

Attention: Scot Donato

Subject: Ambient Sound Level Survey  
Ocho Well Pad  
February 28, 2017  
Project Number 165391

As requested, A. G. Wassenaar, Inc. (AGW) has conducted an ambient sound level survey for select locations adjacent to the Ocho Well Pad in Thornton, Colorado. The survey was conducted on February 28, 2017. This report includes the survey description and attached drawings of the site with measured sound pressure levels and sampling locations.

#### **SOUND LEVEL SURVEY DESCRIPTION**

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The survey was conducted using a CESVA SC160 Sound Level Meter/Spectrum Analyzer set for a 1 second (slow) response, and recording every minute for a sampling period of at least 5 minutes. The wind speed measured from 1.1 to 4.9 miles per hour (mph) during the sampling period. Winds were generally out of the south/southwest during the survey. The survey was conducted between the hours of 7:30 a.m. and 11:30 a.m.

#### **SURVEY SITE DESCRIPTION AND SUMMARY OF RESULTS**

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This site is in Section 8, Township 1 South, Range 67 West, NE 1/4, NW 1/4, in Thornton, Colorado.

Traffic noise from the adjacent Colorado Highway 7 was noticeable during the sample collection period. A wireline truck was operating at the production site to the south of the well pad location during the survey.

Low frequency noise is generally accepted as a sound frequency below 150 Hz (hertz). Noise is commonly defined as unwanted sound. The A-weighted sound level (dBA) is commonly used in various noise regulations, and it characterizes the sound as a single number using a filter to reduce lower frequencies (below ~ 500 Hz). The C-weighted sound level (dBC) is similar to a linear frequency response and does not discount the low frequency sounds as much as the A-weighted response.

**Table 1:  
Ambient Sound Level Survey  
Ocho Well Pad  
February 28, 2017**

Location*	dBA	dBC
1,190' Northeast of Well Location; North of Hwy 7; At Property Fence; Rush Hour	64.3	71.6
1,295' Northwest of Well Location; North of Hwy 7; At Property Fence; Rush Hour	68.9	73.3
Well Location	45.6	64.3
350' North of Well Location	47.5	63.9
350' West of Well Location	45.9	66.9
350' South of Well Location	47.6	70.4
350' East of Well Location	41.5	65.7
1,420' South of Well Location	41.8	63.0
1,190' Northeast of Well Location; North of Hwy 7; At Property Fence; Mid-Morning	64.8	72.0
1,295' Northwest of Well Location North of Hwy 7; At Property Fence; Mid-Morning	70.2	76.7

\*NOTE: Distances listed are approximate

## DISCUSSION

This sound level survey was completed on February 28, 2017, to measure noise levels in proximity to the Ocho Well Pad. The area surrounding this site is a mix of agricultural lands and residential properties. The measured SPLs ranged from 42 to 48 dBA and 63 to 70 dBC at the locations surrounding the well pad. Adjacent to the nearest houses to the north of the property, the measured SPLs ranged from 64 to 69 dBA and 72 to 73 dBC during the rush hour, and 65 to 70 dBA and 72 to 77 dBC during the mid-morning. It is our opinion that the traffic from Colorado Highway 7 contributed significantly to the levels measured adjacent to the houses to the north of the property. The wireline truck operating at the production site to the south of the well pad is also believed to have contributed to the readings obtained 350' south of the well location.

Thank you for the opportunity to assist you with this activity. If you have any questions or require further assistance, please call us at (303) 759-8373.

Sincerely,  
A. G. WASENAAR, INC.

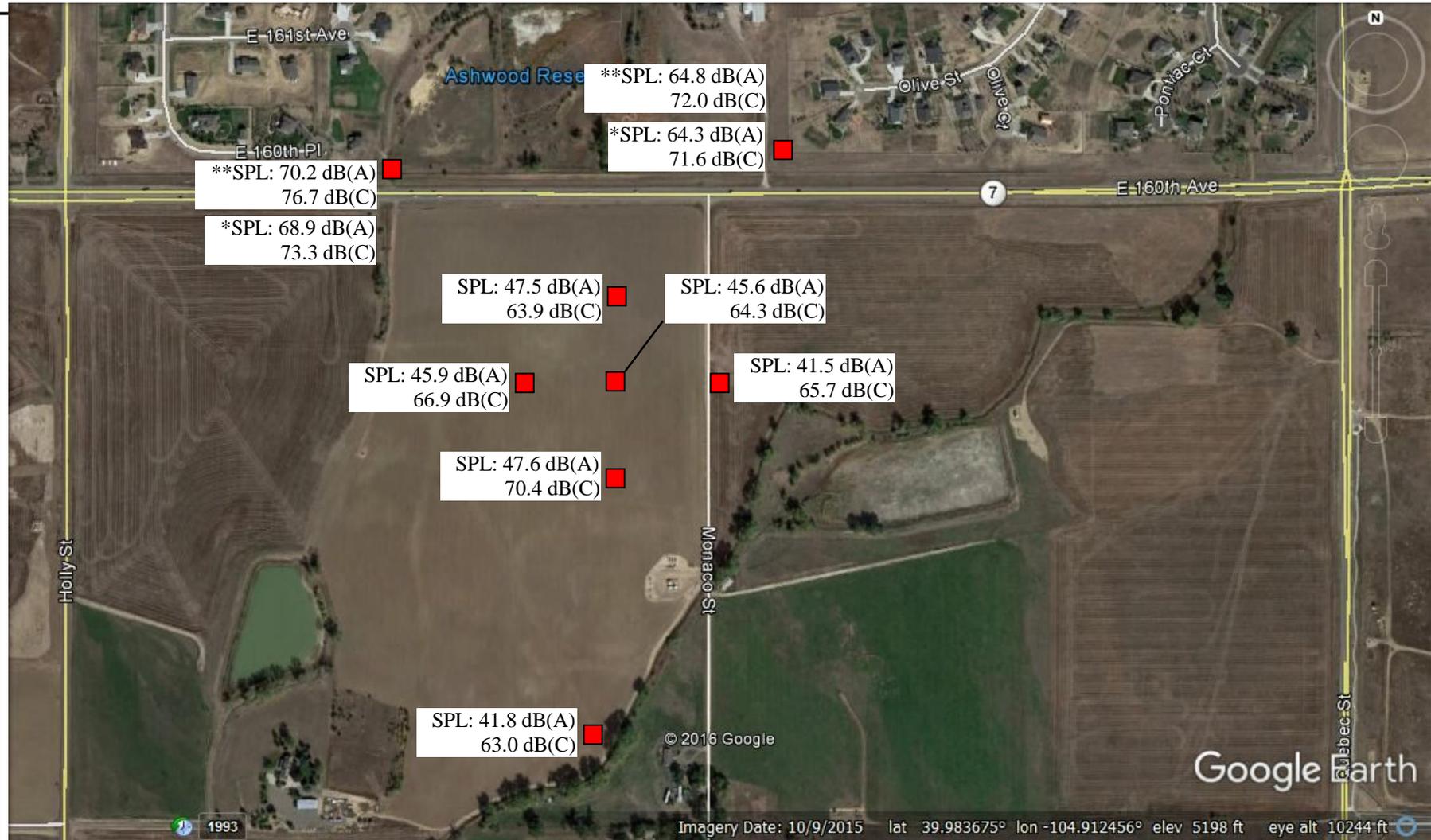


Tod E. Kramer  
Senior Industrial Hygienist



Joseph D. Gifford, CIH  
Principal Project Manager

TEK/JDG/dd  
Attachment



**LEGEND**

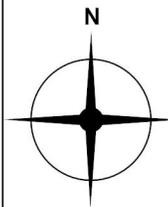
■ = Location of Sound Level Measurement

SPL = Average Sound Pressure Level Measurement in Decibels

*Average wind speed: 1.1 to 4.9 miles per hour from the south/southwest*

\*\* = Measurement taken mid-morning

\* = Measurement taken during morning rush hour



**A.G. Wassenaar**  
Geotechnical and Environmental Consultants | **Inc.**

Great Western Operating Company  
Sound Level Survey  
Ocho Well Pad

Site Visit: February 28, 2017  
AGW Project No. 165391  
Figure 1