CHOW ENGINEERING, INC. 7770 Pardee Lane, Suite 100, Oakland, CA 94621
Tel(510) 636 8500; FAX(510) 636 8544

July 18, 2018

Mr Korey Bradbury
CALIFORNIA WATER SERVICE COMPANY
5837 Crest Road
Rancho Palos Verdes, CA 90275

Ref: Noise Evaluation Study and Analysis in the Loadout of Soils and Debris on site at the Cal Water facility at 5837 Crest Rd, Rancho Palos Verdes, CA
Our Ref: 18R-116

Dear Korey:

Please receive this letter report and the attached Noise Evaluation Study performed at your above described facility. Chow Engineering, Inc (CE) has completed the services in the above described project at your Rancho Palos Verdes facility. The Noise Evaluation Study and Analysis was done as a follow up to an initial round of Noise Studies at the site, since the new landscaping work has been completed, including the Berm rebuild and Wall placement on top of the Berm. The intent of the present project was to determine what impact the Berm and Wall had on typical noise effects from Loadout of Soils and debris in the yard area at the boundary of the property (fence line) and beyond, approaching the neighboring residences.

1. Noise Study

Cal Water had accumulated on site at the Rancho Palos Verdes facility typical soils and debris from field repair operations and this material was placed temporarily in a "Cell" in the yard area.

On June 27, 2018 at approximately 9:00 AM the Noise Study commenced as the Loadout began. Three (3) 10 Yard trucks were loaded using a standard backhoe with a 1-Yard front load bucket and the materials were sent for disposal at off site receptor facilities. The operation ran for about 40 minutes when all 3 trucks were loaded and sent off. The noise from this operation was captured using receptor devices at three (3) locations, two (2) on the fence line towards the east and one (1) on the fence line at the south of the property.

The noise data from the study has been used to develop a model to determine the noise "contours" at both ground and second-storey levels at the neighboring structures. In this manner the noise effects are being shown to help determine any potential impacts to the neighboring structures.

2. Results

The results showed that the Berm and Wall (structure) had an effect in reducing noise at the homes towards the east directly across from the structure, at the first level. The values at the first levels for 3 homes in this area were 40-45 dBA. At the south-east, 1 home received 50-55 dBA and at the north-east, 4 homes received 50-55dBA. At the north (beyond the covered reservoir) 2 homes received 50-55 dBA and at the south all homes received 40 dBA or less.

At the 2nd (upper) levels of the homes, all homes, 3 at the south, 9 at the east and 5 at the north (beyond the covered reservoir) received 50-55 dBA.

3. Conclusion

In conclusion, whereas the Berm and Wall has a direct effect in sound reduction for the closest, directly placed homes, this effect is mostly at the lower levels. At the upper 2nd storey levels, all homes experience 50-55 dBA from typical Loadout operations at the Cal Water site.

This concludes the requirements for this project. Please contact me with any questions, or to let me know how else I can be of service. Thank you.

Sincerely

Reuben Chow, P.E.
Principal

Noise Monitoring Services
Sound and Vibration Measurement, Testing & Consulting

Acoustical Evaluation

for the

California Water Service Company Facility at 5837 Crest Road in Rancho Palos Verdes

July 18, 2017

Prepared for:

Chow Engineering, Inc.
7770 Pardee Lane, Suite 100
Oakland, CA 94621

Prepared by:

Thomas Corbishley, Principal Consultant
Noise Monitoring Services
P.O. Box 14582
Torrance, CA 90503

(323) 546-9902
www.thenoiseexperts.com

Introduction

This report provides the results of a noise modeling analysis performed for loading activities associated with the removal of a dirt pile at the California Water Service Company facility located at 5837 Crest Road in Rancho Palos Verdes. Our analysis was performed using noise measurement data obtained at the site during the loading of three trucks. The analysis was performed to determine the noise levels produced by the loading operation at the residences surrounding the project site at first and second floor locations. The City of Rancho Palos Verdes Municipal Code does not contain quantitative noise limits and therefore this report does not contain an assessment against a noise standard. Figure 1 identifies the location of the project site.

Figure 1. Project Site and Noise Measurement Locations

Noise Measurement Survey

Noise measurements of a loading operation were obtained between 8:55 am and 9:30 am on June 27, 2018. The equipment in operation were one loader and three haul trucks. During the operation, the loader removed a dirt pile at the south end of the facility's parking lot at the location shown in Figure 1. Noise measurements were obtained at three locations at the south and east property boundaries as shown in Figure 1. Frequency spectra measurements were also obtained at locations 50 ft from the operation.

The average noise levels during the loading operation at the three property line locations are provided in Table 1. The measured frequency spectrum and graphed noise data obtained at the perimeter locations during the loading periods are provided in Appendix II. It should be noted that elevated noise levels were measured at Locations 1 and 3 due to mechanical equipment in operation nearby. The level at these locations in Table 1 has been corrected to eliminate the effect of this equipment. (See Appendix I for a Glossary of Terms used in this report.)

Table 1 Loading Operation Noise Measurement Results Summary

Noise Measurement Location	Average Noise Level of Loading Operation (dBA)
1	53.1
2	46.7
3	44.8

The noise measurements were obtained with three Svantek model 971 and one Brüel & Kjaer model 2250 precision sound level meters. The meters were calibrated with a Larson Davis CAL200 calibrator.

Noise Modeling

The noise produced by the loading operation was modeled using three-dimensional sound modeling software. The noise model was calibrated using the onsite noise measurements obtained during the loading operation. Noise levels were modeled at first floor and second floor locations. Noise contour maps providing the estimated noise levels around the project site are provided in Figures 2 and 3. Table 2 contains a summary of the highest average noise levels at the property lines around the site at first and second floor locations.

Table 2. Highest Estimated Average Noise Levels at Property Lines

Property Line	Highest Estimated Average Noise Level at Property Line (dBA)	
	First Floor Elevation	Second Floor Elevation
North	52	53
East	55	56
South	50	52
West	52	52

The noise modeling was performed using SoundPlan version 7.3. This software models the noise levels taking into account the noise level and frequency content of the individual sources, and the barrier and reflective properties of the buildings, barriers and terrain.

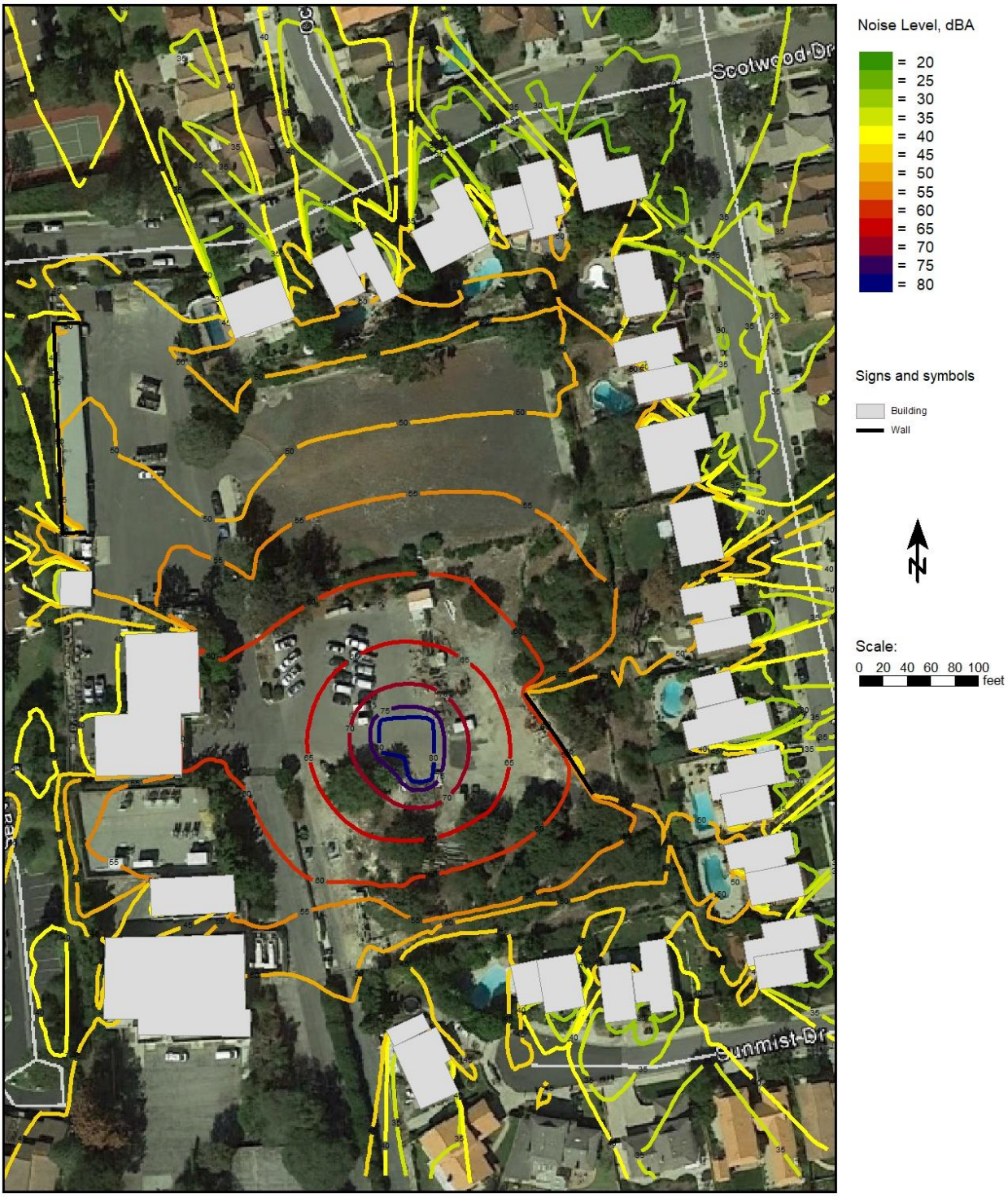


Figure 2. Noise Levels at First Floor Elevation During Loading Operation

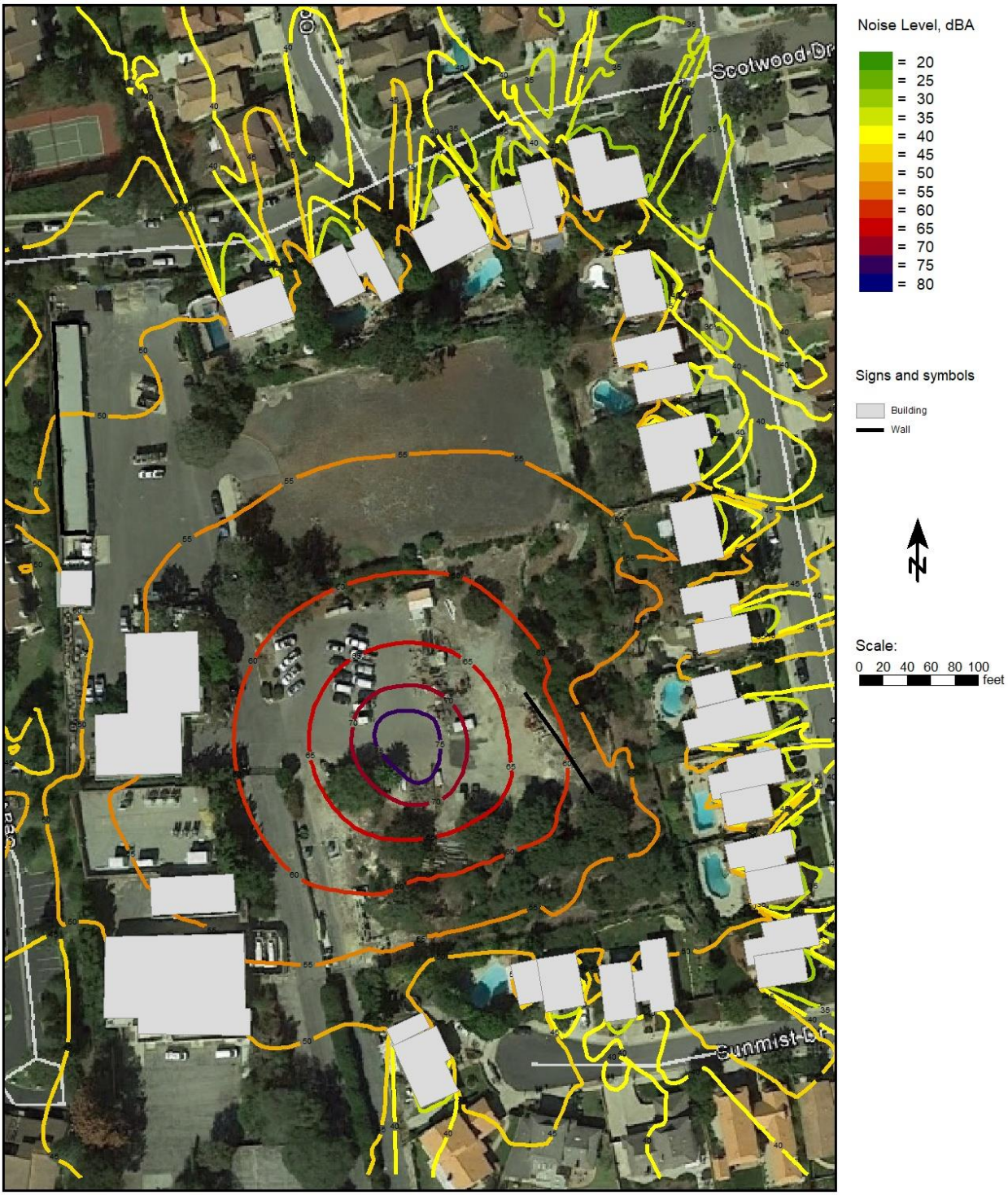


Figure 3. Noise Levels at Second Floor Elevation During Loading Operation

APPENDIX I

Glossary of Terms

Glossary of Terms

The following is a list of definitions of terms commonly used in the field of acoustics. Some, or all, of these terms may have been used in the preceding report:

Ambient Noise: The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources both near and far.

Average Sound Level: See Equivalent-Continuous Sound Level.

A-Weighted Sound Level, dB(A): The sound level obtained by use of A-weighting. Weighting systems were developed to measure sound in a way that more closely mimics the ear's natural sensitivity. The A- weighting system is incorporated into the sound level meter to alter its sensitivity relative to frequency so that the instrument is less sensitive to noise at frequencies where the human ear is less sensitive and more sensitive at frequencies where the human ear is more sensitive.

Community Noise Equivalent Level (CNEL): A 24-hour A-weighted average sound level which takes into account the fact that a given level of noise may be more or less tolerable depending on when it occurs. The CNEL measure of noise exposure weights average hourly noise levels by 5 dB for the evening hours (between 7:00 p.m. and 10:00 p.m.), and 10 dB between 10:00 p.m. and 7:00 a.m., then combines the results with the daytime levels to produce the final CNEL value. It is measured in decibels, dB.

CNEL: See Community Noise Equivalent Level.

Day-Night Average Sound Level (Ldn): A measure of noise exposure level that is similar to CNEL except that there is no weighting applied to the evening hours of 7:00 p.m. to 10:00 p.m. It is measured in decibels, dB.

Daytime Average Sound Level (Leq12): The time-averaged A-weighted sound level measured between the hours of 7:00 am to 7:00 pm. It is measured in decibels, dB.

Decay Rate: The time taken for the sound pressure level at a given frequency to decrease in a room. It is measured in decibels per second, dB/s.

Decibel (dB): The basic unit of measure for sound level.

Direct Sound: Sound that reaches a given location in a direct line from the source without any reflections.

Divergence: The spreading of sound waves from a source in a free field, resulting in a reduction in sound pressure level with increasing distance from the source.

Energy Basis: This refers to the procedure of summing or averaging sound pressure levels on the basis of their squared pressures. This method involves the conversion of decibels to pressures, then performing the necessary arithmetic calculations, and finally changing the pressures back to decibels.

Equivalent-Continuous Sound Level (Leq): The average sound level measured over a specified time period. It is a single-number measure of time-varying noise over a specified time period. It is the level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound. For example, a person who experiences an Leq of 60 dB(A) for a period of 10 minutes standing next to a busy street is exposed to the same amount of sound energy as if he had experienced a constant noise level of 60 dB(A) for 10 minutes rather than the time varying traffic noise level. It is measured in decibels, dB.

Fast Response: A setting on the sound level meter that determines how sound levels are averaged over time. A first sound level is always more strongly influenced by recent sounds, and less influenced by sounds occurring in the distant past, than the corresponding slow sound level. For the same non-steady sound, the maximum first sound level is generally greater than the corresponding maximum slow sound level. Fast response is typically used to measure impact sound levels.

Field Impact Insulation Class (IIC): A single number rating similar to the impact insulation class except that the impact sound pressure levels are measured in the field.

Field Sound Transmission Class (FSTC): A single number rating similar to sound transmission class except that the transmission loss values used to derive this class are measured in the field.

FIIC: See Field Impact Insulation Class.

Flanking Sound Transmission: The transmission of sound from a room in which a source is located to an adjacent receiving room by paths other than through the common partition. Also, the diffraction of noise around the ends of a barrier.

Frequency: The number of oscillations per second of a sound wave (i.e., the number of cycles per second). It is measured in hertz. Hz.

FSTC: See Field Sound Transmission Class.

Hertz (Hz): See Frequency.

Hourly Average Sound Level (HNL): The equivalent-continuous sound level, Leq, over a 1-hour time period. It is measured in decibels.

Impact Insulation Class (IIC): A single number rating used to compare the effectiveness of floor/ceiling assemblies in providing reduction of impact-generated sounds such as the sound of a person walking across the upstairs floor.

Impact Noise: The noise that results when two objects collide.

Impulse Noise: Noise of a transient nature due to a sudden impulse of pressure like that created by a gunshot or a balloon bursting.

Insertion Loss: The decrease in sound power level measured at the location of the receiver when an element (e.g., a noise barrier) is inserted in the transmission path between the sound source and the receiver. It is measured in decibels.

Inverse Square Law: A rule by which the sound intensity varies inversely with the square of the distance from the source. This results in a 6 dB decrease in sound pressure level for each doubling of distance from the source.

L_2, L_8, L_{25}, L_{50}: See X-Percentile-Exceeded Sound Level.

Ldn: See Day-Night Average Sound Level.

Leq: See Equivalent-Continuous Sound Level.

Leq(12): See Daytime Average Sound Level.

Lmax: See Maximum Sound Level.

Ln: See X-Percentile-Exceeded Sound Level.

Lpk: See Peak Sound Level.

Masking: The process by which the threshold of hearing for one sound is raised by the presence of another sound.

Maximum Sound Level (Lmax): The greatest sound level measured on a sound level meter during a designated time interval or event. It is measured in decibels.

NC Curves (Noise Criterion Curves): A system for rating the noisiness of an occupied indoor space. An actual octave-band spectrum is compared with a set of standard NC curves to determine the NC level of the space.

NIC: See Noise Isolation Class.

NNIC: See Normalized Noise Isolation Class.

Noise: Any unwanted or disagreeable sound.

Noise Criterion Curves: See NC Curves.

Noise Isolation Class (NIC): A single number rating derived from measured values of noise reduction between two enclosed spaces that are connected by one or more partitions. Unlike STC or NNIC, this rating is not adjusted or normalized to a measured or standard reverberation time.

Noise Reduction: The difference in sound pressure level between any two points.

Noise Reduction Coefficient (NRC): A single number rating of the sound absorption properties of a material. It is the average of the sound absorption coefficients at 250, 500, 1000, and 2000 Hz, rounded to the nearest multiple of 0.05.

Normalized Noise Isolation Class (NNIC): A single number rating similar to the noise isolation class except that the measured noise reduction values are normalized to a reverberation time of 0.5 seconds.

NRC: See Noise Reduction Coefficient.

Octave: The frequency interval between two sounds whose frequency ratio is 2. For example, the frequency interval between 500 Hz and 1,000 Hz is one octave.

Octave-Band Sound Level (Octave-Band Level): For an octave frequency band, the sound pressure level of the sound contained within that band. It is measured in decibels.

One-Third Octave: The frequency interval between two sounds whose frequency ratio is $2^{1/3}$ (1.26). For example, the frequency interval between 200 Hz and 250 Hz is one-third octave.

One-Third-Octave-Band Sound Level (One-Third-Octave-Band Level): For a one-third-octave frequency band, the sound pressure level of the sound contained within that band. It is measured in decibels.

Outdoor-Indoor Transmission Class (OITC): A single number rating used to compare the sound insulation properties of building facade elements. This rating is designed to correlate with subjective impressions of the ability of facade elements to reduce the overall loudness of ground and air transportation noise.

Peak Sound Level (Lpk): The maximum instantaneous sound level during a stated time period or event. It is measured in decibels.

Pink Noise: Noise that has approximately equal intensities at each octave or one-third-octave band.

Point Source: A source that radiates sound as if from a single point.

RC Curves (Room Criterion Curves): A system for rating the noisiness of an occupied indoor space. An actual octave-bond spectrum is compared with a set of standard RC curves to determine the RC level of the space.

Real-Time Analyzer (RTA): An instrument for the determination of a sound spectrum.

Receiver: A person (or persons) or equipment which is affected by noise.

Reflected Sound: Sound that persists in an enclosed space as a result of repeated reflections or scattering. It does not include sound that travels directly from the source without reflections.

Reverberation: The persistence of a sound in an enclosed or partially enclosed space after the source of the sound has stopped, due to the repeated reflection of the sound waves.

Reverberation Time (T_{60}): The time required for the sound pressure level of a given frequency in an enclosed or partially enclosed space to decrease by 60 dB after the source of the sound has stopped. It is measured in seconds.

Room Absorption: The total absorption within a room due to all objects, surfaces and air absorption within the room. It is measured in Sabins or metric Sabins.

Room Criterion Curves: See RC Curves.

RTA: See Real-Time Analyzer.

SLM: See Sound Level Meter.

Slow Response: A setting on the sound level meter that determines how measured sound levels are averaged over time. A slow sound level is more influenced by sounds occurring in the distant past that the corresponding fast sound level.

Sound: A physical disturbance in a medium (e.g.. air) that is capable of being detected by the human ear.

Sound Absorption: The process of dissipation of sound energy, and the property of materials and structures to dissipate sound energy.

Sound Absorption Coefficient (α): A measure of the sound-absorptive property of a material.

Sound Insulation: The capacity of a structure or element to prevent sound from reaching a receiver room either by absorption or reflection.

Sound Level: See Sound Pressure Level.

Sound Level Meter (SLM): An instrument used for the measurement of sound level, with a standard frequency-weighting and standard exponentially weighted time averaging.

Sound Power Level: A physical measure of the amount of power a sound source radiates into the surrounding air. It is measured in decibels.

Sound Pressure Level: A physical measure of the magnitude of a sound. It is related to the sound's energy. The terms sound pressure level and sound level are often used interchangeably. It is measured in decibels.

Sound Transmission Class (STC): A single number rating used to compare the sauna' insulation properties of walls, floors, ceilings, windows, or doors. This rating is designed to correlate with subjective impressions of the ability of building elements to reduce the overall loudness of speech, radio, television, and similar noise sources in offices and buildings.

Source Room: A room that contains a noise source or sources.

Spectrum: The spectrum of a sound wave is a description of its resolution into components, each of different frequency and usually different amplitude (level).

STC: See Sound Transmission Class.

T_{60}: See Reverberation Time.

Tapping Machine: A device used in rating different floor constructions against impacts. It produces a series of impacts on the floor under test, 10 times per second.

Tone: A sound with a distinct pitch (i.e., a dominant frequency).

Transmission Loss (TL): A property of a material or structure describing its ability to reduce the transmission of sound at a particular frequency from one space to another. The higher the TL value the more effective the material or structure is in reducing sound between two spaces. It is measured in decibels.

White Noise: Noise that has approximately equal intensities at all frequencies. (White noise need not be random noise.)

Windscreen: A porous covering for a microphone, designed to reduce the noise generated by the passage of wind over the microphone.

X-Percentile-Exceeded Sound Level (L_n): The A-weighted sound level equaled or exceeded by a fluctuating sound level x percent of a stated time period. E.g., the letter symbol L_{10}, represents the sound level which is exceeded 10 percent of the stated time period. For a 1-hour measurement, L_{50}, is the sound level exceeded for more than 30 minutes in an hour, L_{25} is the sound level exceeded for more than 15 minutes in an hour. L_8 is the sound level exceeded for more than 5 minutes in an hour, and L_2 is the sound level exceeded for more than 1 minute in an hour.

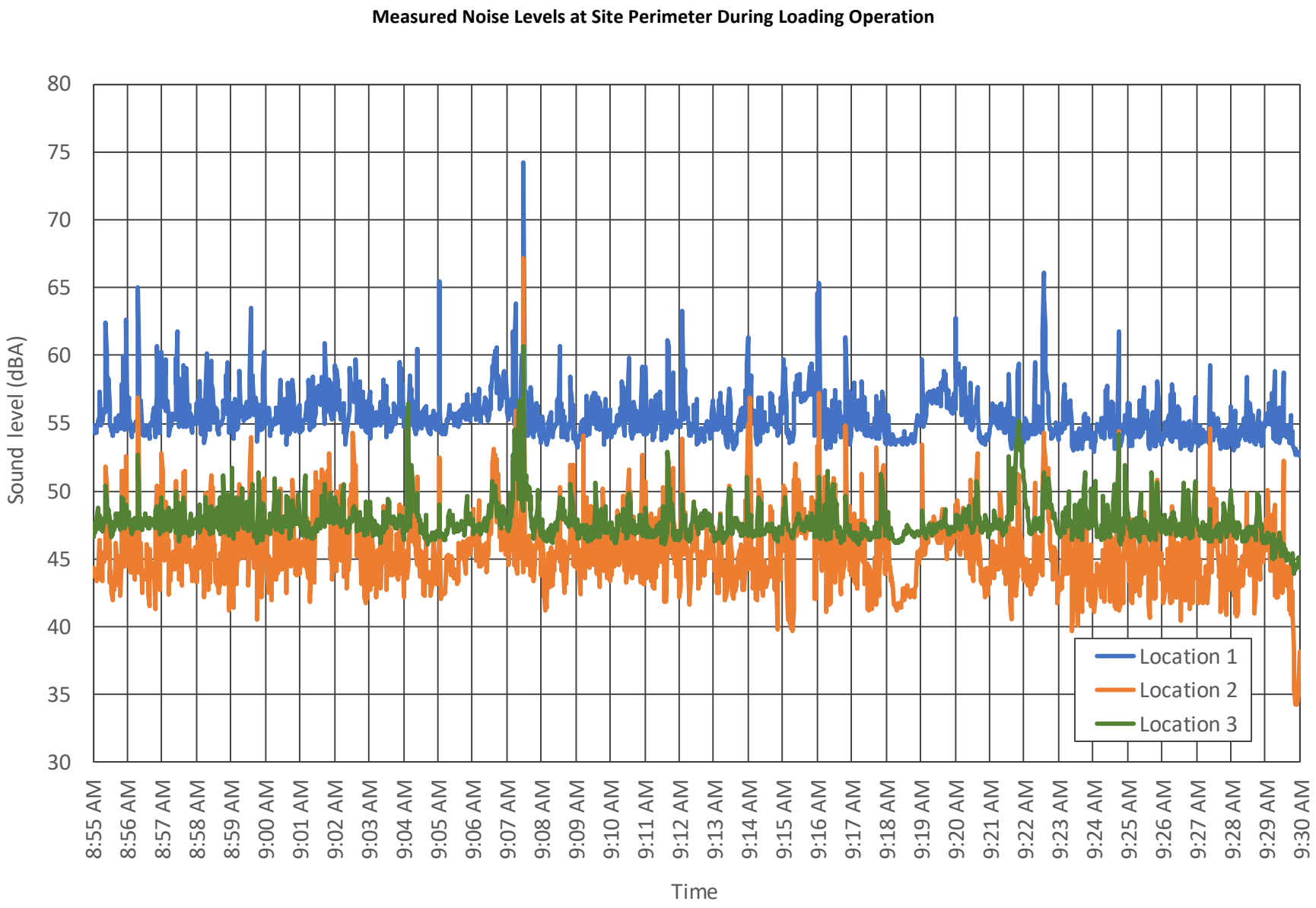
APPENDIX II

Noise Measurement Data

Loading operation frequency spectrum (measured 50 feet from operation)

Octave band center frequency	Sound pressure level (dB)
20 Hz	61.6
25 Hz	62.1
31.5 Hz	69.0
40 Hz	70.7
50 Hz	68.4
63 Hz	71.3
80 Hz	67.7
100 Hz	65.3
125 Hz	65.3
160 Hz	60.4
200 Hz	60.6
250 Hz	57.2
315 Hz	57.6
400 Hz	60.2
500 Hz	58.7
630 Hz	58.0

Octave band center frequency	Sound pressure level (dB)
800 Hz	56.8
1 kHz	54.7
1.25 kHz	54.6
1.6 kHz	54.4
2 kHz	53.9
2.5 kHz	50.6
3.15 kHz	51.5
4 kHz	47.4
5 kHz	45.2
6.3 kHz	42.7
8 kHz	41.6
10 kHz	38.3
12.5 kHz	34.9
16 kHz	32.5
20 kHz	28.3


Measured Noise Levels at Site Perimeter During Loading Operation
Sound level (dBA)
80
75
70
65
60
55
50
45
40
35
30
8:55 AM
8:56 AM
8:57 AM
8:58 AM
8:59 AM
9:00 AM
9:01 AM
9:02 AM
9:03 AM
9:04 AM
9:05 AM
9:06 AM
9:07 AM
9:08 AM
9:09 AM
9:10 AM
9:11 AM
9:12 AM
9:13 AM
9:14 AM
9:15 AM
9:16 AM
9:17 AM
9:18 AM
9:19 AM
9:20 AM
9:21 AM
9:22 AM
9:23 AM
9:24 AM
9:25 AM
9:26 AM
9:27 AM
9:28 AM
9:29 AM
9:30 AM
Time
Location 1
Location 2
Location 3