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HEIDELBERGCEMENT Group

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December 14, 2015

VIA EMAIL AND CERTIFIED MAIL / RETURN RECEIPT
7015 0640 0007 4329 0020

Michael Balliet, Director
County of Santa Clara
Department of Environmental Health
Consumer Protection Division
1555 Berger Drive, Suite 300
San Jose, CA 95112-2716

Re: Permanente Quarry, Noise Complaints – Response to May 15, 2015 Correspondence

Dear Mr. Balliet:

On May 15, 2015, the Department of Environmental Health requested that Lehigh Southwest Cement Company assist with the Department's investigation to determine whether noise levels generated by the Permanente Cement Plant (the "Facility") comply with the Santa Clara County noise ordinance. To that end, Lehigh retained a third-party noise expert, Burns McDonnell, to test and analyze noise from the Facility.

Attached is a copy of the Sound Compliance Study prepared by Burns McDonnell based on noise sampling taken at the Facility and in the surrounding residential communities. The Study demonstrates that the Facility is in compliance with the County's ordinances. We trust that this resolves the County's concerns regarding compliance, and we look forward to working with the County to address any related concerns.

Please call with any questions.

Sam Barket
Environmental Manager
Lehigh Southwest Cement Co.

cc: Distribution

Distribution (via email):

Kirk Girard, Director, Department of Planning and Development
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Lehigh Southwest Cement Co. Sound Compliance Study

Lehigh Southwest Cement Co.

Sound Compliance Study
Project No. 86895

December 2015

Lehigh Southwest Cement Co.
Sound Compliance Study

prepared for

Lehigh Southwest Cement Co.
Sound Compliance Study
Santa Clara County, California

Project No. 86895

December 2015

prepared by

Gabriel Weger
Ian Brewe, INCE

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

TABLE OF CONTENTS

Page No.

LIST OF TABLES

Page No.

LIST OF FIGURES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
ANSI	American National Standards Institute
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
dB	decibel
dBA	A-weighted decibels
Hz	hertz
ID	induced draft
ISO	International Organization for Standardization
Lehigh	Lehigh Southwest Cement Co.
L_{90}	90% exceedance sound level
L_{eq}	equivalent-continuous sound level
L_x	exceedance sound level
rpm	revolutions per minute

1.0 EXECUTIVE SUMMARY

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) conducted an environmental sound assessment study for the Lehigh Southwest Cement Company (Lehigh), located in an unincorporated area of Santa Clara County, California (Facility). The Facility includes mining operations, material transport conveyors, grinding operations, a cement plant and associated cement kiln, and other cement making processes. The Facility also includes an induced draft (ID) fan and a 295-foot tall exhaust stack. This study was completed to determine whether or not sound generated by the Facility complies with the standards contained in Santa Clara County's noise ordinance.

The objectives of this study were as follows:

- Identify the appropriate standards in Santa Clara County's noise ordinance
- Measure sound levels in and around the Facility
- Perform modeling based on onsite noise measurements to calculate noise generated by the Facility at nearby residential receivers
- Determine if fan modifications made by Lehigh in June 2015 reduced sound levels from the Facility
- Compare the measured and modeled sound levels against Santa Clara County's noise ordinance standards

These objectives have been accomplished. Near-field sound level measurements were taken in locations near the ID fan and preheat tower to eliminate extraneous sound sources. Far-field measurements were taken in areas surrounding the Facility, including local residential communities. Measured and modeled sound levels were compared to the County's ordinance standards.

The results of the measurements and modeling show that the sound levels generated at the Facility are in compliance with Santa Clara County's noise ordinance at the surrounding residential communities. The results also demonstrate that the fan modifications reduced sound levels from the Facility.

2.0 ACOUSTICAL TERMINOLOGY

The term “sound level” is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level. The sound power level is the acoustical energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustical energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure, are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered “just barely perceptible,” a 5-dB change is generally considered “clearly noticeable,” and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different wavelengths, also known as the frequency. Frequency is measured in hertz (Hz), and is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 2-1.

Table 2-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 feet	--
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet	--
120	Threshold of feeling	Elevated train	Hard rock band
110	--	Jet flyover at 1,000 feet	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 feet, auto horn at 10 feet, crowd sound at football game	--
90	--	Propeller plane flyover at 1,000 feet, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 feet	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner
60	Moderate	Air-conditioner condenser at 15 feet, near highway traffic	General office
50	Quiet	--	Private office
40	--	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Inside average residence (without TV and stereo)
20	--	Rustling leaves	Quiet theater, whisper
10	Just audible	--	Human breathing
0	Threshold of hearing	--	--

Source: Adapted from *Architectural Acoustics*, M. David Egan, 1988, and *Architectural Graphic Standards*, Ramsey and Sleeper, 1994.

Sound in the environment is constantly fluctuating, such as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level, L_x, is the sound level exceeded during "x" percent of the sampling period and is also referred to as a statistical sound level.

L_{90} levels are presented throughout this study. The L_{90} is a common L_x value and represents the sound level with minimal influence from short-term, loud transient sound sources. The L_{90} represents the sound level exceeded for 90 percent of the time period during which sound levels are measured. The L_{90} value is regarded as the most accurate tool for measuring relatively constant background noise and for minimizing the influence of isolated spikes in sound levels (i.e., barking dog, door slamming). Use of the L_{90} value to measure relatively constant noise sources is endorsed by the California Energy Commission to determine noise levels emitted from power plants, which have similar constant noise levels. The L_{90} value is the optimal tool for this study because the Facility generates a relatively constant sound during normal operations. Other common measurement standards, such as L_{eq} or L_{50} values, were not considered appropriate for this study because they are highly influenced by short duration noise sources such as cars passing by, dogs barking, and aircrafts.

3.0 APPLICABLE REGULATIONS

The Facility is located in an unincorporated area of Santa Clara County. Therefore, the Facility is subject to the Santa Clara County, CA Code of Ordinances.

3.1 Use Permit

The Facility is authorized to operate under a use permit from Santa Clara County. The use permit was first issued on May 8, 1939, and has been modified several times since. The county use permit requires that the Facility comply with the county noise regulations.

3.2 Santa Clara County Regulations

The Santa Clara County, CA Code of Ordinances, Chapter VIII Control of Noise and Vibration, Section B11-152 defines the limits for maximum permissible sound levels by receiving land use category, when measured on the receiving property. Table B11-152 from the Code of Ordinances provides the limits for each land use category, and is included below as Table 3-1. The regulation defines nighttime as the hours between 10:00 p.m. and 7:00 a.m. The land uses immediately surrounding the Facility are rural and residential.

Table 3-1: Santa Clara County Exterior Noise Limits

Receiving Land Use Category	Time Period	Noise Level (dBA)[a]
One- and Two-Family Residential	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	45 55
Multiple-Family Dwelling	10:00 p.m. – 7:00 a.m.	50
Residential Public Space	7:00 a.m. – 10:00 p.m.	55
Commercial	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	60 65
Light Industrial	Any Time	70
Heavy Industrial	Any Time	75

Source: Santa Clara County, CA Code of Ordinances Chapter VIII Control of Noise and Vibration, Table B11-152
(a) Levels not to be exceeded more than 30 minutes in any hour

The Code of Ordinances provides that noise levels in Table 3-1 will be reduced downwards by five dB where the noise contains a steady, audible tone. As explained below, the Facility was not audible at each sampling location, and, where audible, there was no steady, audible tone or “pure tone” present, as defined by the ordinance. Nonetheless, for the purpose of this study, Burns & McDonnell have assumed that the most restrictive possible standard applies, and assumes a limit of 40 dBA at residential properties during nighttime hours and 50 dBA during daytime hours.

4.0 SOUND SURVEY

A sound survey was performed by Gabriel Weger, Tess Fuller, and Ian Brewe, INCE, all with Burns & McDonnell, on September 8 and 9, 2015. Sound level measurements were taken at far-field measurement locations near residential receivers to determine compliance with county regulations. Sound level measurements were also taken at near-field and far-field locations previously measured on May 6 and 7, 2015. Burns & McDonnell took these additional sound level measurements at previously measured locations to quantify any changes in sound emitted from the Facility due to modifications made to the ID fan.

Jeff Fuller, INCE, of dBF Associates, Inc. and Peder Eriksson, Senior Environmental Health Specialist at the Santa Clara County Department of Environmental Health, selected the far-field measurement locations and witnessed various, representative far-field measurements at these locations. Mr. Fuller was retained as an independent, third-party expert at the request of the Santa Clara County Department of Environmental Health.

4.1 Sound Survey Methodology and Conditions

Measurements were taken using three American National Standards Institute (ANSI) S1.4 type 1 sound-level meters (Larson-Davis Model 831). The sound-level meters were calibrated before and after each set of measurements. None of the calibration level changes exceeded ± 0.5 dB, which is within the acceptable variance per ANSI guidance. A windscreen was used at all times on the microphone to avoid the influence of wind-induced sound increases. Certificates of calibration for the equipment used are provided in Appendix A.

Far-field measurements were taken during four time periods over a 24-hour span on September 8 and 9, 2015. Near-field measurements were taken on the morning of September 9, 2015. Meteorological conditions were favorable for conducting ambient sound measurements during each time period. Burns & McDonnell personnel obtained the meteorological conditions presented in Table 4-1 using a Kestrel 3000 anemometer.

Table 4-1: Meteorological Conditions During Sound Measurements

Date	Measurement Type	Time Period	Temp. (°F)	Relative Humidity (%)	Wind Speed (mph)	Sky Cover
September 8, 2015	Far-Field	7:00 p.m.– 9:00 p.m.	87	19	Calm	Clear
September 9, 2015	Far-Field	12:00 a.m. – 2:00 a.m.	71	35	Calm	Clear
September 9, 2015	Far-Field	6:00 a.m. – 8:00 a.m.	65	42	Calm	Clear
September 9, 2015	Far-Field	12:00 p.m. – 2:00 p.m.	94	18	0-5	Clear
September 9, 2015	Near-Field	8:15 a.m. – 9:00 a.m.	75	30	0-5	Clear

Sound measurements were collected during two different operational conditions. During the midnight and morning measurement time periods, the plant was in full operation under normal operating conditions with the fan running at between 759 and 867 revolutions per minute (rpm). Facility noise during these periods would be at its most impactful to the surrounding communities because the fan is operating at its highest level while the extraneous ambient noise (i.e., freeways, etc.) reaches its lowest level. During the evening and noon measurements, the fan operated at a reduced speed, of between 586 and 778 rpm – an operating condition that occurs when kiln maintenance or repairs become necessary. A summary of the operating conditions is provided in Table 4-2; detailed fan operating data is provided in Appendix B.

Table 4-2: Facility Operation During Sound Measurements

Time Period		Kiln	Fan (rpm)		
			Minimum	Average	Maximum
Evening	7:00 p.m. – 9:00 p.m.	Off	578	643	742
Midnight	12:00 a.m. – 2:00 a.m.	On	759	779	800
Morning	6:00 a.m. – 8:00 a.m.	On	862	863	867
Noon	12:00 p.m. – 2:00 p.m.	On	586	668	778
Near-Field	8:15 a.m. – 9:00 a.m.	On	839	861	864

4.2 Comparative Sound Measurements

Sound level measurements were made by Burns & McDonnell on May 6 and 7, 2015, at near-field and far-field locations in and around the Facility. Subsequently, the Facility made modifications to the ID fan in June 2015. On September 8 and 9, 2015, sound level measurements were taken at the same near-field and far-field measurement locations (in addition to County-selected "compliance" locations described in Section 4.3) to determine noise levels emitted from the Facility following the ID fan modifications.

4.2.1 Comparative Near-Field Measurements

Near-field measurements minimize the influence of extraneous background sounds. Since the Facility is not operating in a controlled environment, it is impossible to isolate and measure only the cement plant's sound levels. However, the near-field sound levels are considered generally representative of the cement plant's operational sound levels, as most background sound sources have little influence this close to the equipment.

The near-field measurements were taken over 10-second intervals along an envelope around the ID fan and stack base, and at other critical points near onsite sound-emitting equipment in addition to the ID fan and stack. The near-field measurement points are labeled NF1 through NF35, as indicated in Figure 4-1.

A comparison of the May and September near-field measurements showed an average sound level reduction of 2.2 dB between May and September. Detailed measurement data, and a comparison of the data from each of the near-field measurements, can be found in Appendix C.

4.2.2 Comparative Far-Field Measurements

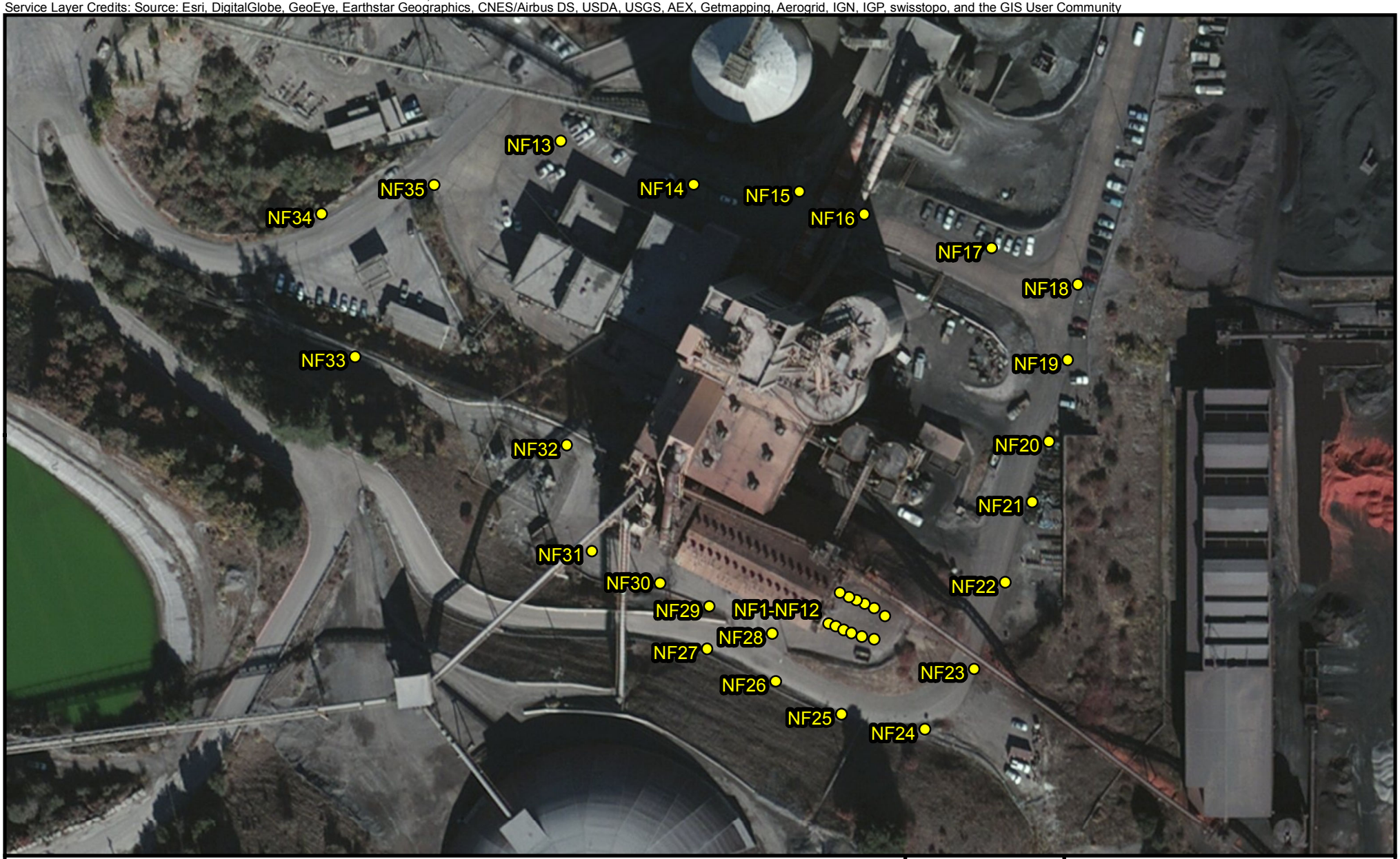
Burns & McDonnell personnel took far-field sound level measurements at six locations, labeled MP1 through MP6, as shown in Figure 4-2. Onsite locations (MP1 to MP4) were selected because they were accessible, close to the Facility property line, and representative of sound levels on all sides of the Facility. Offsite locations (MP5 and MP6) were selected due to their accessibility and proximity to residential areas. Because MP5 is in a residential area, it also is included in the compliance analysis beginning at Section 4.3. County selected locations MP14 and MP15 also were used in the compliance analysis instead of MP6 since they are located in the same area but closer to residences.

The far-field sound level measurement periods were 5 minutes long when measured in May and 10-minutes long when measured in September. The measurement duration was increased for September measurements to be consistent with the California Energy Commission's requirements for short term noise monitoring. Measured values were logged by the sound meter at each measurement location. The sound levels varied at each measurement point due to the extraneous sounds that occurred. Sounds measured included sound associated with the Facility, vehicular traffic from nearby roads (including large trucks), and airplanes flying overhead. Sounds generated by the Facility were audible at some but not all far-field measurement points.

Sound emitted by operation of the Facility is mostly constant at a given operating condition. As described in Section 2.0, the metric used to determine compliance was the L_{90} standard, considered the most appropriate standard for identifying the sound levels associated with constant background noise and for

minimizing the influence of extraneous noise. The lowest, or minimum, L_{90} readings recorded at each location during the midnight or morning time period have the least amount of extraneous noise and best represent the sound emitted by the Facility during normal operation. Therefore, the minimum-measured L_{90} sound level during the midnight or early morning time period at each location is considered representative of the levels generated by the Facility.

The comparative sound levels measured at each location during the May and September periods are presented in Appendix C. The data demonstrates that the fan modifications in June 2015 caused a reduction in sound levels between 2.1 and 9.8 dBA, with the exception of the sound levels at MP5. The minimum L_{90} sound levels measured at MP5 in September were higher than the minimum sound levels measured in May. The measured sound levels at MP5 are, however, very low and dominated by intermittent, extraneous noise associated with sources other than the Facility (traffic, crickets, aircrafts, and animals).



Near-Field Measurement Points

NORTH

125 62.5 0 125

Scale in Feet

BURNS McDONNELL

Figure 4-1

Lehigh Southwest Cement Co.
Near-Field
Measurement Points

Source: Burns & McDonnell Engineering Company, Inc.

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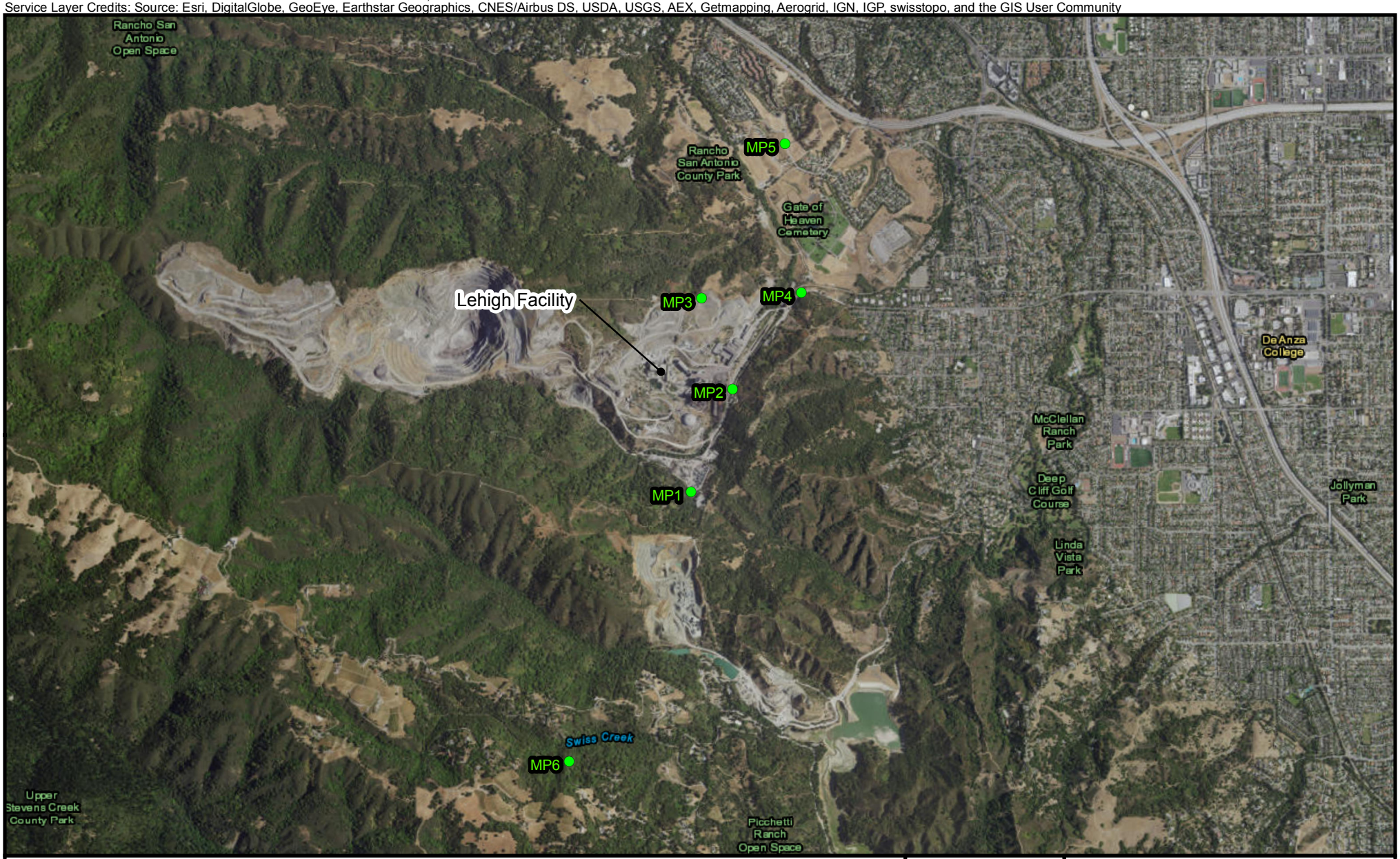

Comparative Far-Field Measurement Points

NORTH

3,000 1,500 0 3,000

Scale in Feet

BURNS McDONNELL

Figure 4-2

Lehigh Southwest Cement Co.
Far-Field Comparative Measurement Points

Source: Burns & McDonnell Engineering Company, Inc.

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4.3 Compliance Far-Field Measurements

Burns & McDonnell personnel took far-field, environmental sound level measurements during four time periods on September 8 and 9, 2015, near residential areas in the vicinity of the Facility. These measurements were taken to determine if the Facility's sound levels are in compliance with the Santa Clara County's noise ordinance. Sound level measurements were made at eight locations, labeled MP5, MP7, MP8, MP9, MP11, MP14, MP15, and MP16, as shown in Figure 4-3. County representatives and Burns & McDonnell personnel determined that measurements were not feasible at locations MP10, MP12, and MP13 due to restricted access or safety concerns. County selected locations MP14 and MP15 were used in the compliance analysis instead of MP6 since they are located in the same area but closer to residences. The far-field sound level measurement periods were 10-minutes long, and measured values were logged by the sound meter at each measurement location. The sound levels varied at each measurement point due to the extraneous sounds that occurred. Sound generated by the Facility was audible at several, but not all, of the far-field measurement points.

Path: Z:\Clients\ESP\LehighSouthw\85239_Lehigh\Studies\Tech_Consult\Second Sound Study\Report\Figures\Figure 4-3 Compliance Measurement Points.mxd irbrewe 10/12/2015

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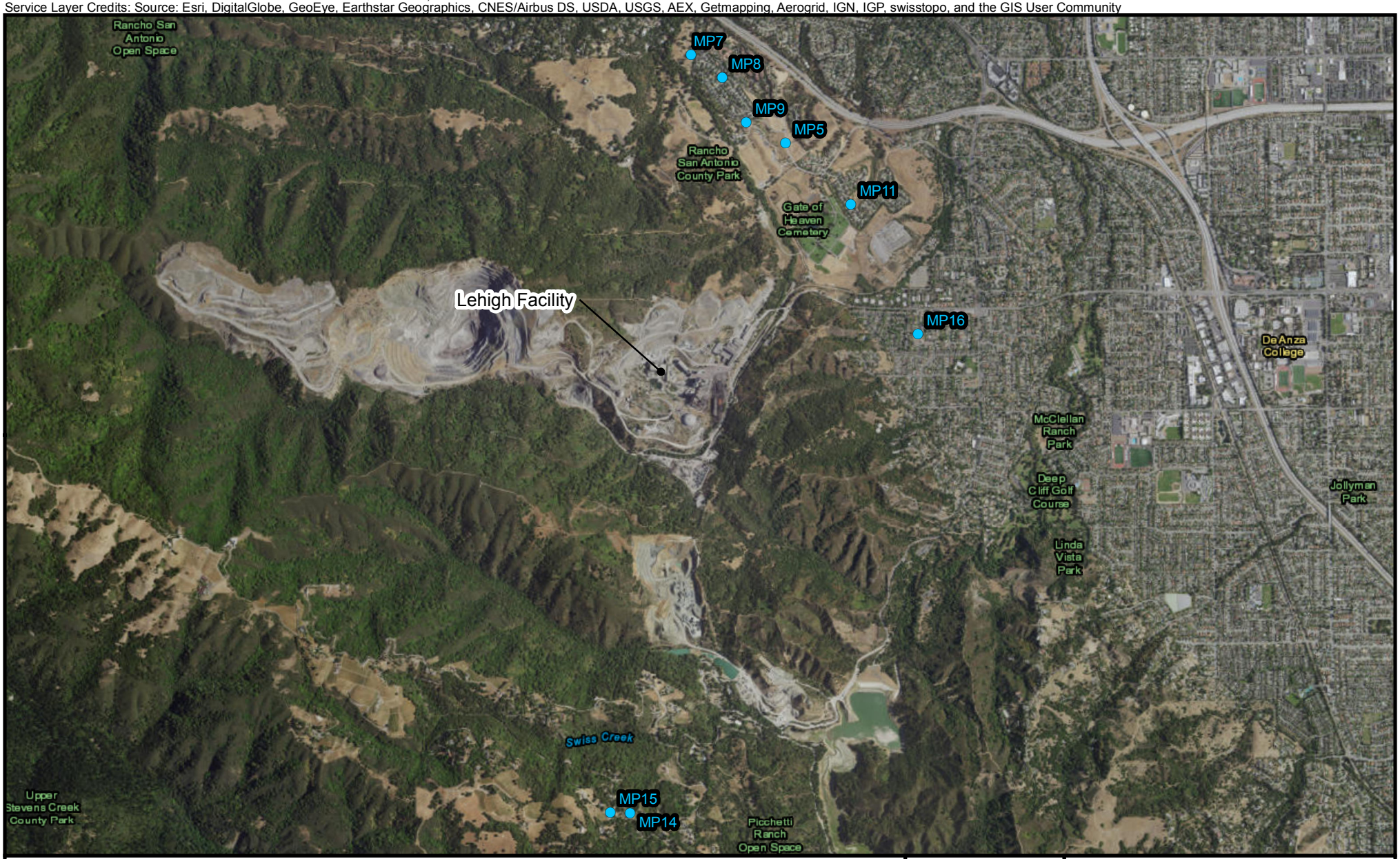

Compliance Far-Field Measurement Points

NORTH

3,000 1,500 0 3,000

Scale in Feet

BURNS McDONNELL

Figure 4-3

Lehigh Southwest Cement Co.
Far-Field Compliance
Measurement Points

Source: Burns & McDonnell Engineering Company, Inc.

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Extraneous sounds during the measurement periods included vehicular traffic from nearby roads (including large trucks), crickets, birds, and airplanes flying overhead. The measured, L_{90} sound levels from all noise sources measured at each location (i.e., Facility, traffic, aircraft, animals, crickets, etc.) are presented in Table 4-3. Ambient, L_{90} sound levels varied from a minimum of 33.1 dBA at MP14 during the evening measurements to a high of 54.9 dBA at MP8 during the morning measurements. Far-field measured values that exceed the noise limits were associated with noise from sources extraneous to the Facility. In these cases, accordingly, sound modeling is required to determine the Facility's impacts in regards to the compliance. Detailed far-field compliance measurement data is included in Appendix D.

Table 4-3: Compliance Sound Level Measurements
(Including all extraneous noise sources)

Time Period	Measurement Point	Measured L_{90} (dBA)[a]	Facility Audible	Noise Limit (dBA)	Extraneous Noises
September 8, 2015 7:00 p.m. - 9:00 p.m.	MP5	41.5	Yes	50	Local traffic, highway traffic, aircraft, crickets, and talking
	MP7	49.0	No	50	Highway traffic dominant, crickets, birds, and aircraft
	MP8	49.4	No	50	Highway traffic dominant, aircraft, local traffic, birds, and crickets
	MP9	47.4	Yes	50	Aircraft, local traffic, highway noise, residential HVAC, and crickets
	MP11	44.2	Yes	50	Highway traffic dominant, aircraft, local traffic, birds, dog barking, and crickets
	MP14	33.1	Yes	50	Shooting range, highway and local traffic, aircraft, birds, dog barking, and crickets
	MP15	40.2	Yes	50	Shooting range, highway and local traffic, aircraft, birds, dog barking, and crickets
	MP16	42.2	No	50	Highway traffic dominant, substation, aircraft, local traffic, birds, and crickets

Time Period	Measurement Point	Measured L_{90} (dBA)[a]	Facility Audible	Noise Limit (dBA)	Extraneous Noises
September 9, 2015 12:00 a.m. - 2:00 a.m.	MP5	34.2	Yes	40	Highway traffic, dogs, aircraft, and crickets
	MP7	48.2	No	40	Highway traffic dominant, crickets, and animal in woods
	MP8	46.8	No	40	Highway traffic dominant, talking, birds, and crickets
	MP9	36.6	Yes	40	Highway noise, local traffic, and crickets
	MP11	40.2	Yes	40	Highway traffic dominant and crickets
	MP14	45.5	Yes	40	Crickets dominant, highway traffic, and local traffic
	MP15	50.5	Yes	40	Crickets dominant, highway traffic, aircraft, and local traffic
	MP16	39.0	No	40	Highway traffic dominant, substation, aircraft, local traffic, birds, and crickets
September 9, 2015 6:00 a.m. - 8:00 a.m.	MP5	45.8	Yes	40	Local traffic, highway traffic, remote control plane, and aircraft
	MP7	53.5	No	40	Highway traffic dominant and birds
	MP8	54.9	No	40	Highway traffic dominant, aircraft, talking, local traffic, birds, and a horn
	MP9	49.0	Yes	40	Local and highway traffic
	MP11	43.8	Yes	40	Highway traffic, birds, construction noise, and local traffic
	MP14	39.7	Yes	40	Local traffic, birds, aircraft, and highway traffic
	MP15	40.8	Yes	40	Local traffic, trucks, biker, birds, aircraft, and highway traffic
	MP16	40.7	No	40	Local traffic, siren, birds, aircraft, and highway traffic

Time Period	Measurement Point	Measured L_{90} (dBA)[a]	Facility Audible	Noise Limit (dBA)	Extraneous Noises
September 9, 2015 12:00 p.m. - 2:00 p.m.	MP5	37.9	Yes	50	Local traffic, highway traffic, remote control plane, and aircraft
	MP7	46.0	No	50	Highway traffic dominant and birds
	MP8	45.6	No	50	Highway traffic dominant, aircraft, talking, local traffic, and birds
	MP9	36.3	Yes	50	Local and highway traffic
	MP11	38.6	Yes	50	Highway traffic, aircraft, local traffic, and birds
	MP14	39.8	Yes	50	Local and highway traffic, birds, and construction noise
	MP15	36.1	Yes	50	Local and highway traffic, birds, and construction noise
	MP16	44.7	No	50	Local and highway traffic, birds, and construction noise

(a) Measured sound levels include noise created by extraneous sources not associated with the Facility.

5.0 SOUND MODELING

Field observations demonstrated that Facility-generated sound levels were sometimes dominated by sound levels from extraneous sources, and the Facility's sound contributions at those locations could not be determined from L_{90} sound measurements, As a result, a sound modeling program was used to project measured sound levels from the Facility out to the nearest residential properties. Modeling is accepted by the acoustic scientific community as an appropriate method to isolate and calculate sound from specific noise sources without the influence of extraneous sources. Using industry-accepted sound modeling software, CadnaA, the expected sound-pressure levels of the Facility were calculated at the County-selected compliance locations (Section 4.3) based on near-field measurements taken at the Facility in September 2015.

5.1 Sound Modeling Methodology

The software is a scaled, three-dimensional program which takes into account each piece of sound-emitting equipment at the Facility and predicts sound-pressure levels over a gridded geographic area of interest. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:1996, General Method of Calculation. ISO 9613-2 assesses the sound levels based on the octave band center frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation and directivity. The sound-modeling software calculates sound propagation using omnidirectional, downwind sound propagation and worst-case directivity factors. In other words, the model assumes that each piece of equipment propagates its maximum sound level in all directions at all times. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result modeling results generally are considered a conservative measure of a facility's actual sound level.

The modeled atmospheric conditions were assumed to be calm, and the temperature and relative humidity were left at the program's default values. Layers in the atmosphere often form where temperature increases with height (temperature inversions). Sound waves can reflect off of the temperature inversion layer and return to the surface of the earth. This process can cause sound waves at the surface to travel farther than they would under normal atmospheric conditions, especially if the height of the inversion begins near the surface of the earth. Temperature inversions tend to occur mainly at night when winds are light or calm. CadnaA calculates the downwind sound in a manner that is favorable for propagation (worst-case scenario) by assuming a well-developed, moderate ground-based temperature inversion.

Therefore, by modeling worst-case-scenario sound levels and sound propagation, the predicted sound level results would be higher than what would actually occur, even during an inversion.

Reflections and shielding were considered for sound waves encountering physical structures. Sound levels around the Facility can be influenced by the sound reflections from physical structures onsite. The physical structures onsite were modeled with structured facades, which account for the amount of sound reflected and the amount of sound absorbed by the structure itself. To provide a conservative estimate of sound traveling offsite, no foliage or residential structures were included in the model. The area surrounding the Facility has a significant amount of elevation change, which scatters and absorbs the sound waves. Thus, terrain was included to account for surface effects such as ground absorption. However, ground absorption was set to a value such that only half of the potential benefits were realized in the model. With all of these assumptions considered, the model provides a conservative calculation of Facility-generated sound received at the neighboring residential properties.

5.2 Sound Modeling Results

The model was used to calculate the Facility-generated noise levels at nearby County-selected compliance locations. The modeled values were then compared to the applicable County standards. The calculated sound levels for the Facility are presented in Table 5-1. Figure 5-1 graphically shows a representation in 5-dB contours of the sound generated by the Facility and projected outward to the County-selected offsite locations. The contours represent the expected sound levels of the Facility only, without the influence of sound generated by extraneous sources. The model shows that the Facility operates within the Santa Clara County noise regulations at each of the County-selected locations.

Table 5-1: Modeled Lehigh Facility Sound Levels at Residential Receivers

Receiver	Modeled Sound Pressure Level (dBA)	Santa Clara County Nighttime Limit (dBA)[a]
MP5	32.8	40
MP7	27.9	40
MP8	27.8	40
MP9	31.5	40
MP11	37.5	40
MP14	31.1	40
MP15	30.9	40
MP16	34.8	40

(b) Assumes most restrictive noise limits under Santa Clara County ordinance.

Path: Z:\Clients\ESP\LehighSouthw\85239_Lehigh\Studies\Tech_Consult\Second Sound Study\Report\Figures\Figure 5-1 Modeled Sound Level Contours.mxd irbrewe 11/25/2015

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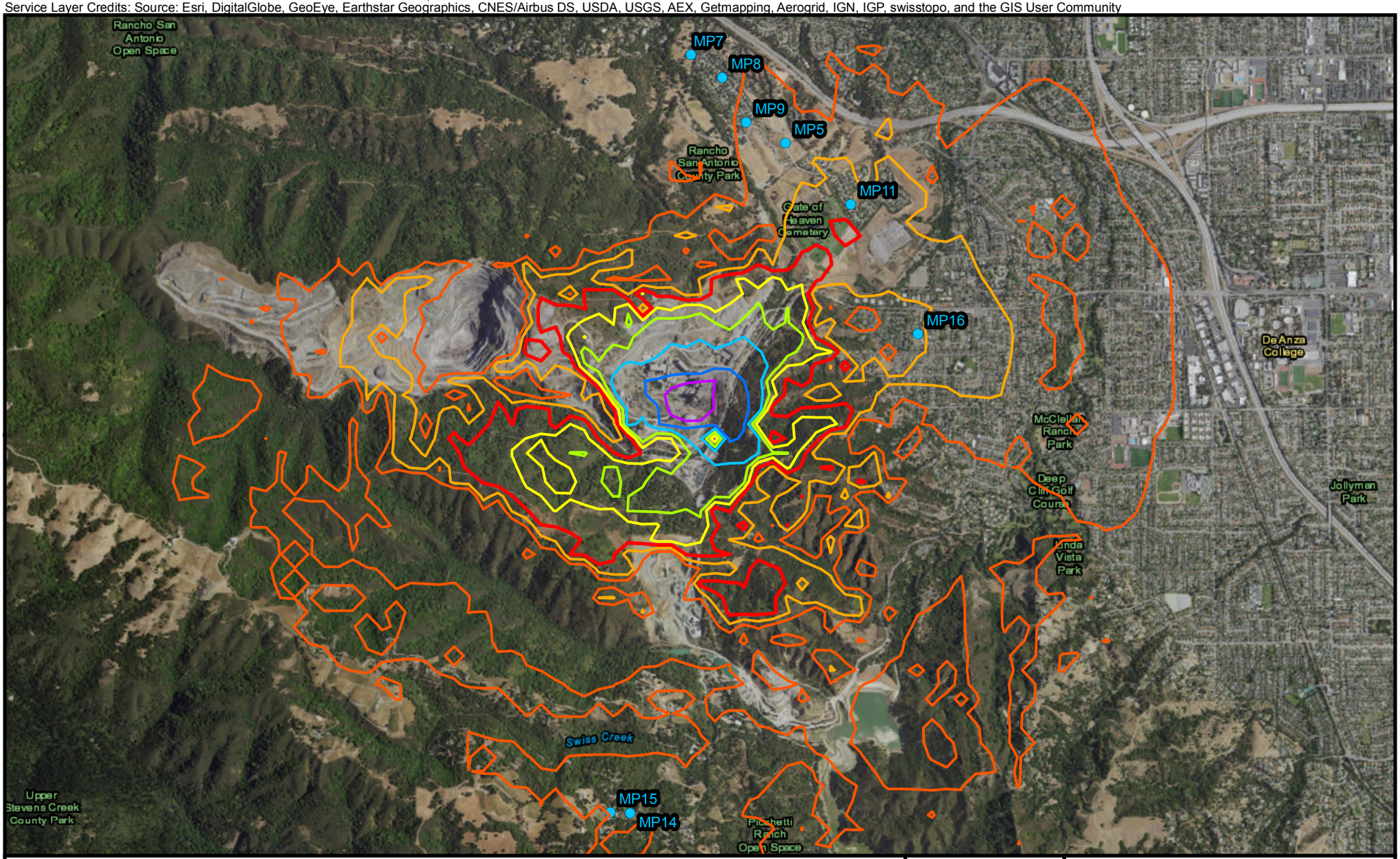


BURNS McDONNELL

Figure 5-1

Lehigh Southwest Cement Co.
Modeled Sound Level
Contours

Source: Burns & McDonnell Engineering Comapny, Inc.

Issued: 11/25/2015

6.0 COMPLIANCE ANALYSIS

For the purposes of this compliance analysis, Burns & McDonnell assumed the application of the most restrictive noise limits available under the Santa Clara County ordinance, a limit of 40 dBA at residential properties during nighttime hours and 50 dBA during daytime hours. The measured and modeled noise levels were compared against these limits to determine compliance.

The Facility is designed to operate 24-hours per day. The sound emitted by normal operation of the Facility is mostly constant. The metric used to determine compliance was the L_{90}, an industry-accepted technique for isolating constant sounds over a given time period. The lowest, or minimum, L_{90} sound levels measured at each location during the midnight or morning time period best represent the sound emitted by the Facility without influence from extraneous noises. Therefore, at most locations, the minimum-measured L_{90} value during the midnight or early morning time period was considered most representative of the levels generated by the Facility and was used to determine compliance with the Santa Clara County's noise ordinances.

In addition to the measured values from the sound survey, sound modeling results were analyzed to calculate the amount of Facility-generated sound at each location. Sound modeling was used because field observations indicate that Facility-generated sound levels are often dominated by, and are low in comparison to, sound levels from extraneous sources. For example, constant traffic noise from I-280 dominated the sound levels at measurement locations MP7, MP8 and MP11, and during the evening and midnight measurements, cricket noise (characterized by higher frequency noise between the 2,000- and 8,000–Hz frequencies) was prominent at all measurement locations. As indicated in Table 4-3, the measured sound levels at several locations are not valid representations of the Facility-generated sound levels. At these locations, the modeled sound levels were used to demonstrate compliance with the noise limits.

The measured and modeled values provided in Table 6-1 show that the Facility is in compliance with the Santa Clara County's noise ordinance in the surrounding residential communities.

Table 6-1: Comparison of Sound Level Measurements and County Nighttime Noise Limit

Measurement Location	Minimum Measured L_{90} (dBA) [c]	Modeled Sound Levels (dBA)	Santa Clara County Nighttime Noise Limit (dBA)	Compliant with County Noise Ordinance
MP5	34.2	32.8	40	Yes
MP7 [a]	48.2	27.9	40	Yes
MP8 [a]	46.8	27.8	40	Yes
MP9	36.6	31.5	40	Yes
MP11 [a]	40.2	37.5	40	Yes
MP14	39.7	31.1	40	Yes
MP15 [b]	40.8	30.9	40	Yes
MP16	39.0	34.8	40	Yes

(a) Highway traffic noise dominated the sound levels at MP7, MP8 and MP11. Modeled results are used to determine compliance at these locations.

(b) Local traffic, aircraft, and other ambient noise influenced the sound levels at MP15. Modeled results are used to determine compliance at this location.

(c) Minimum-measured L_{90} sound levels used because they capture the least amount of extraneous noise and best represent the sound emitted by the Facility's constant noise source.

7.0 CONCLUSION

A sound assessment study for the Lehigh Southwest Cement Plant was completed to determine whether sound generated by the Facility complies with the noise standards set forth in Santa Clara County's ordinances.

On September 8 and 9, 2015, Burns & McDonnell personnel took far-field, sound level measurements at offsite locations selected by the Santa Clara County Department of Environmental Health in residential areas in the vicinity of the Facility. Measurements were taken during four different time periods and under different operating conditions to determine if the Facility's emitted sound levels are in compliance with the most restrictive standards (40 dBA nighttime, 50 dBA daytime) in the County's noise ordinance.

Sound modeling was completed to calculate the Facility-generated sound levels at the County-selected locations. The modeling was based on near-field measured sound levels at the Facility, and was used to calculate the Facility-generated noise levels at each measurement location because some measurement locations were dominated by highway noise and other extraneous, non-Facility noise sources.

The results of the measurements and modeling are shown in Table 6-1. The results demonstrate that the sound levels generated at the Facility are in compliance with most restrictive limit (40 dBA nighttime and 50 dBA daytime) contained in Santa Clara County's noise ordinance at the surrounding residential communities.

APPENDIX A - CERTIFICATES OF CALIBRATION

Calibration Certificate

Certificate Number 2015002202

Customer:
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114, United States

Model Number	831	***Procedure Number***	D0001.8378		
Serial Number	0002986	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	11 Mar 2015		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	11 Mar 2016		
Description	Larson Davis Model 831	***Temperature***	23.19	°C	± 0.01 °C
		Humidity	48.9	%RH	± 0.5 %RH
		Static Pressure	86.5	kPa	± 0.03 kPa

Evaluation Method Tested electrically using PRM831 S/N 023768 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	05/16/2014	05/16/2015	006943
SRS DS360 Ultra Low Distortion Generator	03/26/2014	03/26/2015	007174

Larson Davis, a division of PCB Piezotronics, Inc
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ACCREDITED Cert. #3622.01

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

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:	75	°F
Model Number:	831		23.89	°C
Serial Number:	3141	Rel. Humidity:	24.9	%
Customer:	TMS Rental	Pressure:	994.4	mbars
Description:	Sound Level Meter		994.4	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: 21-Jan-15 Calibration Due:

Calibration Standards Used:

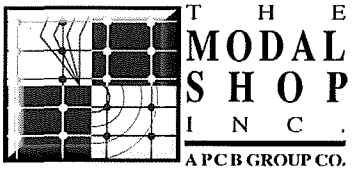
Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/14/2015	2013-176324

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: Wayne Underwood Signature:



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

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:	72.6	°F
Model Number:	831		22.56	°C
Serial Number:	3651	Rel. Humidity:	34.5	%
Customer:	TMS Rental	Pressure:	986.9	mbars
Description:	Sound Level Meter		986.9	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: 21-Apr-15 Calibration Due:

Calibration Standards Used:

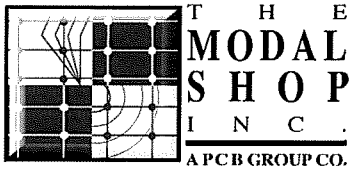
Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2016	2014-193220

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: Wayne Underwood Signature:



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

Calibration Certificate

Certificate Number 2015007808

Customer:
The Modal Shop
3149 East Kemper Road
Cincinnati, OH 45241, United States

Model Number	CAL200	***Procedure Number***	D0001.8386		
Serial Number	12371	***Technician***	Scott Montgomery		
Test Results	**Pass**	***Calibration Date***	17 Aug 2015		
Initial Condition	As Manufactured	***Calibration Due***			
		Temperature	24	°C	± 0.3 °C
Description	Larson Davis CAL200 Acoustic Calibrator	***Humidity***	33	%RH	± 3 %RH
		Static Pressure	101.4	kPa	± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2003 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	09/04/2014	09/04/2015	001021
Sound Level Meter / Real Time Analyzer	04/07/2015	04/07/2016	001051
Microphone Calibration System	08/20/2014	08/20/2015	005446
1/2" Preamplifier	10/09/2014	10/09/2015	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/20/2014	08/20/2015	006507
1/2 inch Microphone - RI - 200V	02/26/2015	02/26/2016	006510
Pressure Transducer	05/07/2015	05/07/2016	007310

Calibration Certificate

Certificate Number 2015002204

Customer:
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114, United States

Model Number	CAL200	***Procedure Number***	D0001.8386		
Serial Number	3009	***Technician***	Scott Montgomery		
Test Results	**Pass**	***Calibration Date***	11 Mar 2015		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	11 Mar 2016		
		Temperature	24	°C	± 0.3 °C
Description	Larson Davis CAL200 Acoustic Calibrator	***Humidity***	34	%RH	± 3 %RH
		Static Pressure	101.3	kPa	± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2003 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	09/04/2014	09/04/2015	001021
Sound Level Meter / Real Time Analyzer	04/07/2014	04/07/2015	001051
Microphone Calibration System	08/20/2014	08/20/2015	005446
1/2" Preamplifier	10/09/2014	10/09/2015	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/20/2014	08/20/2015	006507
1/2 inch Microphone - RI - 200V	07/25/2014	07/25/2015	006511
Pressure Transducer	05/03/2014	05/03/2015	007205

THE MODAL SHOP INC.
A PCB GROUP CO.

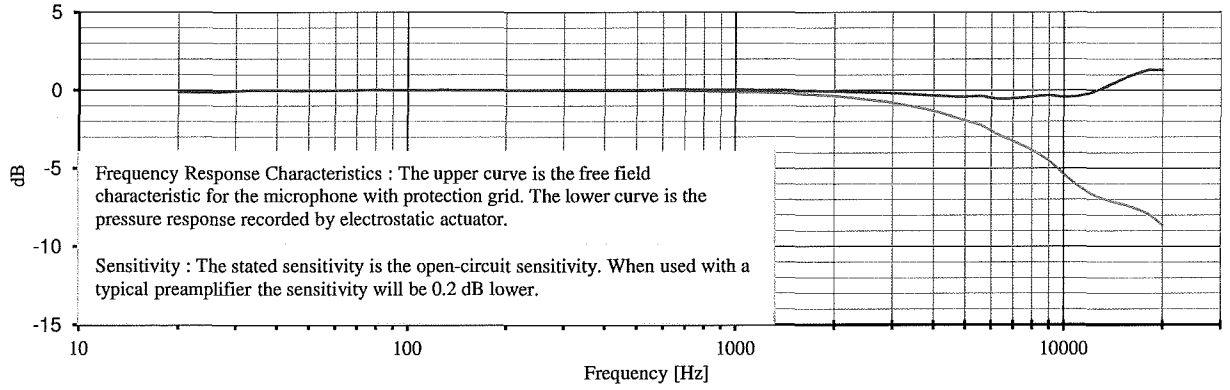
3149 East Kemper Rd.
Cincinnati, OH 45241
Ph : 513-351-9919
Fax: 513-458-2172
www.modalshop.com

~Certificate of Calibration~

Manufacturer:	PCB	**Asset ID:**	51386
Model Number:	377B02	**Customer:**	TMS Rental
Serial Number:	142162	**Calibration Date:**	Jan 30, 2015 16:22:49
Description:	Free-Field Microphone	**Due Date:**	

Sensitivity:	**250 Hz**	**1 kHz**		**Temperature:**	75 (24)	°F (°C)
	-26.47	-26.57	dB re. 1V/Pa	**Humidity:**	20	%
	47.48	46.92	mV/Pa	**Ambient Pressure:**	1008.6	mbar

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



Traceability: The calibration is traceable through 683/281764-12.

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; In Tolerance

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	-0.11	**630**	0.04	**4500**	-0.39		
25	-0.14	**800**	0.03	**5000**	-0.41		
31.5	-0.03	**1000**	0.02	**5600**	-0.38		
40	-0.02	**1120**	0.01	**6300**	-0.55		
50	-0.04	**1250**	0.00	**7100**	-0.52		
63	-0.02	**1400**	0.00	**8000**	-0.41		
80	0.02	**1600**	-0.03	**9000**	-0.33		
100	0.00	**1800**	-0.05	**10000**	-0.42		
125	0.01	**2000**	-0.06	**11200**	-0.36		
160	0.00	**2240**	-0.11	**12500**	-0.05		
200	0.00	**2500**	-0.13	**14000**	0.40		
250	0.00	**2800**	-0.16	**16000**	0.95		
315	0.00	**3150**	-0.20	**18000**	1.29		
400	0.00	**3550**	-0.26	**20000**	1.29		
500	0.01	**4000**	-0.33				

Technician: Wayne Underwood

Approval:

Reference Equipment Used:

Manuf.	*Model*	*Serial*	*Cal. Date*	*Due Date*
GRAS	40AG	9542	9/15/2014	9/15/2015

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Calibration Lab
CALIBRATION CERT 2649.01

Calibration Certificate

Certificate Number 2015002222

Customer:
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114, United States

Model Number	831	***Procedure Number***	D0001.8384
Serial Number	0002986	***Technician***	Ron Harris
Test Results	**Pass**	***Calibration Date***	12 Mar 2015
		Calibration Due	12 Mar 2016
Initial Condition	AS RECEIVED same as shipped	***Temperature***	23.32 °C ± 0.01 °C
Description	Larson Davis Model 831	***Humidity***	50.9 %RH ± 0.5 %RH
		Static Pressure	86.77 kPa ± 0.03 kPa

Evaluation Method ***Tested with:***
PRM831, S/N 023768
377B20, S/N 127773

Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	07/08/2014	07/08/2015	006311
Hart Scientific 2626-S Humidity/Temperature Sensor	05/16/2014	05/16/2015	006943
Larson Davis CAL200 Acoustic Calibrator	08/06/2014	08/06/2015	007027
Larson Davis Model 831	03/05/2015	03/05/2016	007182
1/2 inch Microphone - P - 0V	03/11/2014	03/11/2015	007185
Larson Davis CAL291 Residual Intensity Calibrator	09/26/2014	09/26/2015	007287

Larson Davis, a division of PCB Piezotronics, Inc
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ilac-MRA ACCREDITED Cert. #3622.01

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

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
Model Number: 377B02
Serial Number: LW137584
Asset ID: 49582
Description: Free-Field Microphone

Customer: TMS Rental
Address:

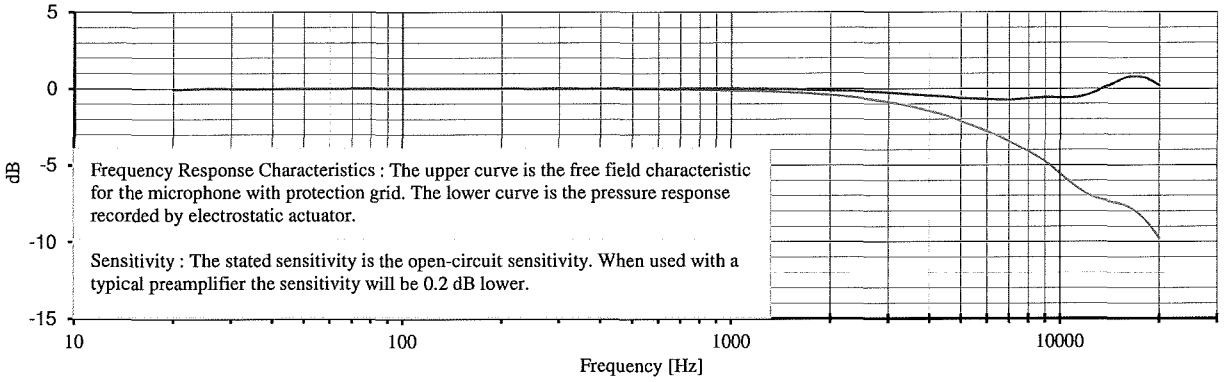
Calibration Date: Jun 10, 2015 09:57:01
Due Date:

Sensitivity:	**250 Hz**	**1 kHz**	
	-26.62	-26.74	dB re. 1V/Pa
	46.68	46.05	mV/Pa

Temperature:	72 (22)	°F (°C)
Humidity:	46	%
Ambient Pressure:	990.4	mbar

Cal. Results: In Tolerance

Polarization Voltage: 0 VDC



Traceability: The calibration is traceable through 683/281764-12.

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 In Tolerance

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	-0.09	**630**	-0.01	**4500**	-0.53		
25	-0.01	**800**	0.02	**5000**	-0.63		
31.5	-0.03	**1000**	0.00	**5600**	-0.68		
40	-0.03	**1120**	0.00	**6300**	-0.72		
50	0.00	**1250**	-0.02	**7100**	-0.73		
63	-0.01	**1400**	-0.03	**8000**	-0.66		
80	0.01	**1600**	-0.07	**9000**	-0.57		
100	0.02	**1800**	-0.09	**10000**	-0.60		
125	0.01	**2000**	-0.11	**11200**	-0.57		
160	0.01	**2240**	-0.16	**12500**	-0.32		
200	0.01	**2500**	-0.19	**14000**	0.18		
250	0.00	**2800**	-0.24	**16000**	0.73		
315	0.01	**3150**	-0.30	**18000**	0.71		
400	0.00	**3550**	-0.38	**20000**	0.20		
500	0.01	**4000**	-0.47				

Technician: Wayne Underwood

Approval:

Reference Equipment Used:

Manuf.	*Model*	*Serial*	*Cal. Date*	*Due Date*
GRAS	40AG	9542	9/15/2014	9/15/2015

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Calibration Lab
CALIBRATION CERT 2649.01

APPENDIX B - FACILITY OPERATING DATA

Lehigh Southwest Cement Co.
Appendix B
Operating Data

Date / Time	Fan (rpm)
9/8/15 19:00	578
9/8/15 19:01	581
9/8/15 19:02	581
9/8/15 19:03	578
9/8/15 19:04	578
9/8/15 19:05	578
9/8/15 19:06	579
9/8/15 19:07	578
9/8/15 19:08	578
9/8/15 19:09	578
9/8/15 19:10	580
9/8/15 19:11	578
9/8/15 19:12	578
9/8/15 19:13	580
9/8/15 19:14	578
9/8/15 19:15	578
9/8/15 19:16	578
9/8/15 19:17	581
9/8/15 19:18	578
9/8/15 19:19	578
9/8/15 19:20	578
9/8/15 19:21	578
9/8/15 19:22	584
9/8/15 19:23	586
9/8/15 19:24	586
9/8/15 19:25	586
9/8/15 19:26	586
9/8/15 19:27	586
9/8/15 19:28	586
9/8/15 19:29	584
9/8/15 19:30	582
9/8/15 19:31	582
9/8/15 19:32	580
9/8/15 19:33	580
9/8/15 19:34	582
9/8/15 19:35	583
9/8/15 19:36	579
9/8/15 19:37	578
9/8/15 19:38	578
9/8/15 19:39	578
9/8/15 19:40	578
9/8/15 19:41	578
9/8/15 19:42	578
9/8/15 19:43	578
9/8/15 19:44	578
9/8/15 19:45	578
9/8/15 19:46	579
9/8/15 19:47	578
9/8/15 19:48	578
9/8/15 19:49	580
9/8/15 19:50	582
9/8/15 19:51	578
9/8/15 19:52	578

Date / Time	Fan (rpm)
9/8/15 19:53	578
9/8/15 19:54	578
9/8/15 19:55	578
9/8/15 19:56	578
9/8/15 19:57	578
9/8/15 19:58	585
9/8/15 19:59	592
9/8/15 20:00	599
9/8/15 20:01	605
9/8/15 20:02	612
9/8/15 20:03	621
9/8/15 20:04	629
9/8/15 20:05	637
9/8/15 20:06	656
9/8/15 20:07	681
9/8/15 20:08	701
9/8/15 20:09	711
9/8/15 20:10	716
9/8/15 20:11	717
9/8/15 20:12	716
9/8/15 20:13	711
9/8/15 20:14	703
9/8/15 20:15	695
9/8/15 20:16	692
9/8/15 20:17	686
9/8/15 20:18	686
9/8/15 20:19	687
9/8/15 20:20	690
9/8/15 20:21	703
9/8/15 20:22	715
9/8/15 20:23	718
9/8/15 20:24	716
9/8/15 20:25	713
9/8/15 20:26	708
9/8/15 20:27	711
9/8/15 20:28	724
9/8/15 20:29	737
9/8/15 20:30	738
9/8/15 20:31	732
9/8/15 20:32	729
9/8/15 20:33	723
9/8/15 20:34	720
9/8/15 20:35	716
9/8/15 20:36	716
9/8/15 20:37	716
9/8/15 20:38	716
9/8/15 20:39	716
9/8/15 20:40	716
9/8/15 20:41	716
9/8/15 20:42	716
9/8/15 20:43	716
9/8/15 20:44	716
9/8/15 20:45	716

Date / Time	Fan (rpm)
9/8/15 20:46	721
9/8/15 20:47	723
9/8/15 20:48	721
9/8/15 20:49	724
9/8/15 20:50	724
9/8/15 20:51	725
9/8/15 20:52	731
9/8/15 20:53	727
9/8/15 20:54	732
9/8/15 20:55	732
9/8/15 20:56	732
9/8/15 20:57	732
9/8/15 20:58	732
9/8/15 20:59	732
9/8/15 21:00	732
9/8/15 21:01	732
9/8/15 21:02	732
9/8/15 21:03	732
9/8/15 21:04	732
9/8/15 21:05	729
9/8/15 21:06	728
9/8/15 21:07	726
9/8/15 21:08	727
9/8/15 21:09	731
9/8/15 21:10	732
9/8/15 21:11	732
9/8/15 21:12	732
9/8/15 21:13	732
9/8/15 21:14	732
9/8/15 21:15	732
9/8/15 21:16	732
9/8/15 21:17	732
9/8/15 21:18	732
9/8/15 21:19	738
9/8/15 21:20	738
9/8/15 21:21	734
9/8/15 21:22	733
9/8/15 21:23	733
9/8/15 21:24	734
9/8/15 21:25	732
9/8/15 21:26	732
9/8/15 21:27	732
9/8/15 21:28	734
9/8/15 21:29	735
9/8/15 21:30	738
9/8/15 21:31	738
9/8/15 21:32	737
9/8/15 21:33	733
9/8/15 21:34	737
9/8/15 21:35	738
9/8/15 21:36	738
9/8/15 21:37	735
9/8/15 21:38	737

Date / Time	Fan (rpm)
9/8/15 21:39	738
9/8/15 21:40	738
9/8/15 21:41	738
9/8/15 21:42	738
9/8/15 21:43	738
9/8/15 21:44	738
9/8/15 21:45	738
9/8/15 21:46	738
9/8/15 21:47	738
9/8/15 21:48	738
9/8/15 21:49	738
9/8/15 21:50	738
9/8/15 21:51	738
9/8/15 21:52	738
9/8/15 21:53	738
9/8/15 21:54	738
9/8/15 21:55	738
9/8/15 21:56	738
9/8/15 21:57	742
9/8/15 21:58	738
9/8/15 21:59	738
9/8/15 22:00	741

Lehigh Southwest Cement Co.
Appendix B
Operating Data

Date / Time	Fan (rpm)
9/9/15 0:00	799
9/9/15 0:01	793
9/9/15 0:02	796
9/9/15 0:03	799
9/9/15 0:04	800
9/9/15 0:05	800
9/9/15 0:06	800
9/9/15 0:07	800
9/9/15 0:08	800
9/9/15 0:09	800
9/9/15 0:10	800
9/9/15 0:11	800
9/9/15 0:12	798
9/9/15 0:13	800
9/9/15 0:14	800
9/9/15 0:15	799
9/9/15 0:16	799
9/9/15 0:17	799
9/9/15 0:18	799
9/9/15 0:19	799
9/9/15 0:20	798
9/9/15 0:21	798
9/9/15 0:22	792
9/9/15 0:23	790
9/9/15 0:24	786
9/9/15 0:25	786
9/9/15 0:26	787
9/9/15 0:27	790
9/9/15 0:28	790
9/9/15 0:29	786
9/9/15 0:30	786
9/9/15 0:31	785
9/9/15 0:32	784
9/9/15 0:33	784
9/9/15 0:34	782
9/9/15 0:35	782
9/9/15 0:36	780
9/9/15 0:37	779
9/9/15 0:38	775
9/9/15 0:39	770
9/9/15 0:40	770
9/9/15 0:41	772
9/9/15 0:42	770
9/9/15 0:43	770
9/9/15 0:44	773
9/9/15 0:45	778
9/9/15 0:46	771
9/9/15 0:47	770
9/9/15 0:48	770
9/9/15 0:49	770
9/9/15 0:50	770
9/9/15 0:51	770
9/9/15 0:52	767

Date / Time	Fan (rpm)
9/9/15 0:53	767
9/9/15 0:54	770
9/9/15 0:55	763
9/9/15 0:56	769
9/9/15 0:57	770
9/9/15 0:58	770
9/9/15 0:59	770
9/9/15 1:00	770
9/9/15 1:01	773
9/9/15 1:02	781
9/9/15 1:03	786
9/9/15 1:04	785
9/9/15 1:05	778
9/9/15 1:06	771
9/9/15 1:07	765
9/9/15 1:08	762
9/9/15 1:09	762
9/9/15 1:10	762
9/9/15 1:11	762
9/9/15 1:12	762
9/9/15 1:13	762
9/9/15 1:14	760
9/9/15 1:15	759
9/9/15 1:16	763
9/9/15 1:17	763
9/9/15 1:18	762
9/9/15 1:19	762
9/9/15 1:20	762
9/9/15 1:21	762
9/9/15 1:22	764
9/9/15 1:23	762
9/9/15 1:24	762
9/9/15 1:25	762
9/9/15 1:26	762
9/9/15 1:27	763
9/9/15 1:28	765
9/9/15 1:29	764
9/9/15 1:30	764
9/9/15 1:31	764
9/9/15 1:32	765
9/9/15 1:33	769
9/9/15 1:34	770
9/9/15 1:35	770
9/9/15 1:36	770
9/9/15 1:37	770
9/9/15 1:38	773
9/9/15 1:39	778
9/9/15 1:40	778
9/9/15 1:41	778
9/9/15 1:42	778
9/9/15 1:43	778
9/9/15 1:44	778
9/9/15 1:45	778

Date / Time	Fan (rpm)
9/9/15 1:46	778
9/9/15 1:47	780
9/9/15 1:48	781
9/9/15 1:49	786
9/9/15 1:50	786
9/9/15 1:51	786
9/9/15 1:52	786
9/9/15 1:53	786
9/9/15 1:54	786
9/9/15 1:55	786
9/9/15 1:56	786
9/9/15 1:57	786
9/9/15 1:58	786
9/9/15 1:59	786
9/9/15 2:00	788

Lehigh Southwest Cement Co.
Appendix B
Operating Data

Date / Time	Fan (rpm)
9/9/15 6:30	863
9/9/15 6:31	864
9/9/15 6:32	865
9/9/15 6:33	862
9/9/15 6:34	863
9/9/15 6:35	864
9/9/15 6:36	867
9/9/15 6:37	865
9/9/15 6:38	863
9/9/15 6:39	864
9/9/15 6:40	864
9/9/15 6:41	862
9/9/15 6:42	862
9/9/15 6:43	865
9/9/15 6:44	864
9/9/15 6:45	863
9/9/15 6:46	864
9/9/15 6:47	866
9/9/15 6:48	862
9/9/15 6:49	862
9/9/15 6:50	862
9/9/15 6:51	862
9/9/15 6:52	862
9/9/15 6:53	862
9/9/15 6:54	865
9/9/15 6:55	863
9/9/15 6:56	863
9/9/15 6:57	864
9/9/15 6:58	867
9/9/15 6:59	864
9/9/15 7:00	863
9/9/15 7:01	862
9/9/15 7:02	864
9/9/15 7:03	862
9/9/15 7:04	862
9/9/15 7:05	865
9/9/15 7:06	866
9/9/15 7:07	865
9/9/15 7:08	864
9/9/15 7:09	864
9/9/15 7:10	862
9/9/15 7:11	864
9/9/15 7:12	862
9/9/15 7:13	863
9/9/15 7:14	863
9/9/15 7:15	864
9/9/15 7:16	866
9/9/15 7:17	862
9/9/15 7:18	862
9/9/15 7:19	862
9/9/15 7:20	864
9/9/15 7:21	863
9/9/15 7:22	862

Date / Time	Fan (rpm)
9/9/15 7:23	862
9/9/15 7:24	862
9/9/15 7:25	862
9/9/15 7:26	862
9/9/15 7:27	862
9/9/15 7:28	862
9/9/15 7:29	862
9/9/15 7:30	864
9/9/15 7:31	863
9/9/15 7:32	863
9/9/15 7:33	864
9/9/15 7:34	862
9/9/15 7:35	862
9/9/15 7:36	862
9/9/15 7:37	862
9/9/15 7:38	862
9/9/15 7:39	862
9/9/15 7:40	864
9/9/15 7:41	862
9/9/15 7:42	863
9/9/15 7:43	863
9/9/15 7:44	862
9/9/15 7:45	862
9/9/15 7:46	862
9/9/15 7:47	862
9/9/15 7:48	862
9/9/15 7:49	862
9/9/15 7:50	862
9/9/15 7:51	862
9/9/15 7:52	862
9/9/15 7:53	862
9/9/15 7:54	862
9/9/15 7:55	862
9/9/15 7:56	862
9/9/15 7:57	862
9/9/15 7:58	862
9/9/15 7:59	863
9/9/15 8:00	863
9/9/15 8:01	863
9/9/15 8:02	866
9/9/15 8:03	865
9/9/15 8:04	864
9/9/15 8:05	863
9/9/15 8:06	864
9/9/15 8:07	862
9/9/15 8:08	862
9/9/15 8:09	865
9/9/15 8:10	862
9/9/15 8:11	862
9/9/15 8:12	864
9/9/15 8:13	862
9/9/15 8:14	863
9/9/15 8:15	863

Date / Time	Fan (rpm)
9/9/15 8:16	864
9/9/15 8:17	862
9/9/15 8:18	862
9/9/15 8:19	862
9/9/15 8:20	864
9/9/15 8:21	862
9/9/15 8:22	862
9/9/15 8:23	864
9/9/15 8:24	862
9/9/15 8:25	862
9/9/15 8:26	862
9/9/15 8:27	862
9/9/15 8:28	862
9/9/15 8:29	862
9/9/15 8:30	862
9/9/15 8:31	862
9/9/15 8:32	862
9/9/15 8:33	862
9/9/15 8:34	862
9/9/15 8:35	862
9/9/15 8:36	862
9/9/15 8:37	862
9/9/15 8:38	864
9/9/15 8:39	862
9/9/15 8:40	862
9/9/15 8:41	862
9/9/15 8:42	862
9/9/15 8:43	862
9/9/15 8:44	862
9/9/15 8:45	862
9/9/15 8:46	862
9/9/15 8:47	862
9/9/15 8:48	862
9/9/15 8:49	862
9/9/15 8:50	862
9/9/15 8:51	862
9/9/15 8:52	862
9/9/15 8:53	857
9/9/15 8:54	857
9/9/15 8:55	855
9/9/15 8:56	854
9/9/15 8:57	852
9/9/15 8:58	846
9/9/15 8:59	839
9/9/15 9:00	836
9/9/15 9:01	843
9/9/15 9:02	841
9/9/15 9:03	835
9/9/15 9:04	827
9/9/15 9:05	819
9/9/15 9:06	811
9/9/15 9:07	803
9/9/15 9:08	797

Date / Time	Fan (rpm)
9/9/15 9:09	790
9/9/15 9:10	783
9/9/15 9:11	775
9/9/15 9:12	768
9/9/15 9:13	761
9/9/15 9:14	753
9/9/15 9:15	745
9/9/15 9:16	738
9/9/15 9:17	731
9/9/15 9:18	724
9/9/15 9:19	717
9/9/15 9:20	709
9/9/15 9:21	701
9/9/15 9:22	693
9/9/15 9:23	689
9/9/15 9:24	681
9/9/15 9:25	673
9/9/15 9:26	666
9/9/15 9:27	659
9/9/15 9:28	651
9/9/15 9:29	644
9/9/15 9:30	637
9/9/15 9:31	629
9/9/15 9:32	623
9/9/15 9:33	615
9/9/15 9:34	608
9/9/15 9:35	601
9/9/15 9:36	600
9/9/15 9:37	600
9/9/15 9:38	599
9/9/15 9:39	592
9/9/15 9:40	592
9/9/15 9:41	592
9/9/15 9:42	592
9/9/15 9:43	592
9/9/15 9:44	586
9/9/15 9:45	589
9/9/15 9:46	592
9/9/15 9:47	592
9/9/15 9:48	592
9/9/15 9:49	592
9/9/15 9:50	592
9/9/15 9:51	592
9/9/15 9:52	592
9/9/15 9:53	592
9/9/15 9:54	592
9/9/15 9:55	589
9/9/15 9:56	591
9/9/15 9:57	592
9/9/15 9:58	592
9/9/15 9:59	588
9/9/15 10:00	587

Lehigh Southwest Cement Co.
Appendix B
Operating Data

Date / Time	Fan (rpm)
9/9/15 11:30	586
9/9/15 11:31	586
9/9/15 11:32	586
9/9/15 11:33	586
9/9/15 11:34	586
9/9/15 11:35	586
9/9/15 11:36	586
9/9/15 11:37	586
9/9/15 11:38	586
9/9/15 11:39	586
9/9/15 11:40	586
9/9/15 11:41	586
9/9/15 11:42	586
9/9/15 11:43	591
9/9/15 11:44	599
9/9/15 11:45	601
9/9/15 11:46	611
9/9/15 11:47	617
9/9/15 11:48	624
9/9/15 11:49	626
9/9/15 11:50	630
9/9/15 11:51	630
9/9/15 11:52	631
9/9/15 11:53	631
9/9/15 11:54	631
9/9/15 11:55	631
9/9/15 11:56	632
9/9/15 11:57	634
9/9/15 11:58	640
9/9/15 11:59	640
9/9/15 12:00	640
9/9/15 12:01	640
9/9/15 12:02	640
9/9/15 12:03	640
9/9/15 12:04	640
9/9/15 12:05	640
9/9/15 12:06	640
9/9/15 12:07	640
9/9/15 12:08	640
9/9/15 12:09	640
9/9/15 12:10	640
9/9/15 12:11	644
9/9/15 12:12	643
9/9/15 12:13	646
9/9/15 12:14	646
9/9/15 12:15	646
9/9/15 12:16	646
9/9/15 12:17	646
9/9/15 12:18	646
9/9/15 12:19	646
9/9/15 12:20	649
9/9/15 12:21	654
9/9/15 12:22	653

Date / Time	Fan (rpm)
9/9/15 12:23	649
9/9/15 12:24	654
9/9/15 12:25	654
9/9/15 12:26	659
9/9/15 12:27	662
9/9/15 12:28	662
9/9/15 12:29	662
9/9/15 12:30	662
9/9/15 12:31	662
9/9/15 12:32	662
9/9/15 12:33	667
9/9/15 12:34	670
9/9/15 12:35	670
9/9/15 12:36	677
9/9/15 12:37	679
9/9/15 12:38	680
9/9/15 12:39	683
9/9/15 12:40	684
9/9/15 12:41	685
9/9/15 12:42	686
9/9/15 12:43	689
9/9/15 12:44	685
9/9/15 12:45	686
9/9/15 12:46	692
9/9/15 12:47	699
9/9/15 12:48	700
9/9/15 12:49	700
9/9/15 12:50	700
9/9/15 12:51	700
9/9/15 12:52	703
9/9/15 12:53	708
9/9/15 12:54	708
9/9/15 12:55	708
9/9/15 12:56	708
9/9/15 12:57	708
9/9/15 12:58	708
9/9/15 12:59	711
9/9/15 13:00	715
9/9/15 13:01	716
9/9/15 13:02	715
9/9/15 13:03	711
9/9/15 13:04	716
9/9/15 13:05	716
9/9/15 13:06	716
9/9/15 13:07	710
9/9/15 13:08	716
9/9/15 13:09	716
9/9/15 13:10	716
9/9/15 13:11	716
9/9/15 13:12	718
9/9/15 13:13	720
9/9/15 13:14	717
9/9/15 13:15	724

Date / Time	Fan (rpm)
9/9/15 13:16	724
9/9/15 13:17	724
9/9/15 13:18	728
9/9/15 13:19	732
9/9/15 13:20	735
9/9/15 13:21	738
9/9/15 13:22	738
9/9/15 13:23	738
9/9/15 13:24	740
9/9/15 13:25	741
9/9/15 13:26	746
9/9/15 13:27	746
9/9/15 13:28	746
9/9/15 13:29	746
9/9/15 13:30	746
9/9/15 13:31	751
9/9/15 13:32	755
9/9/15 13:33	758
9/9/15 13:34	762
9/9/15 13:35	762
9/9/15 13:36	762
9/9/15 13:37	760
9/9/15 13:38	761
9/9/15 13:39	762
9/9/15 13:40	762
9/9/15 13:41	762
9/9/15 13:42	764
9/9/15 13:43	767
9/9/15 13:44	770
9/9/15 13:45	770
9/9/15 13:46	770
9/9/15 13:47	770
9/9/15 13:48	770
9/9/15 13:49	770
9/9/15 13:50	770
9/9/15 13:51	770
9/9/15 13:52	770
9/9/15 13:53	771
9/9/15 13:54	775
9/9/15 13:55	775
9/9/15 13:56	772
9/9/15 13:57	771
9/9/15 13:58	776
9/9/15 13:59	778
9/9/15 14:00	778

APPENDIX C - COMPARATIVE MEASUREMENT DATA

Lehigh Southwest Cement Co.
Appendix C - Comparative Data
Far-Field Measurement Data

Measurement Point	Time Period	May 6 - 7 Overall L_{90} (dBA)	Sept 8 - 9 Overall L_{90} (dBA)	Overall Change (dBA)
MP1	Evening	--	42.2	--
MP2	Evening	63.9	58.3	-5.6
MP3	Evening	46.0	42.6	-3.4
MP4	Evening	46.6	50.0	3.4
MP5	Evening	42.3	41.5	-0.8
MP6	Evening	--	31.2	--
MP1	Midnight	52.3	47.4	-4.9
MP2	Midnight	63.1	60.0	-3.1
MP3	Midnight	44.2	42.1	-2.1
MP4	Midnight	46.4	47.0	0.6
MP5	Midnight	30.9	34.2	3.3
MP6	Midnight	--	53.0	--
MP1	Morning	51.5	45.8	-5.7
MP2	Morning	62.8	61.3	-1.5
MP3	Morning	46.1	46.9	0.8
MP4	Morning	53.7	44.7	-9.0
MP5	Morning	40.4	45.8	5.4
MP6	Morning	45.3	35.5	-9.8
MP1	Noon	51.7	44.3	-7.4
MP2	Noon	62.7	58.1	-4.6
MP3	Noon	47.2	49.4	2.2
MP4	Noon	46.6	41.7	-4.9
MP5	Noon	40.1	37.9	-2.2
MP6	Noon	--	38.7	--

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.

L_{90} = Sound level exceed 90% of the measurement period.

Lehigh Southwest Cement Co.
Appendix C
Far-Field Measurement Data
May 6 and 7, 2015

Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
Tonal Limits	15	15	15	15	15	15	15	15	15	15	8	8	8	8	8	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Evening Time Period

7:00 PM to 9:00 PM	*LAeq*	*LA90*
MP1	53.1	--
MP2	66.0	63.9
MP3	49.8	46.0
MP4	49.7	46.6
MP5	45.7	42.3

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	57.3	56.0	54.8	56.8	57.6	55.6	50.8	46.9	50.0	50.3	50.2	47.6	54.0	46.0	46.7	52.0	44.1	42.9	41.5	38.2	35.4	31.0	28.0	23.7	21.3	19.2	17.8	16.0	14.5
MP2	Overall 1/3 Spectra	66.3	70.4	66.7	70.3	66.1	63.3	61.8	60.3	63.0	64.5	57.9	59.0	71.2	59.1	58.0	59.4	54.3	53.4	52.3	49.9	47.6	47.0	45.0	40.6	37.3	32.0	26.4	23.1	21.3
MP3	Overall 1/3 Spectra	65.0	63.5	61.5	59.9	58.0	55.6	53.3	49.4	48.4	50.2	43.3	41.1	53.2	37.9	38.3	44.4	40.9	40.4	39.1	35.9	32.5	29.4	28.3	26.3	21.7	20.7	20.8	21.5	21.6
MP4	Overall 1/3 Spectra	63.8	61.8	59.0	57.5	54.6	51.6	51.5	47.4	46.7	47.9	42.8	43.6	50.1	44.1	43.8	43.6	41.6	40.5	38.7	34.7	31.7	28.1	26.0	25.7	26.2	27.2	27.1	27.9	28.3
MP5	Overall 1/3 Spectra	62.8	61.1	59.2	56.9	54.2	53.1	50.5	47.7	47.2	44.7	40.9	39.5	38.7	35.9	35.3	36.0	36.4	36.6	36.0	34.2	32.5	31.6	30.6	34.6	34.9	27.5	23.0	22.3	20.4

Midnight Time Period

12:00 AM to 2:00 AM	*LAeq*	*LA90*
MP1	54.0	52.3
MP2	63.9	63.1
MP3	46.8	44.2
MP4	47.8	46.4
MP5	33.7	30.9

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	53.1	54.7	53.4	59.2	61.3	57.1	51.6	49.9	55.0	55.2	52.1	46.8	57.5	44.8	47.7	50.0	44.5	46.2	40.9	39.5	36.7	32.7	30.9	29.0	29.8	24.9	22.2	20.2	16.6
MP2	Overall 1/3 Spectra	63.9	70.6	67.8	72.4	66.5	63.3	63.1	59.6	61.6	64.5	57.7	58.1	68.1	58.4	58.9	58.3	53.7	52.8	52.1	49.0	47.9	47.3	45.2	41.3	37.3	30.5	23.6	18.8	16.9
MP3	Overall 1/3 Spectra	53.2	56.6	55.0	56.9	56.2	53.3	52.6	49.5	49.8	56.3	41.2	34.8	49.0	34.1	35.2	41.5	36.6	39.0	36.6	31.4	26.5	21.9	18.2	15.3	28.1	20.6	12.9	13.8	13.0
MP4	Overall 1/3 Spectra	50.1	53.4	48.9	51.8	50.9	48.2	49.2	45.3	46.6	50.4	43.4	43.4	47.9	42.9	42.7	42.5	41.0	38.8	38.4	33.3	31.4	26.9	27.5	20.8	20.2	20.5	21.6	22.3	22.9
MP5	Overall 1/3 Spectra	42.2	42.8	42.2	44.0	43.8	42.3	40.1	37.1	36.0	32.0	27.0	25.5	34.2	26.0	25.5	27.6	23.9	25.3	24.9	22.8	18.6	14.6	12.0	11.6	17.7	15.2	13.3	13.5	12.8

Morning Time Period

8:00 AM to 10:00 AM	*LAeq*	*LA90*
MP1	53.0	51.5
MP2	64.5	62.8
MP3	48.1	46.1
MP4	57.5	53.7
MP5	59.1	40.4
MP6	47.8	45.3

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	54.4	53.6	53.3	58.0	59.4	55.9	54.0	53.0	52.7	53.7	49.9	47.3	53.9	43.7	44.0	51.2	44.2	41.6	43.0	40.4	38.0	35.0	32.4	28.3	24.4	20.3	18.0	15.7	13.6
MP2	Overall 1/3 Spectra	64.5	69.9	66.6	71.8	68.0	63.3	63.6	60.2	63.1	65.7	56.8	57.4	70.0	57.7	57.5	58.8	53.6	53.2	51.1	48.9	47.6	46.5	44.9	41.7	38.3	32.5	26.8	21.8	16.8
MP3	Overall 1/3 Spectra	56.4	56.5	56.4	59.2	56.8	54.7	54.0	50.8	50.3	55.3	45.1	41.2	50.9	36.8	37.0	41.8	37.7	39.2	37.9	34.8	30.3	30.5	31.9	28.6	21.6	20.5	19.4	18.6	18.9
MP4	Overall 1/3 Spectra	55.9	56.0	54.3	55.9	55.4	72.0	58.2	55.6	56.5	54.3	50.9	51.2	53.7	51.4	51.3	51.0	49.0	48.7	48.5	46.1	45.3	43.5	42.1	39.8	37.0	35.0	34.2	33.7	33.2
MP5	Overall 1/3 Spectra	50.9	51.4	52.0	54.4	58.2	57.5	57.8	52.6	50.5	49.5	48.9	50.4	50.8	48.4	47.6	48.9	50.3	52.1	52.7	51.1	49.1	45.1	40.8	37.8	34.8	31.7	29.2	26.6	23.4
MP6	Overall 1/3 Spectra	56.7	51.4	50.5	50.9	51.3	53.8	57.6	51.7	46.6	45.1	45.1	46.4	48.4	43.6	43.2	41.0	38.2	38.0	36.3	35.4	31.1	28.5	26.9	26.1	25.5	26.1	34.4	28.6	19.6

Noon Time Period

12:00 PM to 2:00 PM	*LAeq*	*LA90*
MP1	61.4	40.1
MP2	56.9	46.6
MP3	49.8	47.2
MP4	63.7	62.7
MP5	55.4	51.7

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	55.7	53.8	53.8	60.0	59.8	55.2	53.8	54.0	55.1	54.0	51.0	49.5	55.8	49.4	49.2	53.5	47.1	46.2	45.1	40.4	37.4	33.3	31.0	28.8	27.0	26.2	25.1	23.8	22.6
MP2	Overall 1/3 Spectra	64.1	70.4	67.7	72.7	69.0	64.6	64.9	62.0	64.9	65.6	58.7	57.6	65.8	58.5	59.4	58.8	54.3	53.6	51.8	49.6	48.4	47.5	46.1	42.9	39.7	34.2	28.9	24.9	21.2
MP3	Overall 1/3 Spectra	58.8	58.3	56.8	59.2	56.8	55.0	53.4	50.9	51.1	55.6	45.2	42.9	47.5	40.2	41.2	43.9	41.2	42.7	41.5	38.4	36.3	33.3	29.2	25.0	21.5	19.7	19.0	18.4	18.2
MP4	Overall 1/3 Spectra	55.8	56.3	55.2	56.4	56.5	53.0	54.7	56.1	52.9	54.2	51.2	51.5	52.0	49.7	48.7	48.7	48.2	47.7	48.0	46.8	44.4	44.5	43.9	41.8	40.3	37.5	35.6	37.8	33.8
MP5	Overall 1/3 Spectra	57.5	60.8	56.4	58.0	57.9	62.8	64.2	51.2	54.6	52.1	52.9	52.9	53.3	51.9	50.6	50.8	51.3	53.2	54.9	53.2	51.0	48.3	46.6	44.7	40.9	39.2	37.6	33.8	31.4

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.

L_{90} = Sound level exceed 90% of the measurement period.

Lehigh Southwest Cement Co.
Appendix C
Far-Field Measurement Data
September 8 and 9, 2015

	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
	Tonal Limits	15	15	15	15	15	15	15	15	15	15	8	8	8	8	8	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Evening Time Period

7:00 PM to 9:00 PM	LAeq	LA90
MP1	45.7	42.2
MP2	58.9	58.3
MP3	44.8	42.6
MP4	52.3	50.0
MP5	55.9	41.5
MP6	39.9	31.2

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	46.2	48.3	49.9	50.6	49.7	46.8	47.7	50.0	50.2	49.2	42.5	42.1	41.9	40.8	40.7	40.9	37.8	36.0	34.7	30.1	27.8	25.2	29.3	28.7	31.6	25.1	21.5	17.4	14.6
MP2	Overall 1/3 Spectra	64.2	70.8	67.2	73.2	63.8	61.1	60.2	59.1	64.2	62.2	56.2	55.7	55.1	55.5	55.4	51.6	50.2	49.4	47.5	46.2	44.3	43.7	42.0	37.5	33.8	27.2	18.0	15.8	15.5
MP3	Overall 1/3 Spectra	54.4	54.5	54.4	55.9	55.5	51.4	51.3	53.6	57.5	54.9	43.8	41.2	36.0	34.4	35.4	34.4	32.4	31.4	30.1	26.4	22.9	19.2	18.1	30.0	33.3	14.2	15.4	14.0	12.4
MP4	Overall 1/3 Spectra	52.0	51.5	49.8	49.4	48.0	51.6	50.2	48.3	51.8	51.9	49.2	47.5	45.0	43.1	41.9	40.6	39.9	38.9	38.3	37.0	34.7	33.3	36.5	47.7	42.0	27.1	26.6	26.7	29.7
MP5	Overall 1/3 Spectra	48.5	48.6	49.5	48.0	48.9	47.9	47.5	47.6	45.7	44.6	47.4	46.1	47.0	45.2	44.5	45.3	45.9	48.3	50.0	48.2	45.9	41.5	37.2	34.6	37.0	29.6	25.2	21.3	18.3
MP6	Overall 1/3 Spectra	40.9	40.3	41.3	40.0	39.8	41.2	41.9	44.0	41.3	37.3	37.7	34.8	34.6	35.2	35.8	35.0	33.1	30.5	28.6	27.8	24.7	24.6	24.0	22.1	18.9	17.2	14.9	13.8	12.5

Midnight Time Period

12:00 AM to 2:00 AM	LAeq	LA90
MP1	48.3	47.4
MP2	60.4	60.0
MP3	45.9	42.1
MP4	48.4	47.0
MP5	36.3	34.2
MP6	54.3	53.0

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	55.3	52.5	50.4	52.4	50.9	45.3	51.2	48.4	50.6	52.4	42.4	41.1	46.9	42.6	43.4	39.9	37.4	36.6	35.0	30.7	28.0	26.1	36.0	41.5	27.7	19.3	20.4	15.5	13.5
MP2	Overall 1/3 Spectra	64.1	70.4	65.9	73.9	65.5	62.9	60.8	58.4	62.8	64.5	54.0	57.6	59.8	57.3	56.5	52.9	50.4	50.5	48.5	48.0	46.3	46.7	44.1	40.5	35.3	29.5	22.5	20.2	17.2
MP3	Overall 1/3 Spectra	54.5	55.7	53.2	55.2	50.1	50.3	51.6	49.2	51.0	57.8	45.7	43.8	43.8	43.1	40.3	37.6	34.2	31.0	28.5	23.9	19.4	16.6	17.4	29.4	29.2	18.2	13.1	11.9	10.5
MP4	Overall 1/3 Spectra	54.2	56.6	55.1	54.5	52.4	52.4	49.2	47.1	48.4	48.8	45.0	42.4	43.5	43.4	43.1	40.5	37.8	35.4	34.8	32.7	32.1	28.7	36.5	41.6	32.6	22.5	22.7	22.9	23.5
MP5	Overall 1/3 Spectra	44.9	45.5	45.6	46.1	46.0	44.6	43.8	40.8	38.8	37.8	37.4	33.0	28.2	26.8	26.4	27.7	27.5	27.1	25.7	22.8	20.7	20.9	27.7	21.8	17.6	16.5	14.7	13.4	12.5
MP6	Overall 1/3 Spectra	40.9	40.1	38.7	39.0	38.8	38.3	38.2	36.1	32.9	36.7	30.9	26.0	27.4	24.8	22.9	19.5	18.4	17.9	18.2	18.3	18.1	17.5	35.2	48.5	51.1	29.8	24.9	24.7	18.5

Morning Time Period

6:00 AM to 8:00 AM	LAeq	LA90
MP1	47.6	45.8
MP2	62.0	61.3
MP3	48.1	46.9
MP4	55.4	44.7
MP5	59.3	45.8
MP6	38.6	35.5

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	56.4	52.3	53.7	54.3	50.6	48.2	49.4	50.0	50.3	52.3	43.7	42.2	46.8	41.2	43.9	42.8	39.4	38.5	37.3	32.6	30.6	26.6	25.4	25.9	22.9	20.4	21.7	16.6	15.3
MP2	Overall 1/3 Spectra	65.8	70.0	67.5	72.7	65.7	63.8	63.4	60.4	62.4	62.9	56.0	58.4	65.2	57.3	58.3	53.6	52.5	51.6	49.7	49.2	45.2	43.4	42.0	37.7	34.0	27.3	22.1	17.1	14.0
MP3	Overall 1/3 Spectra	58.2	58.2	55.5	58.2	54.8	55.0	55.9	53.8	52.3	58.1	48.2	44.4	43.1	40.9	41.4	42.3	41.4	39.9	36.3	30.2	26.2	22.4	20.1	18.7	16.2	13.7	12.3	12.2	11.5
MP4	Overall 1/3 Spectra	55.1	54.2	51.1	52.8	53.2	53.7	57.9	55.3	53.0	54.8	48.9	48.7	50.1	48.9	47.7	48.3	47.2	47.1	46.5	44.9	43.1	41.0	40.6	39.4	36.1	33.4	35.3	33.7	27.8
MP5	Overall 1/3 Spectra	51.2	51.4	51.8	53.8	53.3	53.4	53.4	53.0	49.5	49.7	48.2	49.4	50.4	49.3	48.7	49.2	50.6	53.1	53.3	51.1	48.2	44.0	40.0	36.6	33.0	28.8	25.3	22.3	18.7
MP6	Overall 1/3 Spectra	45.1	43.7	43.5	44.9	45.4	46.0	47.0	45.8	43.5	42.8	39.9	40.2	36.9	35.4	33.6	32.4	29.9	27.8	25.5	22.1	18.1	16.4	14.9	13.2	12.7	10.8	10.2	10.7	9.8

Noon Time Period

12:00 PM to 2:00 PM	LAeq	LA90
MP1	47.9	44.3
MP2	60.0	58.1
MP3	51.5	49.4
MP4	54.3	41.7
MP5	59.8	37.9
MP6	41.7	38.7

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP1	Overall 1/3 Spectra	58.5	55.8	53.4	54.4	54.6	52.6	51.2	51.2	58.2	52.2	46.4	46.0	44.6	43.8	42.6	41.4	39.6	39.0	36.1	32.8	30.9	28.7	26.3	24.5	25.7	24.1	21.4	21.0	16.0
MP2	Overall 1/3 Spectra	62.2	67.7	64.1	74.3	66.2	65.7	64.3	62.1	66.5	64.3	59.7	57.9	55.1	55.4	55.1	52.3	50.8	51.0	48.4	47.8	46.1	45.0	44.6	40.8	37.5	34.8	32.2	29.1	26.7
MP3	Overall 1/3 Spectra	67.9	66.4	65.0	63.1	60.3	69.1	57.9	56.2	64.8	60.7	52.1	50.5	45.4	43.7	41.4	43.5	39.8	38.4	39.2	36.3	33.1	30.2	27.2	25.0	22.1	19.5	17.9	17.5	18.7
MP4	Overall 1/3 Spectra	53.7	53.7	55.3	57.2	55.3	57.9	57.7	52.3	53.9	51.4	48.3	50.3	47.8	47.0	46.8	47.5	46.8	46.1	45.7	43.7	41.6	40.0	38.6	36.6	33.9	32.4	31.0	28.3	27.1
MP5	Overall 1/3 Spectra	55.8	53.9	52.3	51.5	51.3	50.5	56.8	54.1	48.8	49.6	49.2	52.1	51.7	48.5	48.7	49.7	50.3	52.6	54.3	52.2	48.9	44.3	40.1	36.3	32.7	28.8	24.8	21.4	18.2
MP6	Overall 1/3 Spectra	44.7	42.7	42.7	43.2	43.8	43.7	44.8	42.9	42.0	41.2	40.3	39.7	38.8	37.9	36.7	35.1	33.7	32.8	32.5	29.9	26.6	23.6	21.3	20.2	18.1	17.1	18.3	18.6	13.9

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.

L_{90} = Sound level exceed 90% of the measurement period.

Lehigh Southwest Cement Co.
Appendix C - Comparative Data
Near-Field Measurement Data

Measurement Point	File Name	May 7 Overall L_{eq} (dBA)	Sept 9 Overall L_{eq} (dBA)	Overall Reduction (dBA)
NF1	020	89.6	86.8	-2.9
NF2	021	89.8	86.2	-3.6
NF3	022	88.9	87.6	-1.3
NF4	023	90.4	87.3	-3.1
NF5	024	88.3	86.4	-1.9
NF6	025	87.1	84.7	-2.4
NF7	026	85.4	85.3	0.0
NF8	027	87.4	89.0	1.5
NF9	028	91.2	87.6	-3.7
NF10	029	91.5	90.2	-1.3
NF11	030	93.0	91.1	-1.8
NF12	031	91.4	88.9	-2.5
NF13	017	73.4	72.5	-0.9
NF14	018	79.1	83.7	4.6
NF15	019	87.7	87.2	-0.5
NF16	020	83.2	84.9	1.7
NF17	021	79.9	77.1	-2.8
NF18	022	75.3	74.3	-1.0
NF19	023	78.2	74.5	-3.7
NF20	024	76.5	74.7	-1.7
NF21	025	76.9	75.5	-1.4
NF22	026	78.4	77.1	-1.3
NF23	027	79.4	76.2	-3.2
NF24	028	78.4	73.5	-5.0
NF25	029	77.6	74.9	-2.7
NF26	031	81.8	75.7	-6.1
NF27	032	83.4	76.5	-6.9
NF28	033	78.4	81.1	2.7
NF29	034	85.1	78.8	-6.3
NF30	035	85.3	77.4	-7.9
NF31	036	78.9	74.2	-4.7
NF32	037	73.9	72.0	-1.9
NF33	038	70.6	68.3	-2.2
NF34	039	70.2	69.2	-1.0
NF35	040	71.5	71.2	-0.3

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.

L_{90} = Sound level exceed 90% of the measurement period.

Lehigh Southwest Cement Co.
Appendix C
Near-Field Measurement Data
May 7, 2015

Measurement Point	File Name	Overall Leq
NF1	017	89.6
NF2	018	89.8
NF3	019	88.9
NF4	020	90.4
NF5	021	88.3
NF6	022	87.1
NF7	023	85.4
NF8	024	87.4
NF9	025	91.2
NF10	026	91.5
NF11	027	93.0
NF12	028	91.4
NF13	029	73.4
NF14	030	79.1
NF15	031	87.7
NF16	032	83.2
NF17	033	79.9
NF18	034	75.3
NF19	035	78.2
NF20	036	76.5
NF21	037	76.9
NF22	038	78.4
NF23	039	79.4
NF24	040	78.4
NF25	041	77.6
NF26	042	81.8
NF27	043	83.4
NF28	044	78.4
NF29	045	85.1
NF30	046	85.3
NF31	047	78.9
NF32	048	73.9
NF33	049	70.6
NF34	050	70.2
NF35	051	71.5

Frequency (Hz)	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
Overall 1/3 Spectra	82.3	90.6	85.0	87.4	86.5	84.0	79.2	78.4	81.1	93.4	88.9	79.7	89.9	80.6	80.9	85.7	78.1	78.2	77.8	77.3	72.5	77.3	76.5	74.8	72.4	71.6	64.7	59.5	55.9
Overall 1/3 Spectra	80.4	88.9	90.0	86.8	85.0	83.6	80.1	78.6	79.9	87.9	86.5	81.1	91.6	81.4	82.5	84.1	78.1	77.7	80.5	77.1	73.8	76.2	76.7	76.7	73.1	73.2	65.9	60.2	55.7
Overall 1/3 Spectra	80.6	87.6	88.5	86.8	88.1	84.8	79.2	80.3	79.6	83.5	86.3	80.9	87.4	82.1	83.0	85.4	78.8	78.7	77.9	76.3	74.1	75.1	77.4	71.0	69.1	68.2	62.9	60.4	57.2
Overall 1/3 Spectra	80.1	85.8	90.8	89.8	87.9	85.4	81.0	81.8	80.7	84.7	84.7	82.2	90.7	82.2	83.4	88.9	79.8	82.6	78.1	75.6	73.6	73.7	73.4	69.9	67.3	65.9	61.5	58.4	56.0
Overall 1/3 Spectra	78.3	86.7	89.2	88.0	85.3	81.8	80.8	80.7	78.7	87.2	83.2	79.6	86.3	81.7	81.4	87.1	79.6	78.5	76.6	73.8	72.2	72.1	72.0	68.9	66.7	64.7	60.6	58.4	55.4
Overall 1/3 Spectra	76.2	80.3	85.9	84.4	81.3	78.1	75.4	78.5	77.1	82.3	81.5	79.0	90.8	80.0	80.3	84.8	76.7	76.1	74.5	72.0	68.6	68.6	68.0	65.1	62.8	61.0	56.8	52.9	49.1
Overall 1/3 Spectra	78.0	79.3	81.8	83.8	80.3	78.7	78.9	82.0	78.3	80.3	82.2	81.1	86.2	79.9	81.0	81.4	76.4	76.6	73.1	71.4	68.4	68.4	68.5	64.5	61.8	60.5	56.9	54.4	52.0
Overall 1/3 Spectra	79.1	84.6	86.4	91.0	84.6	83.5	82.4	81.8	80.5	84.1	82.7	81.3	85.1	81.6	81.9	84.6	79.1	78.5	76.3	74.2	72.1	72.5	72.2	68.6	66.0	63.3	59.8	57.4	54.3
Overall 1/3 Spectra	80.4	86.5	91.0	93.8	86.3	89.3	83.4	85.3	84.2	87.8	88.4	83.7	88.3	82.8	83.1	90.5	81.0	81.6	79.9	76.4	75.1	75.2	75.0	73.2	72.7	70.2	67.5	66.8	64.3
Overall 1/3 Spectra	79.4	87.9	88.3	92.3	86.5	87.8	82.5	85.4	85.4	88.2	87.9	86.7	92.7	82.2	83.0	88.6	81.9	80.5	80.1	79.0	76.4	77.1	76.4	75.5	73.1	70.1	66.9	65.4	62.5
Overall 1/3 Spectra	80.1	88.4	88.8	90.0	87.8	88.5	83.6	83.9	87.5	91.3	87.2	82.7	90.4	82.0	81.7	86.9	82.6	81.4	81.9	80.6	80.6	80.5	80.8	80.6	82.3	76.2	73.6	72.0	69.3
Overall 1/3 Spectra	80.7	89.8	84.8	84.6	87.1	85.3	82.4	83.1	82.7	86.1	87.0	82.1	93.0	81.3	81.6	87.3	79.0	78.4	79.7	78.9	75.7	80.6	79.8	76.4	75.0	74.2	67.2	63.8	61.0
Overall 1/3 Spectra	71.3	74.4	68.9	73.8	72.1	68.8	71.2	70.3	70.4	76.8	72.8	70.9	73.0	66.1	67.5	66.5	64.2	64.0	62.5	62.1	60.8	59.3	56.9	54.8	51.6	48.1	45.6	42.0	38.1
Overall 1/3 Spectra	70.9	85.4	77.6	75.5	75.0	74.4	73.5	73.4	75.4	80.3	78.5	75.9	74.8	71.9	77.5	73.1	70.4	69.6	67.9	66.2	64.5	63.3	60.5	57.7	55.0	51.2	47.6	44.1	38.3
Overall 1/3 Spectra	75.4	89.9	78.1	77.5	79.1	79.6	80.3	80.9	78.0	83.4	84.5	83.2	82.3	79.6	86.5	80.0	78.7	78.9	77.4	76.3	74.1	72.6	69.9	67.8	65.2	62.1	59.2	56.7	52.4
Overall 1/3 Spectra	74.7	78.0	76.2	76.7	79.6	79.6	80.0	77.2	76.3	90.5	88.5	78.7	78.6	77.4	78.7	75.3	74.4	72.5	71.2	69.4	67.6	69.4	65.5	61.5	59.4	56.1	52.9	50.4	46.0
Overall 1/3 Spectra	74.1	77.6	76.9	75.9	78.8	76.5	77.6	76.1	75.9	83.4	79.3	76.4	75.4	71.8	74.1	72.7	72.2	70.5	68.9	67.5	66.5	67.2	65.1	63.9	63.1	61.2	60.8	59.1	55.8
Overall 1/3 Spectra	71.0	77.4	75.4	76.5	76.3	75.0	74.4	72.0	73.5	77.6	73.4	74.0	75.7	70.2	70.4	67.6	65.4	64.8	64.1	63.0	61.4	61.5	59.3	56.8	56.3	51.9	47.5	44.8	38.4
Overall 1/3 Spectra	71.6	72.6	75.6	77.7	76.6	74.3	73.8	71.9	76.3	78.2	72.5	72.5	84.8	70.3	69.6	67.5	65.8	64.9	64.1	62.1	60.4	60.1	58.6	56.2	55.3	50.8	46.2	42.7	36.9
Overall 1/3 Spectra	73.2	73.3	76.2	80.6	78.1	74.8	75.4	72.9	77.5	80.0	72.8	73.2	78.4	71.9	70.5	69.1	66.6	65.9	65.0	63.4	61.9	61.9	61.2	57.4	55.8	52.6	49.4	46.5	42.3
Overall 1/3 Spectra	74.4	76.8	75.7	78.8	77.2	79.9	77.3	75.7	76.2	75.8	72.6	75.3	78.8	72.0	70.9	70.4	67.4	66.1	66.0	63.8	61.8	62.4	62.3	57.5	55.1	51.1	46.9	44.5	39.3
Overall 1/3 Spectra	72.3	77.4	75.5	79.0	77.9	77.3	76.1	74.0	72.8	76.3	74.2	74.7	77.4	73.3	72.5	72.9	66.9	66.5	69.5	65.9	63.2	63.4	64.5	63.3	62.2	60.8	59.0	58.2	54.1
Overall 1/3 Spectra	72.9	75.4	77.3	74.7	76.3	73.8	74.7	73.2	70.6	73.9	72.5	71.1	86.7	72.2	70.7	69.2	65.1	64.1	64.7	63.4	60.5	60.0	59.1	55.3	53.5	51.2	48.3	45.9	42.8
Overall 1/3 Spectra	72.9	74.6	76.7	78.4	74.8	71.5	69.8	68.8	71.0	71.3	70.3	70.3	85.2	72.9	71.0	68.7	64.0	65.6	64.1	63.3	60.8	59.0	57.7	54.3	51.8	49.5	45.6	42.9	37.8
Overall 1/3 Spectra	72.4	77.7	80.7	78.4	76.4	72.2	71.2	70.8	70.9	71.0	74.2	70.5	76.4	74.0	73.4	73.8	67.5	66.2	66.2	66.5	61.9	64.4	63.2	57.8	55.8	54.0	49.3	46.2	42.9
Overall 1/3 Spectra	74.9	81.9	81.1	82.1	76.8	73.0	70.8	72.1	71.1	72.6	73.1	71.1	84.3	73.6	73.2	74.4	68.3	67.2	66.7	66.7	63.7	73.9	73.3	61.1	62.8	62.8	58.9	54.2	52.2
Overall 1/3 Spectra	78.6	82.6	82.6	80.6	79.1	73.0	72.8	71.4	71.2	77.0	76.5	73.1	85.5	72.9	71.5	73.0	68.1	68.4	67.8	67.6	65.2	76.1	76.4	63.6	65.5	66.0	60.4	57.5	55.0
Overall 1/3 Spectra	77.8	79.5	75.8	77.5	75.0	73.2	73.4	72.2	71.1	71.8	75.2	77.9	79.1	71.9	71.0	71.7	67.4	67.9	66.5	65.2	62.7	67.7	67.8	58.3	58.4	57.4	54.4	53.8	52.2
Overall 1/3 Spectra	80.1	83.2	83.3	80.8	79.1	74.9	72.4	69.7	70.6	79.6	81.9	74.5	84.8	72.3	71.0	72.6	68.2	67.6	68.2	68.7	65.7	78.2	79.5	65.1	67.7	68.7	62.0	58.4	54.3
Overall 1/3 Spectra	81.5	83.1	77.9	79.7	78.9	74.2	73.0	70.6	70.8	76.0	78.3	74.7	77.6	71.0	72.4	71.1	69.0	70.3	69.8	68.4	66.6	79.0	79.2	68.3	69.9	70.1	68.9	69.8	70.4
Overall 1/3 Spectra	75.9	76.8	74.5	76.2	77.3	76.0	71.8	72.7	71.1	72.8	84.2	83.3	72.8	69.2	70.7	69.0	65.0	63.4	62.8	62.4	59.2	70.6	69.0	56.8	60.6	59.0	54.6	53.3	51.2
Overall 1/3 Spectra	78.1	77.7	73.8	74.1	83.0	77.0	70.4	69.4	69.8	79.0	75.4	72.3	72.9	66.2	69.2	65.2	65.7	63.0	61.3	61.3	60.5	59.5	59.2	55.0	53.0	51.0	47.3	45.8	47.8
Overall 1/3 Spectra	72.9	71.7	69.6	74.0	79.1	72.9	70.0	67.6	70.4	71.0	72.7	68.2	72.9	64.7	65.0	63.0	60.8	59.4	57.7	58.2	55.9	54.7	54.0	50.8	48.7	46.5	42.6	40.0	40.6
Overall 1/3 Spectra	67.5	70.8	68.0	70.2	73.3	68.3	66.2	65.2	67.0	70.0	72.7	67.2	68.3	62.7	64.0	62.5	61.9	61.4	59.1	59.2	57.8	55.8	54.9	52.3	48.5	44.5	39.4	34.3	32.0
Overall 1/3 Spectra	70.0	71.7	67.9	72.5	73.6	68.9	68.2	67.7	67.6	72.3	72.5	69.8	69.3	64.8	66.2	63.5	63.1	63.4	60.1	60.2	59.2	57.1	55.6	52.6	48.8	44.6	40.2	35.0	29.0

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.

L_{90} = Sound level exceed 90% of the measurement period.

Lehigh Southwest Cement Co.
Appendix C
Near-Field Measurement Data
September 9, 2015

Measurement Point	File Name	Overall L_{eq}
NF1	020	86.8
NF2	021	86.2
NF3	022	87.6
NF4	023	87.3
NF5	024	86.4
NF6	025	84.7
NF7	026	85.3
NF8	027	89.0
NF9	028	87.6
NF10	029	90.2
NF11	030	91.1
NF12	031	88.9
NF13	017	72.5
NF14	018	83.7
NF15	019	87.2
NF16	020	84.9
NF17	021	77.1
NF18	022	74.3
NF19	023	74.5
NF20	024	74.7
NF21	025	75.5
NF22	026	77.1
NF23	027	76.2
NF24	028	73.5
NF25	029	74.9
NF26	031	75.7
NF27	032	76.5
NF28	033	81.1
NF29	034	78.8
NF30	035	77.4
NF31	036	74.2
NF32	037	72.0
NF33	038	68.3
NF34	039	69.2
NF35	040	71.2

Frequency (Hz)	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
Overall 1/3 Spectra	84.8	81.4	90.7	85.6	87.8	81.0	77.7	76.3	78.4	93.1	83.5	76.1	83.4	78.2	84.3	78.4	79.0	75.2	74.6	76.2	71.7	72.1	71.4	69.7	67.2	65.0	63.0	55.8	51.7
Overall 1/3 Spectra	81.0	80.6	89.8	84.3	84.6	81.1	76.6	74.9	78.9	92.8	81.6	75.9	82.4	78.3	81.9	78.1	77.2	77.8	73.8	76.4	71.1	71.4	71.3	70.5	67.1	64.4	60.6	55.6	51.0
Overall 1/3 Spectra	80.6	85.2	88.0	81.1	84.1	79.4	75.3	74.5	78.8	95.3	83.8	76.4	88.4	79.4	84.1	81.3	78.1	76.2	74.9	74.2	70.8	70.9	69.9	67.1	66.2	62.6	58.0	54.3	50.1
Overall 1/3 Spectra	79.6	82.8	88.2	84.1	83.4	80.9	77.8	77.8	78.3	91.7	81.6	78.0	87.4	79.0	85.6	80.3	78.5	78.7	75.0	73.8	71.0	69.8	68.0	66.5	63.7	60.7	57.5	54.7	51.6
Overall 1/3 Spectra	78.8	80.8	90.0	84.2	82.5	79.7	78.2	78.3	78.4	93.5	80.6	75.7	84.8	79.0	85.2	80.2	77.5	76.3	74.0	71.6	68.8	68.2	66.1	64.6	61.9	59.0	55.6	53.3	49.2
Overall 1/3 Spectra	77.2	76.4	82.1	82.7	79.3	77.0	75.6	76.5	75.7	86.8	78.1	75.7	80.7	78.8	83.0	78.0	77.5	76.5	74.0	71.7	69.3	67.6	67.1	63.1	61.2	58.5	55.0	52.8	49.0
Overall 1/3 Spectra	78.6	76.1	79.0	80.2	78.8	76.3	78.2	76.7	77.8	82.8	79.1	79.2	86.7	77.5	84.9	79.2	77.0	74.3	71.8	69.6	67.1	66.7	65.9	64.4	63.6	61.3	60.1	58.3	55.3
Overall 1/3 Spectra	79.8	80.8	85.1	85.8	83.0	82.1	81.0	80.8	80.9	88.2	82.7	80.5	90.4	79.3	89.3	81.8	79.3	77.8	75.1	74.3	71.3	70.8	69.6	66.8	65.3	61.4	58.0	55.6	51.6
Overall 1/3 Spectra	82.6	83.9	87.4	88.4	83.6	83.4	81.7	82.9	83.4	88.8	85.4	81.8	83.0	80.2	85.9	80.9	79.7	77.7	76.8	75.0	73.2	73.2	70.8	69.0	68.3	64.3	61.1	58.7	54.9
Overall 1/3 Spectra	84.0	82.7	85.6	87.4	83.9	85.8	82.4	84.4	84.4	91.9	85.9	85.2	91.7	80.7	83.1	83.7	81.7	80.5	79.3	78.7	75.5	75.4	74.2	72.8	72.4	68.0	65.4	63.6	60.4
Overall 1/3 Spectra	83.1	84.8	86.2	88.4	85.1	87.2	84.9	82.9	85.0	89.5	84.6	80.7	87.7	80.7	82.8	85.5	81.2	80.2	79.8	79.7	81.3	79.2	78.0	77.3	77.7	71.8	68.4	66.0	63.5
Overall 1/3 Spectra	83.8	81.8	83.7	85.3	83.6	83.6	80.7	82.6	84.2	94.7	82.6	78.7	83.4	80.1	83.6	81.4	79.3	77.7	76.4	80.6	74.8	77.6	74.9	71.9	72.0	68.5	67.3	59.9	56.9
Overall 1/3 Spectra	73.2	72.2	71.2	70.9	72.6	71.3	74.5	74.8	68.5	70.4	67.7	67.8	65.1	64.8	63.8	62.1	60.6	58.3	56.5	53.8	50.5	46.6	41.8	35.6	29.8	27.4	25.1	20.9	17.8
Overall 1/3 Spectra	81.0	79.0	72.2	73.8	80.1	78.8	85.4	78.8	77.6	74.3	78.5	79.2	78.4	75.4	75.7	74.5	73.0	70.5	68.5	66.0	63.0	61.5	56.9	52.3	45.6	38.8	31.4	24.1	17.3
Overall 1/3 Spectra	77.4	80.6	79.0	79.6	77.4	78.9	86.0	88.8	87.5	78.4	80.6	80.8	80.0	80.4	78.0	77.8	76.3	74.4	72.5	69.7	67.1	64.4	61.1	57.2	53.3	48.7	43.9	40.5	36.3
Overall 1/3 Spectra	75.8	76.9	76.8	76.9	78.4	76.8	83.0	82.1	79.7	80.6	80.3	80.6	77.7	77.9	76.9	74.9	73.9	71.7	69.8	67.2	64.8	61.8	57.8	53.7	49.6	45.3	40.6	36.6	32.4
Overall 1/3 Spectra	77.6	78.0	76.9	76.6	77.4	75.8	79.2	76.1	74.1	72.4	71.7	73.0	71.0	70.7	68.3	66.6	64.8	62.3	60.3	58.5	56.1	54.4	49.6	42.9	36.9	29.9	23.2	25.9	14.9
Overall 1/3 Spectra	76.1	75.5	74.6	73.2	74.4	73.5	76.8	72.1	70.7	70.4	68.6	69.4	66.7	65.3	65.1	63.7	62.9	60.2	60.7	59.1	59.4	58.8	53.3	43.8	36.4	27.6	15.6	10.7	10.7
Overall 1/3 Spectra	79.2	73.4	75.9	72.9	71.4	75.1	77.5	72.3	74.6	71.5	69.8	70.1	65.3	65.4	64.7	63.5	64.8	59.6	59.2	57.3	55.2	55.1	48.8	39.7	32.8	23.0	13.9	10.8	10.8
Overall 1/3 Spectra	74.4	77.3	76.5	72.3	74.1	76.9	78.1	72.2	72.9	73.5	70.3	70.7	68.4	66.3	64.5	63.7	61.7	59.5	59.2	56.7	54.1	52.1	46.0	39.0	33.3	25.0	19.0	15.2	12.9
Overall 1/3 Spectra	74.9	77.7	74.9	75.3	74.6	76.5	77.9	70.1	71.6	76.5	70.7	71.8	68.3	66.8	65.1	64.3	62.7	60.2	59.5	57.6	54.2	52.0	46.1	42.7	39.6	34.8	27.5	20.5	14.9
Overall 1/3 Spectra	79.3	75.5	75.8	73.8	73.6	75.2	79.2	72.1	72.7	73.4	71.0	78.4	69.4	66.1	64.8	64.5	62.7	60.2	59.7	58.0	55.1	53.1	48.3	44.8	40.7	34.6	30.3	24.9	18.6
Overall 1/3 Spectra	74.9	72.1	69.7	70.0	68.7	70.6	78.6	70.0	69.2	77.8	70.6	76.7	66.2	63.7	63.5	62.7	62.0	58.8	57.4	56.0	56.1	50.9	47.9	47.1	45.3	36.2	27.1	20.2	13.9
Overall 1/3 Spectra	75.4	73.2	69.2	68.0	67.5	69.5	77.5	66.5	67.2	75.2	69.7	70.7	65.5	64.1	61.8	61.7	60.3	57.9	55.9	53.8	51.4	48.5	43.7	38.8	32.6	25.8	19.7	13.5	11.9
Overall 1/3 Spectra	74.6	72.7	68.8	69.0	68.7	67.6	76.9	70.1	68.3	72.9	71.2	73.9	67.6	64.9	65.4	63.8	63.4	59.3	57.5	55.2	52.4	49.9	44.9	40.3	34.9	31.0	25.1	18.5	13.1
Overall 1/3 Spectra	79.7	76.0	72.1	71.2	67.2	68.8	77.4	70.3	69.2	72.5	71.0	73.4	68.4	67.4	65.6	65.6	64.1	60.7	62.1	60.1	54.1	53.0	49.8	45.1	40.1	35.9	30.7	26.4	21.5
Overall 1/3 Spectra	81.5	74.7	71.2	68.7	67.1	69.5	78.5	74.9	73.3	78.6	70.2	72.0	67.9	67.0	67.0	63.7	62.7	60.9	63.0	62.3	55.7	54.5	51.4	48.2	43.6	39.3	35.7	32.5	30.1
Overall 1/3 Spectra	81.2	78.5	74.8	73.4	69.0	71.8	89.2	83.3	71.8	82.7	73.0	75.9	70.9	70.5	69.9	66.6	67.2	64.3	66.9	67.4	59.7	58.4	56.3	53.5	49.4	45.5	41.6	38.6	36.5
Overall 1/3 Spectra	81.7	77.1	73.5	74.3	69.0	72.3	80.0	75.3	72.4	73.9	72.1	73.3	71.0	72.3	70.7	65.6	65.2	64.6	66.0	65.7	62.6	63.1	61.3	59.7	59.2	58.1	53.3	48.5	45.1
Overall 1/3 Spectra	77.9	74.1	72.7	71.0	67.8	72.5	79.3	76.3	80.6	74.2	72.7	77.4	66.2	65.3	63.9	62.5	61.3	59.7	61.5	63.9	56.6	55.7	53.4	50.8	47.8	44.6	41.9	38.3	34.5
Overall 1/3 Spectra	75.3	71.5	68.3	71.1	68.1	71.0	80.2	74.5	79.3	70.8	67.7	72.4	63.3	62.7	62.2	59.6	58.3	56.3	56.5	55.2	52.6	53.6	49.0	45.9	42.5	39.5	33.9	27.8	21.2
Overall 1/3 Spectra	72.1	70.2	74.7	68.3	68.3	69.9	72.3	70.2	73.7	69.4	66.4	65.9	65.0	64.1	61.9	60.3	59.4	59.2	58.0	57.1	53.2	50.5	47.8	44.7	40.1	36.4	31.7	29.8	23.3
Overall 1/3 Spectra	70.5	68.1	68.7	66.1	63.9	64.6	70.1	68.3	64.8	66.8	63.5	64.9	60.0	59.9	58.6	56.9	56.4	55.1	53.7	52.1	50.1	47.0	41.9	37.4	28.1	21.2	15.2	11.4	10.5
Overall 1/3 Spectra	69.3	67.8	68.0	67.3	68.0	68.2	73.8	73.7	67.3	65.2	62.6	63.9	63.0	62.2	58.7	57.1	57.1	54.6	52.7	50.2	46.9	42.4	35.9	29.3	18.6	11.5	9.6	9.9	10.5
Overall 1/3 Spectra	75.9	72.1	69.9	70.6	69.6	71.9	76.9	77.8	69.2	66.7	64.8	65.3	64.8	61.5	60.9	59.5	58.0	55.9	54.1	50.4	47.3	43.8	38.6	31.8	23.5	14.8	10.3	9.9	10.7

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.

L_{90} = Sound level exceed 90% of the measurement period.

APPENDIX D - COMPLIANCE MEASUREMENT DATA

Lehigh Southwest
Appendix D
Compliance Measurement Data
September 8 and 9, 2015

	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
	Tonal Limits	15	15	15	15	15	15	15	15	15	15	8	8	8	8	8	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Evening Time Period

7:00 PM to 9:00 PM	LAeq	LA90
MP5	55.9	41.5
MP7	51.0	49.0
MP8	51.5	49.4
MP9	50.5	47.7
MP11	50.7	44.2
MP14	39.2	33.1
MP15	46.0	40.2
MP16	47.4	42.2

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP5	Overall 1/3 Spectra	48.5	48.6	49.5	48.0	48.9	47.9	47.5	47.6	45.7	44.6	47.4	46.1	47.0	45.2	44.5	45.3	45.9	48.3	50.0	48.2	45.9	41.5	37.2	34.6	37.0	29.6	25.2	21.3	18.3
MP7	Overall 1/3 Spectra	51.9	53.8	52.1	52.2	51.7	51.0	49.4	47.8	47.3	46.6	44.8	42.3	42.6	43.0	43.9	45.1	45.2	44.7	43.3	40.0	37.0	32.1	31.9	28.6	24.2	22.0	21.4	20.8	18.2
MP8	Overall 1/3 Spectra	49.7	49.4	52.5	50.7	51.9	53.2	52.2	49.3	50.8	48.5	44.7	42.8	46.3	45.3	44.9	44.6	44.3	44.1	44.4	42.6	37.5	31.2	27.0	24.5	21.5	19.3	18.2	16.9	15.5
MP9	Overall 1/3 Spectra	46.3	53.3	53.2	49.4	47.9	50.2	49.2	47.7	45.9	46.1	44.1	43.0	42.2	43.0	44.1	44.8	43.2	43.7	43.4	40.9	36.0	31.1	29.1	29.8	23.1	19.7	17.9	16.4	14.8
MP11	Overall 1/3 Spectra	47.9	50.2	50.4	47.3	47.5	50.5	47.5	45.4	44.9	49.5	44.2	46.7	43.7	41.0	40.4	41.1	41.4	44.4	42.0	40.3	38.1	35.3	37.6	39.6	29.9	31.7	29.5	25.0	23.4
MP14	Overall 1/3 Spectra	43.5	44.0	44.8	45.1	43.1	44.8	43.1	42.3	39.7	38.6	36.8	33.5	34.2	34.8	36.2	34.5	32.1	30.4	28.5	25.3	21.8	20.2	19.5	22.1	14.7	13.1	11.8	11.4	10.6
MP15	Overall 1/3 Spectra	43.8	44.7	45.4	42.3	41.2	42.3	40.7	40.3	39.8	40.5	39.2	35.6	37.6	37.4	38.4	37.6	34.4	30.9	27.0	22.7	20.5	20.2	27.0	42.3	35.7	19.7	18.0	14.9	14.9
MP16	Overall 1/3 Spectra	44.0	45.9	48.1	52.6	47.1	53.3	48.2	50.2	47.6	47.2	48.7	43.7	42.6	41.1	40.0	40.3	38.9	37.6	36.8	35.6	33.4	32.2	35.3	35.2	25.7	22.8	20.9	20.1	19.5

Midnight Time Period

12:00 AM to 2:00 AM	LAeq	LA90
MP5	36.3	34.2
MP7	49.2	48.2
MP8	48.1	46.8
MP9	40.2	36.6
MP11	42.0	40.2
MP14	45.8	45.5
MP15	50.8	50.5
MP16	40.3	39.0

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP5	Overall 1/3 Spectra	44.9	45.5	45.6	46.1	46.0	44.6	43.8	40.8	38.8	37.8	37.4	33.0	28.2	26.8	26.4	27.7	27.5	27.1	25.7	22.8	20.7	20.9	27.7	21.8	17.6	16.5	14.7	13.4	12.5
MP7	Overall 1/3 Spectra	46.1	46.7	47.6	45.9	48.6	45.0	42.5	41.8	42.5	42.6	40.0	37.4	38.3	39.5	38.5	38.9	38.0	36.8	35.0	32.3	28.9	39.4	45.2	32.8	18.9	19.0	17.5	16.2	14.6
MP8	Overall 1/3 Spectra	44.0	42.3	41.5	41.1	40.0	41.8	42.9	41.7	38.1	38.7	34.5	32.5	35.1	36.8	35.4	35.7	35.4	35.3	36.0	34.0	29.6	26.4	45.1	31.3	17.1	18.3	15.1	13.7	12.4
MP9	Overall 1/3 Spectra	39.6	39.3	37.7	39.0	39.3	38.5	37.3	38.3	38.4	41.2	30.4	31.8	35.2	39.1	38.2	31.5	28.0	28.2	27.4	24.0	19.7	24.1	31.9	21.2	15.0	15.4	14.5	12.9	11.9
MP11	Overall 1/3 Spectra	44.4	45.9	41.4	42.2	40.4	40.3	40.4	37.2	34.1	34.4	31.5	30.9	31.9	32.0	32.2	32.8	32.2	32.1	31.1	27.2	23.0	22.2	36.4	32.6	19.3	20.1	19.7	18.3	17.5
MP14	Overall 1/3 Spectra	44.2	41.5	40.0	41.0	39.1	38.7	37.8	35.9	35.3	39.6	30.8	27.5	33.6	26.5	23.8	25.1	20.1	19.6	20.1	19.8	19.1	18.7	31.3	44.1	22.1	12.8	14.3	10.8	10.2
MP15	Overall 1/3 Spectra	44.8	44.0	43.4	44.1	43.2	43.1	41.6	39.7	39.4	42.5	38.9	33.7	32.5	29.6	25.6	20.7	18.4	16.8	17.2	17.3	22.0	17.1	38.0	49.1	31.8	16.0	21.2	13.6	13.6
MP16	Overall 1/3 Spectra	36.8	41.6	38.1	40.6	40.4	40.2	41.7	38.8	38.4	41.8	34.0	33.0	31.4	32.4	36.4	32.6	30.2	27.5	27.6	25.2	21.5	22.7	35.1	19.0	11.2	11.1	9.7	10.5	9.8

Morning Time Period

6:00 AM to 8:00 AM	LAeq	LA90
MP5	59.3	45.8
MP7	55.6	53.5
MP8	56.8	54.9
MP9	51.1	49.0
MP11	58.7	43.8
MP14	44.1	39.7
MP15	45.8	40.8
MP16	45.6	40.7

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP5	Overall 1/3 Spectra	51.2	51.4	51.8	53.8	53.3	53.4	53.4	53.0	49.5	49.7	48.2	49.4	50.4	49.3	48.7	49.2	50.6	53.1	53.3	51.1	48.2	44.0	40.0	36.6	33.0	28.8	25.3	22.3	18.7
MP7	Overall 1/3 Spectra	55.1	54.2	54.6	54.7	54.3	55.2	54.0	53.0	52.2	53.7	50.7	50.2	50.7	50.1	50.0	50.3	49.1	47.6	47.1	44.8	41.1	36.0	36.6	31.2	31.4	26.5	26.2	20.8	19.4
MP8	Overall 1/3 Spectra	50.5	49.8	50.3	50.6	50.7	51.7	53.1	54.6	53.2	53.3	47.3	49.1	49.9	49.6	50.9	50.5	49.2	50.4	50.1	47.1	42.7	37.5	30.5	28.1	24.3	21.9	20.3	16.3	14.8
MP9	Overall 1/3 Spectra	49.2	49.0	50.7	51.1	51.0	49.8	49.1	50.0	49.6	48.1	43.5	43.2	44.1	45.3	45.0	44.1	44.4	44.8	43.8	40.4	36.4	32.7	27.9	24.1	20.8	18.8	16.3	15.3	13.8
MP11	Overall 1/3 Spectra	54.0	54.0	52.7	53.5	53.7	51.7	52.2	53.5	53.1	54.3	49.8	51.5	51.6	50.4	50.0	49.4	49.7	51.7	51.8	49.9	48.0	44.4	41.1	38.8	36.9	36.1	33.2	30.1	27.2
MP14	Overall 1/3 Spectra	53.5	45.2	46.7	47.9	48.9	52.0	50.4	48.0	45.3	45.8	42.4	40.4	42.5	41.2	40.3	41.0	37.2	34.1	29.7	25.7	21.2	18.6	16.9	15.6	14.6	12.8	11.7	11.6	10.2
MP15	Overall 1/3 Spectra	52.2	48.4	49.5	50.8	51.2	52.3	51.7	49.4	45.8	45.6	44.0	43.7	41.9	39.5	38.0	38.8	37.0	35.9	34.9	35.3	33.7	32.1	31.1	27.6	26.6	23.5	25.0	21.9	18.6
MP16	Overall 1/3 Spectra	45.7	45.0	46.1	48.2	48.6	48.9	49.6	47.0	46.0	44.0	42.5	39.9	39.9	38.9	38.4	37.9	36.2	35.1	34.8	35.0	37.4	32.8	27.6	29.3	30.3	25.1	22.8	18.1	15.6

Noon Time Period

12:00 PM to 2:00 PM	LAeq	LA90
MP5	59.8	37.9
MP7	52.7	46.0
MP8	48.8	45.6
MP9	40.7	36.3
MP11	53.0	38.6
MP14	44.5	39.8
MP15	40.2	36.1
MP16	55.4	44.7

Measurement	Frequency (Hz)	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1,000	1,250	1,600	2,000	2,500	3,150	4,000	5,000	6,300	8,000	10,000
MP5	Overall 1/3 Spectra	55.8	53.9	52.3	51.5	51.3	50.5	56.8	54.1	48.8	49.6	49.2	52.1	51.7	48.5	48.7	49.7	50.3	52.6	54.3	52.2	48.9	44.3	40.1	36.3	32.7	28.8	24.8	21.4	18.2
MP7	Overall 1/3 Spectra	53.7	52.9	51.9	51.8	51.5	50.8	51.1	49.5	48.5	46.3	45.6	45.0	41.9	42.8	43.2	43.9	43.8	44.2	43.8	40.9	38.2	42.2	39.1	41.5	36.3	35.9	34.2	30.2	26.8
MP8	Overall 1/3 Spectra	52.0	51.0	50.1	50.2	50.5	54.4	50.7	49.1	48.6	48.2	46.2	44.4	45.2	43.5	42.9	42.9	41.6	40.0	39.8	37.7	35.4	32.8	28.3	25.5	22.8	21.5	21.2	17.3	15.8
MP9	Overall 1/3 Spectra	50.4	49.9	48.3	48.1	47.8	45.2	43.4	40.7	40.0	37.9	34.4	32.8	33.3	33.1	33.5	32.3	33.1	33.9	33.0	30.8	28.3	25.8	23.9	22.6	20.6	19.0	18.1	17.9	16.8
MP11	Overall 1/3 Spectra	52.6	51.0	49.4	51.2	51.7	50.0	49.8	55.3	50.8	48.3	46.7	49.6	48.9	44.1	44.1	44.7	44.1	45.8	45.6	43.3	40.0	37.8	37.0	34.8	32.2	33.3	32.0	28.4	26.6
MP14	Overall 1/3 Spectra	53.1	49.9	46.8	46.9	47.9	48.3	47.7	48.2	45.3	42.9	42.8	41.3	40.9	39.9	40.2	40.0	37.6	36.3	33.9	31.3	26.9	24.7	22.6	21.5	20.4	17.3	14.3	11.8	10.8
MP15	Overall 1/3 Spectra	50.7	45.0	45.1	45.3	45.7	47.8	44.7	43.4	43.6	41.5	40.4	38.5	37.1	35.6	35.5	36.4	32.2	30.0	28.1	27.4	22.5	20.8	19.2	18.5	17.4	15.5	15.0	13.4	12.4
MP16	Overall 1/3 Spectra	55.1	54.2	51.1	52.8	53.2	53.7	57.9	55.3	53.0	54.8	48.9	48.7	50.1	48.9	47.7	48.3	47.2	47.1	46.5	44.9	43.1	41.0	40.6	39.4	36.1	33.4	35.3	33.7	27.8

Note: The noise measurements presented in the table represents all noise sources recorded at each location, and does not isolate noise generated exclusively by the facility

L_{eq} = Average sound level.
L_{90} = Sound level exceed 90% of the measurement period.

APPENDIX E - MODEL CALIBRATION DATA

Lehigh Southwest Cement Co.
Appendix E
Model Calibration Data

Receiver	Measured Sound L_{eq} (dBA)	Modeled Sound L_{eq} (dBA)	Difference (dBA)
NF1	86.8	89.0	2.2
NF2	86.2	88.1	1.9
NF3	87.6	87.6	0.0
NF4	87.3	87.8	0.5
NF5	86.4	86.6	0.2
NF6	84.7	82.5	-2.2
NF7	85.3	83.8	-1.5
NF8	89.0	87.8	-1.2
NF9	87.6	90.1	2.5
NF10	90.2	91.0	0.8
NF11	91.1	91.7	0.6
NF12	88.9	91.6	2.7
NF13	72.5	69.2	-3.3
NF14	83.7	75.1	-8.6
NF15	87.2	82.0	-5.2
NF16	84.9	84.1	-0.8
NF17	77.1	74.8	-2.3
NF18	74.3	69.8	-4.5
NF19	74.5	69.6	-4.9
NF20	74.7	72.9	-1.8
NF21	75.5	73.8	-1.7
NF22	77.1	73.6	-3.5
NF23	76.2	74.4	-1.8
NF24	73.5	74.9	1.4
NF25	74.9	77.6	2.7
NF26	75.7	79.1	3.4
NF27	76.5	79.5	3.0
NF28	81.1	84.2	3.1
NF29	78.8	83.4	4.6
NF30	77.4	82.6	5.2
NF31	74.2	77.6	3.4
NF32	72.0	77.3	5.3
NF33	68.3	70.0	1.7
NF34	69.2	66.7	-2.5
NF35	71.2	64.3	-6.9

Average Difference	-0.2

BURNS McDONNELL

CREATE AMAZING.

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