March 25, 2025

Comite Dialogo Ambiental, Inc.

Re: Steri-Tech Salinas PR Community Noise Impact Study

Comite,

Per your request, I have prepared this report summarizing my opinions relating to this issue and the factual basis for my opinions. This report includes my opinions regarding the noise emissions and impact created by the Salinas Puerto Rico Steri-Tech faciality as incident on the surrounding residential community.

The opinions in this report are based on site noise testing and analysis. The opinions in this report are also based on my education, knowledge, training, and experience in the fields of engineering/physical acoustics, mechanical vibrations, and noise control. I have completed noise and vibrations projects (ranging from industrial noise control, environmental/community noise, product noise/sound quality, hearing conservation, etc.) for approximately six hundred clients located throughout North America as outlined in my attached CV.

I hold all the opinions stated in this report and the subsequent conclusions with a reasonable degree of engineering certainty.

Regards,

William Thornton

THORNTON ACOUSTICS & VIBRATIONS
Consulting Engineers in Acoustics, Vibrations & Noise Control
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Mill Run, PA 15464
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Steri-Tech Community Noise Study

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March 25, 2025

TAV Report # 1908_2025_01

CONTENTS

1 INTRODUCTION

Thornton Acoustics & Vibrations (TAV) performed a community noise study to assess the noise emitted by the Steri-Tech physical plant (Industrial Park, Rd. 701 km. 0.7, Salinas, 00751, Puerto Rico) as incident on the surrounding residential community. Noise monitoring and testing was performed in La Margarita Urbanization, due to the proximity to the plant – directly to the West, with testing at two representative residences (Hilda Carlo, Urb. La Margarita A35 D Street, Salinas, PR 00751 and Margarita Perez's address is Urb. La Margarita A34 D Street, Salinas, PR 00751). The noise study was performed March 8-11, 2025.

This report will discuss the methodology, results, and conclusions of the noise study.

In preparing this report, I have reviewed the following documents:

1. Commonwealth of Puerto, Reglamento para el Control de la Contaminacion por Ruidos, 5 de mayo de 2011

The opinions in this report are based on my site sound testing and analysis. The opinions in this report are also based on my education, knowledge, training, and experience in the fields of engineering/physical acoustics, mechanical vibrations, and noise control. My formal education includes specific course work and training in:

1. Physical Acoustics
2. Mechanical Vibration
3. Non-linear Dynamics
4. Signal Processing
5. Psychoacoustics
6. Audiology

1.2 NOISE PRIMER

To understand and interpret the noise data, analyses and discussions contained in this report it is essential to understand several of the technical nuances related to noise (unwanted sound) and the human perception and impact of noise.

Sound is a pressure perturbation propagating through air, in the form of waves, which can be described in terms of the level (magnitude), the frequency content (spectrum – perceived as tone/pitch) and temporal variation. These variables affect the generation, radiation, propagation, perception, and impact of the sound.

In modelling, measuring and characterizing noise, there exist numerous metrics (dozens) and descriptors. The metrics/descriptors used must be carefully chosen such that they capture and accurately describe and characterize the sound or noise problem being addressed. For many of these metrics and descriptors, although they fundamentally differ in their computation, the results are expressed in terms of decibels (dB), and this can lead to confusion and misinterpretation. The use of the wrong metric will distort the measured results leading to erroneous conclusions. While regulations may dictate the descriptors to be used, this does not necessarily mean that the metric used in the regulation is the most technically appropriate metric.

To characterize the typical ambient sound levels in a community, the sound level exceeded 90 percent of the time (L_{90}, (dB)) metric is often used by convention (in the absence of a formal standard or specific guidance in an ordinance).

The decibel scale used to measure noise is a logarithmic scale rather than a simple linear scale and this leads to misunderstanding and misinterpretation of noise data, levels, and decibel math. Small numerical changes or differences in sound level (expressed in decibels (dB)) are significant differences in acoustical energy. For the reader to interpret and understand the noise data, several simplified rules-of-thumb regarding the sound level/decibel scale are useful. First, every 3-dB increase (or decrease) is a doubling (or halving) the amount of acoustical energy and is considered the smallest change perceptible to an average human listener. Secondly, every 10-dB increase (or decrease) is a doubling (or halving) of the perceived loudness of a sound. For example, if the ambient sound level is increased by 10 dB, the average person would perceive this as twice as loud. An increase of 20 dB would be perceived as roughly 4-times as loud, 30 dB as 8-times as loud and so on.

Noise may create a deleterious impact based on the absolute level of the noise and/or the level increase above some baseline or ambient condition. A sufficiently loud noise will interfere with human activity, speech, sleep etc. regardless of the ambient noise environment. However, in quiet environments (with low ambient noise levels), even relatively "quiet" sounds may produce a negative impact to the degree that they exceed the ambient levels. Noise may also produce a disproportionately large (more than suggested by the simple overall sound level) deleterious impact due to its temporal nature and frequency content such as occurs with Impulse noise or low-frequency noise.

Noise may contain differing levels of energy over a frequency range of roughly 20 to 20,000 Hertz ((Hz), or cycles per second – the human audible frequency range). The frequency content of noise (which can be measured and expressed as a spectrum) has a significant effect on the emission and propagation of noise as well as on the human perception, loudness, and impact of the noise.

Noises that are emitted at one or more single frequencies or narrow frequency bands are known as pure tones. These pure tones are heard and often subjectively described as "hums," "buzz," "whine" or "whistle." It is well established in scientific literature that noise containing pure tones is more intrusive, disruptive, and annoying than broadband noise of a similar level.

In a very crude attempt to create metrics that approximated the simple frequency response of human hearing; the A,C, and Z (zero-weighting or linear) frequency weightings were developed based upon equal loudness curves over 70 years ago (denoted dB(A), dB(C) and dB/dB(Z)). In the subsequent 70 years, more accurate and representative metrics and human loudness descriptors have been developed. The A-weighting filter (used in the Puerto Rico noise regulations) is essentially a low-pass acoustical filter which filters out, deemphasizes, or rejects low frequency acoustical energy below 500 Hz. The A-weighted decibel has been proven over time to be highly correlated with the risk of occupational noise induced hearing loss and this has led to widespread use and familiarity with the A-weighted decibel. This has also led to overuse and over-emphasis on the A-weighted decibel in noise regulations (many practitioners are unaware of the limitations and alternatives). The A-weighted decibel will understate the loudness and human impact of sound containing strong low-frequency energy or tones.

2 METHODOLOGY

TAV measured and monitored the noise emissions produced by the Steri-Tech facility including noise incident on the homes in La Margarita Urbanization. TAV measured and monitored using a Bruel & Kjaer 2270 Sound level meter/Analyzer and a SoftdB Piccolo-II sound level meter (the calibration certificates for both devices are shown in the report appendix). All measurements and testing were performed according to accepted industry best practices and in compliance with applicable US/International (ANSI, ISO) standards and guidelines. The sound level meters were traceably calibrated within the last 12 months and were field calibrated at the start and completion of this project. Noise testing was performed at two primary locations shown in Figure 1, with a noise monitor located at point 1 and testing at points one and two (including on the interior of the home).

The measured noise levels and spectra were evaluated in terms of the Puerto Rico noise regulation limits and relative to industry noise impact guidelines.

Figure 1 Aerial site view showing the Steri-Tech plant and La Margarita Urbanization. Test/monitoring locations indicated by red place markers.

2.1 NOISE MONITORING/TESTING

A noise monitor was installed at point one and used to measure and record the noise levels and spectra, computed in 15-minute intervals, continuously from March 9 until March 11, 2025.

Additional spot measurements were collected periodically throughout the study to augment the monitor data. These measurements were collected at points 1, 2, and in the residence at point 1 as well as other community locations.

2.2 COMMONWEALTH OF PUERTO RICO NOISE REGULATIONS

The Commonwealth of Puerto Rico has enacted environmental and community noise regulations that are applicable to the noise incident in this community. The Regulation title page and limits are shown in Figures 2 and 3, respectively.

The limits for a residential receiver due to a commercial/industrial source, expressed in terms of the A-weighted sound level exceeded 10% of the time (L_{A10}), are 65 dB(A) during the daytime (7AM – 10PM) and 50 dB(A) during the nighttime (10:01PM – 6:59AM). The lower nighttime limits reflect the need for quiet during nighttime hours to allow residents to sleep with a **reduced** risk of sleep interference and disruption.

JUNTA DE CALIDAD AMBIENTAL

VOLANTE SUPLETORIO

DEPARTAMENTO DE ESTADO CERTIFICACIONES Y REGLAMENTOS
11 MAY -9 PM 3:50

Título del Reglamento:	Reglamento para el Control de la Contaminación por Ruidos
Fecha de aprobación	5 de mayo de 2011 (Resolución R-11-7-1)
Aprobación:	Junta de Gobierno en pleno compuesta por: Sr. Reynaldo Matos Miembro Asociado Lcda. Blanche Gonzalez Hodge Miembro Asociado Lcdo. Pedro J. Nieves Miranda Presidente
Fecha de publicación del Aviso Público:	1 de mayo de 2010, periódico El Vocero 1 de mayo de 2010, periódico Primera Hora 11 de septiembre de 2010, periódico Primera Hora 11 de septiembre de 2010, periódico El Vocero
Agencia que lo aprobó:	Junta de Calidad Ambiental Edificio Agencias Ambientales Cruz A. Matos Urb. San José Industrial Park 1375 Avenida Ponce de León San Juan, Puerto Rico 00926-2604
Referencia sobre autoridad estatutaria para promulgar el reglamento:	Ley sobre Política Pública Ambiental, Ley Núm. 416 de 22 de septiembre de 2004, según enmendada

Figure 2 Puerto Rico Noise Regulations title page.

TABLA I
LIMITE DE NIVELES DE SONIDO
dB(A)
Nivel de Sonido Excedido en 10 % del Periodo de Medición (L_{10})

FUENTE EMISORA	ZONAS RECEPTORAS							
	Zona I (Residencial)		Zona II (Comercial)		Zona III (Industrial)		Zona IV (Tranquilidad)	
	D	N	D	N	D	N	D	N
Zona I (Residencial)	60	50	65	55	70	60	55	50
Zona II (Comercial)	65	50	70	60	75	65	55	50
Zona III (Industrial)	65	50	70	65	75	75	55	50
Zona IV (Tranquilidad)	65	50	70	65	75	75	55	50

Nota: "**D**" implica el periodo diurno y "**N**" implica el periodo nocturno.

20

Figure 3 Noise limits.

3 RESULTS

3.1 EXTERIOR NOISE MONITORING

The noise levels, measured in 15-minute increments at point 1, are plotted in Figure 4 relative to the regulatory noise limits. Note that during several periods during the daytime hours of March 9, March 10 and March 11, the overall noise levels were affected by paving/road construction noise. These times are shown in Figure 4 with green circles. At other times, the noise levels were controlled by emissions from Steri-Tech as confirmed by direct listening/observation and frequency analysis.

During the daytime hours, the Steri-Tech noise levels were on the order of 64-66 dB(A) and nominally exceed the regulatory limit.

However, during the nighttime hours, the steady state noise emissions from the Steri-tech plant are consistently on the order of 62-65 dB(A) and as such clearly exceed the regulatory limit (50 dB(A)) by as much as 15 dB. Recall that for every 10 dB increase the perceived loudness is doubled. Accordingly, the Steri-tech noise is roughly three times as loud as the permitted limit.

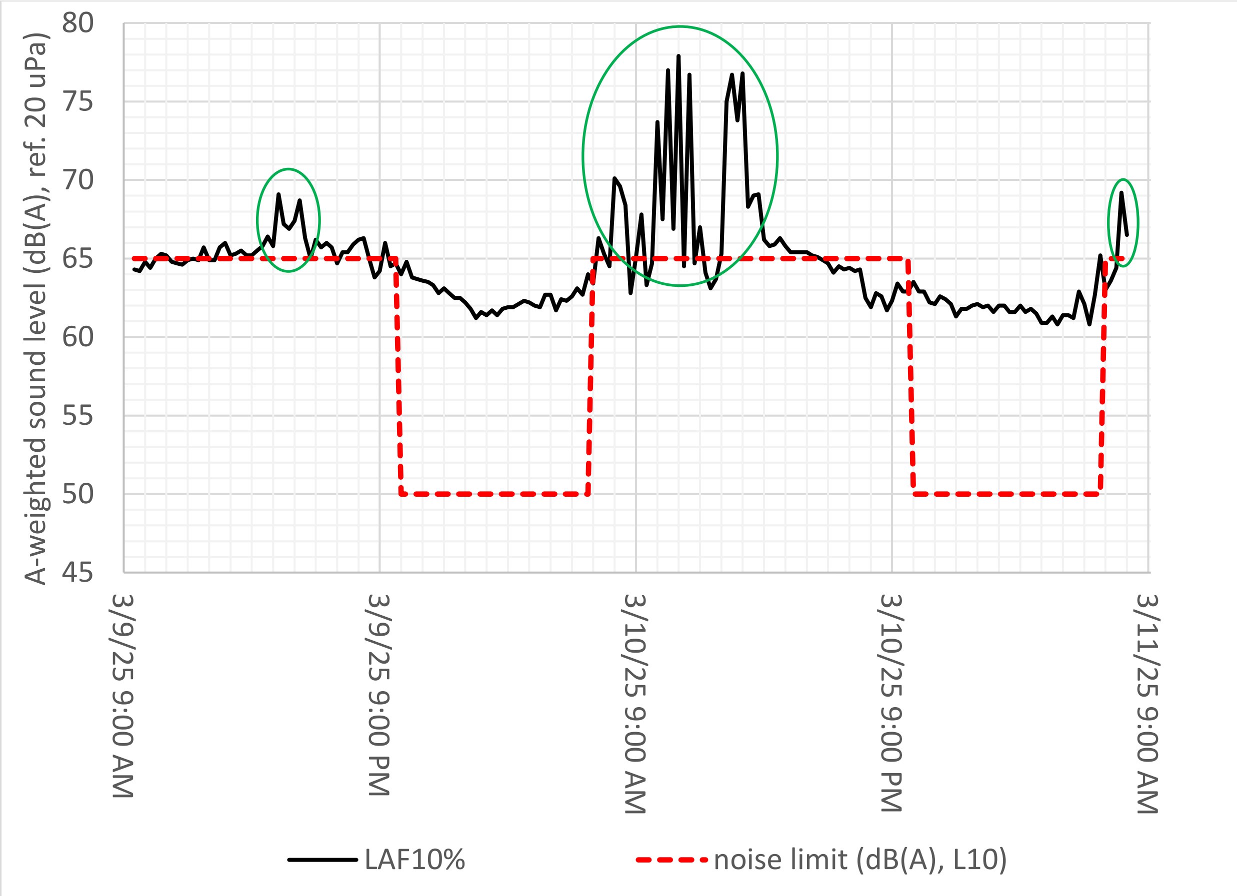

Figure 4 measured noise levels at site 1, plotted relative to the PR noise limits (red dashed curve). Green circles indicate times during which road construction noise controlled the overall levels.

3.2 NOISE SPECTRUM

The noise emitted by Steri-Tech not only exceeds the regulatory limits, but it contains significant low-frequency energy and strong pure-tones which increase and exacerbate the human noise impact. Recall (see noise primer) that pure tones are heard as “hum,” “buzz,” “whistle,” “whine” etc. Note that measuring the noise simply with the overall A-weighted level, as required by the Regulation, underestimates the annoyance and impact.

The noise spectrum, a description of the energy frequency distribution at a point in time, was measured at sites 1 and 2 and representative spectra are shown in Figures 5-8. Note that these spectra are un-weighted to accurately depict the low-frequency energy and tones. Note that the pure-tones are emitted by rotating equipment at Steri-Tech, including pumps, motors, fans, blowers, etc. and the tone frequencies correspond to the rotational speed and number of lobes, blades (fan/blower blade passing tone), etc.

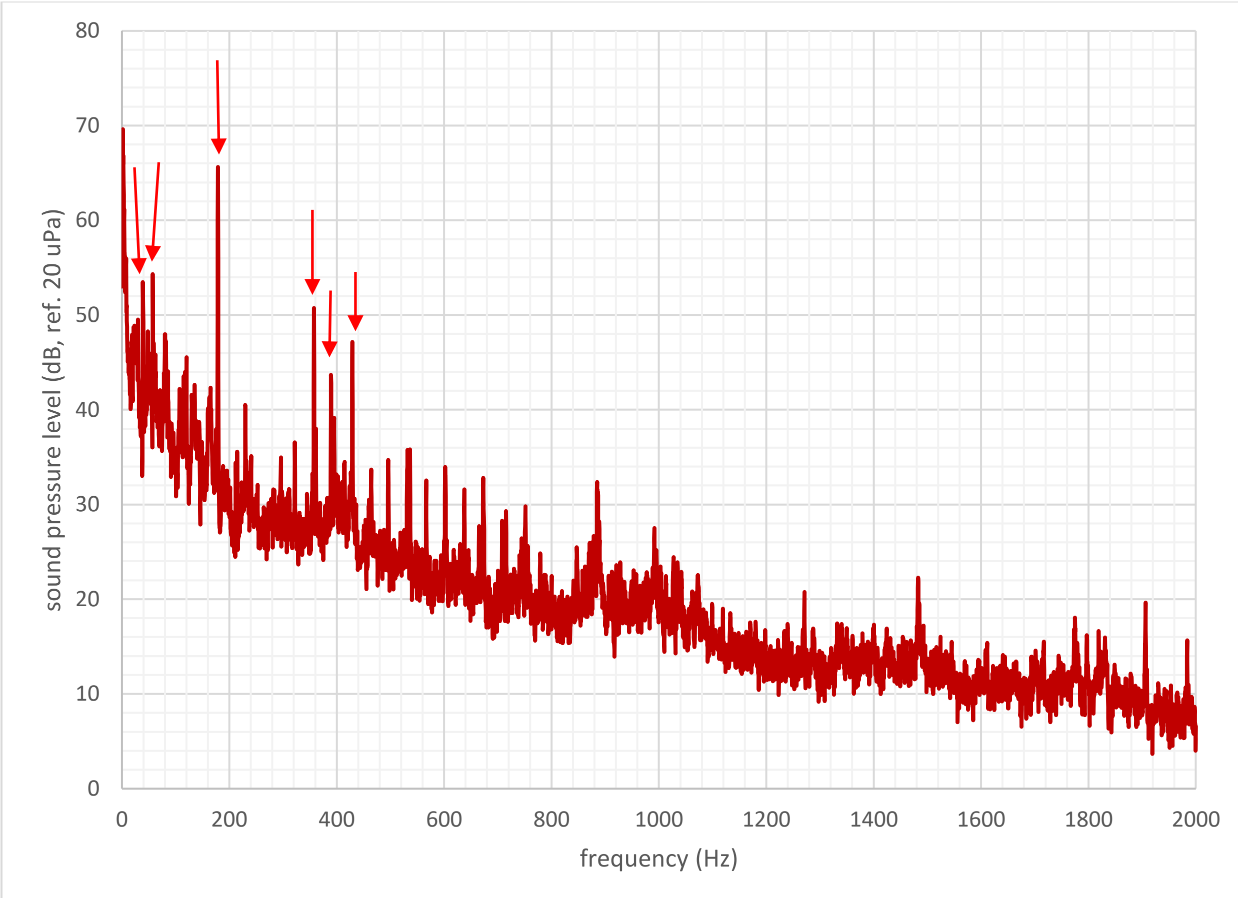

Figure 5 Steri-Tech noise spectrum measured at site 1. Several dominant pure tones are indicated by red arrows.

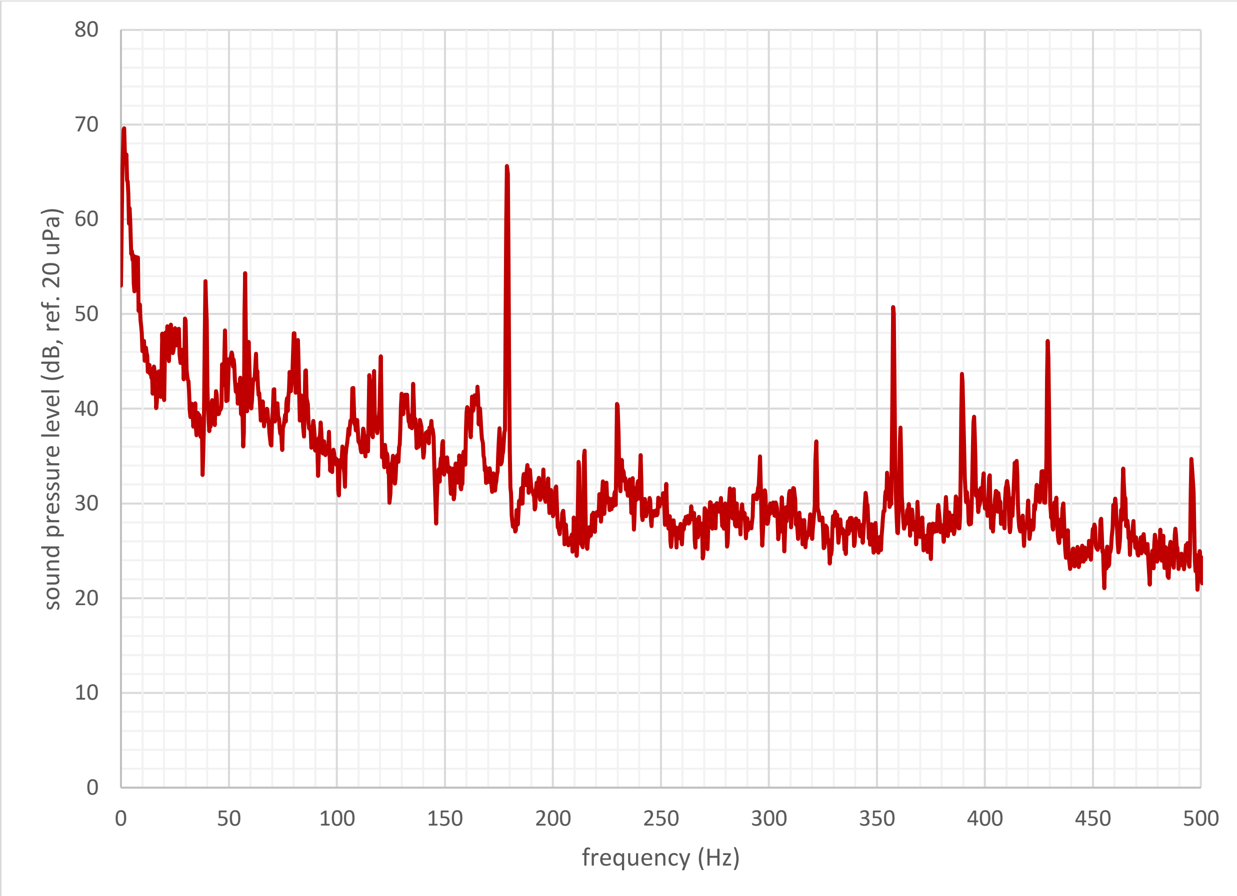

Figure 6 Steri-Tech noise spectrum measured at site 1 (zoomed view 0-500 Hz).

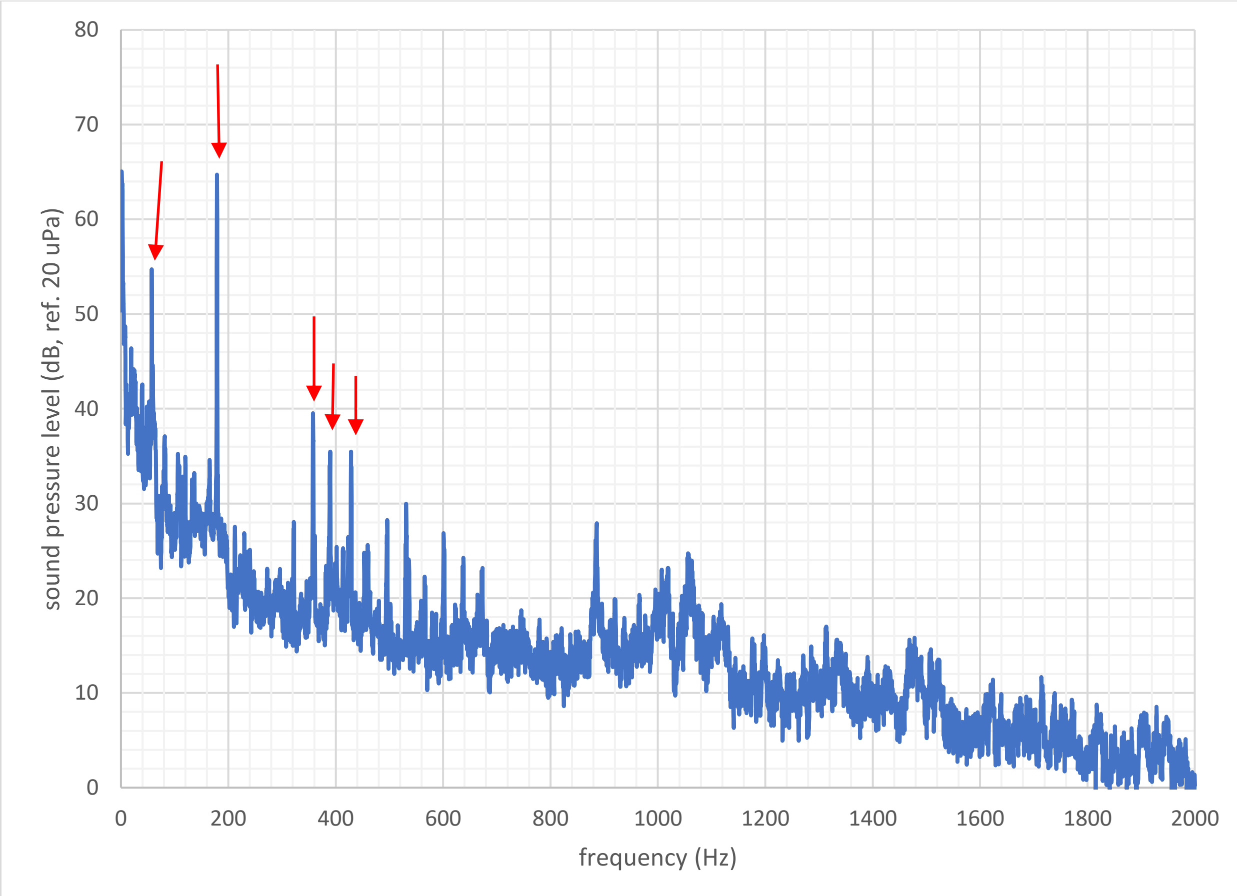

Figure 7 Steri-Tech noise spectrum measured at site 2. Several dominant pure tones are indicated by red arrows.

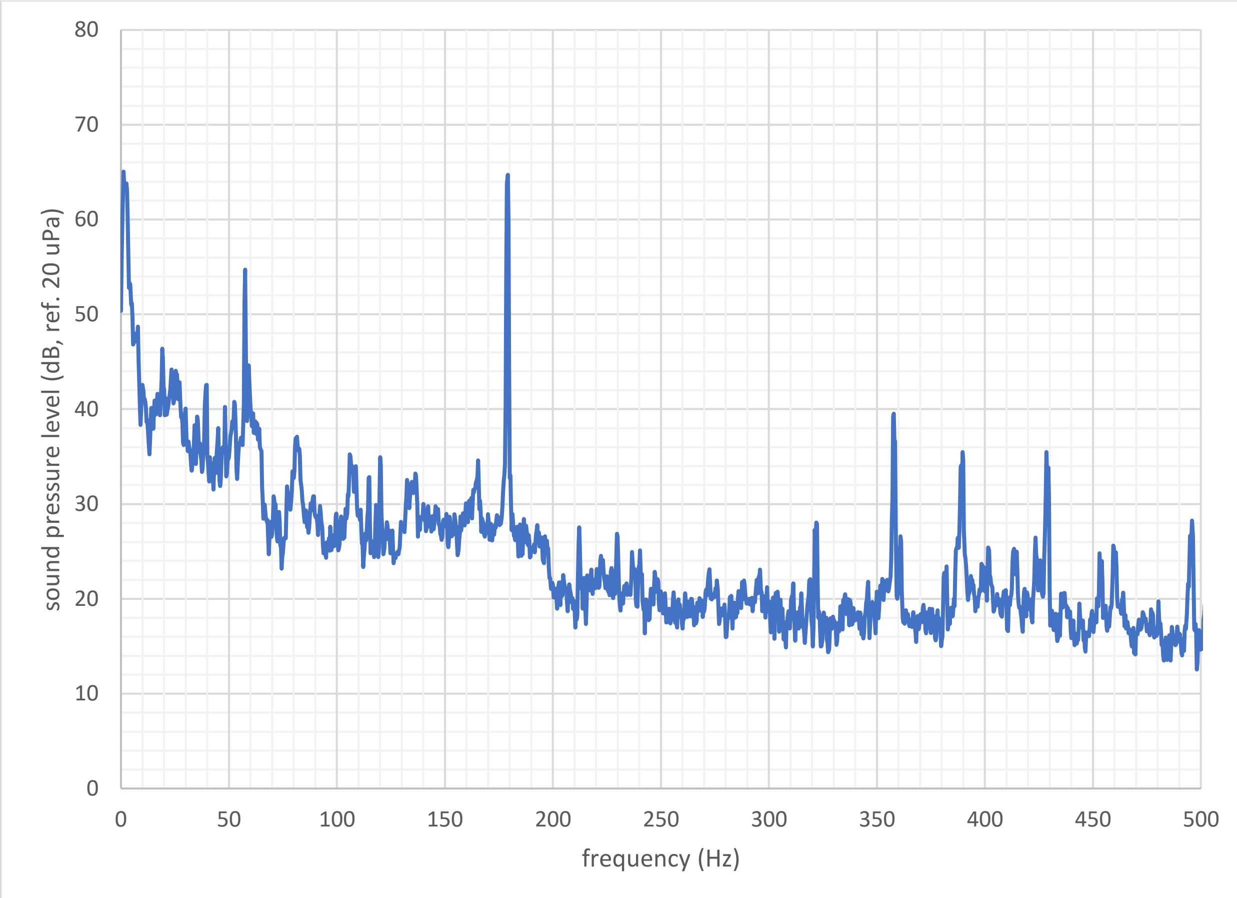

Figure 8 Steri-Tech noise spectrum measured at site 2 (zoomed view 0-500 Hz).

3.3 Interior Noise Levels

Because the Steri-Tech noise propagates into the adjacent residences, interior noise measurements were collected in the bedroom of site 1 to document the propagation into the home. The interior overall sound levels and the Noise Criterion levels (NC), were measured. The Noise Criteria (NC) curves are a rating system, based upon the noise spectrum, used to specify acceptable background noise levels in occupied spaces which are affected by noise from air-conditioning systems, HVAC/R, fans/blowers, and any other mechanical noise sources. The acoustics and HVAC/R industries have also developed guidelines for acceptable mechanical noise limits, based on the NC curves, to prevent disruption, sleep disturbance etc. For private residential homes in rural and suburban areas, the interior noise levels should not exceed NC 20-30 (these are very roughly equivalent to sound levels of approximately 30-38 dB(A)). The measured NC level in the bedroom is NC-55; more than 25 NC points above industry guidelines. **These levels will interfere with normal living activity in the home and will result in sleep interference and sleep disruption.**

4 Conclusions & Recommendations

The noise emitted by Steri-Tech, in the surrounding residential community and incident on the homes and in the homes, grossly exceeds the Puerto Rico Noise regulations limits, particularly at night when quiet is most important for restful sleep.

The deleterious noise impact is underestimated by the methodology dictated in the Regulations. Due to the low-frequency noise and strong pure tones, the noise has a greater negative impact and will interfere with normal activity not only outdoors, but in the homes and will cause sleep disturbances and interruptions.

The Steri-Tech noise emissions must be reduced by at least twenty-five decibels (25 dB) to begin to comply with both the letter and intent of the Regulations. Note that while the overall levels are expressed in dB(A), when discussing relative differences, levels are called dB by convention.

The Steri-Tech noise is emitted by an array of fans, pumps, blowers, and motors distributed over the roof and grounds as shown in Figures 9-12. Note that the objective identification and rank ordering of the individual noise contributions due to each distinct source is a standardized engineering noise control process.

Figure 9 Steri-Tech viewed from the south.

Figure 10 Steri-Tech rooftop sources.

Figure 11 Steri-Tech rooftop and ground sources.

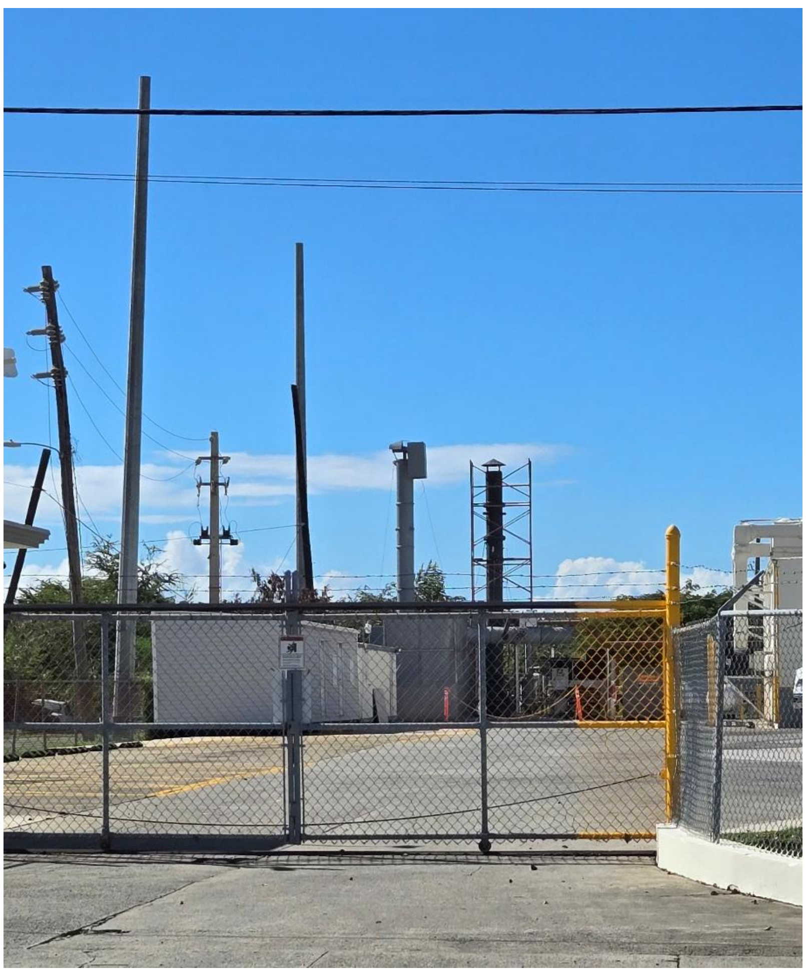

Figure 12 Steri-Tech ground sources.

To noise-control these noise sources, the devices can be replaced with intrinsically quiet equipment, or the existing devices can be noise controlled with a correctly engineered combination of noise enclosures, silencers, mufflers, etc. It is critical that nay noise controls be properly engineered to provide the correct Insertion Loss (IL) and that all sources be controlled to achieve an overall reduction (many small sources can contribute as much energy as one big source). Our firm sees a shocking amount of wasted money when companies do not guide their noise control efforts and implementation based upon best noise control practices as this is not an intuitive subject which even highly competent technical people routinely misunderstand.

TAV has also been advised that the Steri-Tech facility may be expanded. It is important to note that the addition of new noise emitting mechanical equipment will exacerbate the existing problem as noise is additive and cumulative.

Please feel free to contact us with any questions regarding this project and report or if we may be of any future assistance.

Best Regards,

William Thornton

5 APPENDIX – CALIBRATION CERTIFICATES

Brüel & Kjær

The Calibration Laboratory
Skodsborgvej 307, DK-2850 Nærum, Denmark

ilac-MRA DANAK CAL Reg.nr. 307

CERTIFICATE OF CALIBRATION

No: C1207 Page 1 of 10

CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2270	No: 3009879
Microphone:	Brüel & Kjær Type 4189	No: 3043927
Preamplifier:	Brüel & Kjær Type None	No: NA
Supplied Calibrator:		

Software version:	LabShop 17.0.0.423	Pattern Approval:	PENDING
Instruction manual:	BE1631		

CUSTOMER

Brüel & Kjær Sound & Vibration Measurement A/S
Skodsborgvej 307
DK-2850 Nærum
Denmark

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in* ***Environmental conditions*** *sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2270 has been calibrated in accordance with the requirements as specified in IEC61672-1:2002 class 1. Procedures from IEC 61672-3:2006 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 4.7 - DB: 4.70) by using procedure LAN-XI 4189.

RESULTS

Calibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 2024-8-23

Date of issue: 2024-8-23

Jonas Johannessen
Calibration Technician

Henning Ploug
Approved Signatory

Soft dB
WWW.SOFTDB.COM

1040, Avenue Belvedere, Suite 215
Quebec, Qc, Canada, G1S 3G3
1 (418) 686-0993
Email: info@softdb.com
www.softdb.com

Calibration Certificate No. P02QC2023080802

24/04/25

Instrument

Type:	Integrating Averaging Sound Level Meter
Model:	Piccolo-II
SN:	P0223080802
Class:	2
Mic Sensitivity:	16.82mV/Pa (-0.5 dB from nominal)

Standards

Tested in accordance with procedures from ANSI/ASA S1.4-3 (2014) / IEC 61672-3 (2013) Electroacoustics - Sound Level Meters - Part 3: Periodic tests

Calibration Instruments

Description	Manufacturer	Model	Serial Number
Function Generator	Stanford Research Systems	DS360	33623
Multi-function Calibrator	Brüel & Kjær	4226	1551588

Environmental Conditions

Temperature	Barometric Pressure	Humidity
23.7°C	99.5kPa	47%

Personnel

Calibrated by: ________________ Date : 24/04/25

Amine Safir

Summary

Description	PASS / FAIL
Section 11.1 – Self-generated noise (Microphone)	Pass
Section 11.2 – Self-generated noise (Electrical input)	Pass
Section 12 – Acoustical signal tests of frequency weightings	Pass
Section 13 – Electrical signal tests of frequency weightings	Pass
Section 14 – Frequency and time weightings at 1 kHz	Pass
Section 15 – Long-term stability	Pass
Section 16 – Level linearity on the reference level range	Pass
Section 17 – Level linearity including range control	Pass
Section 18 – Toneburst response	Pass
Section 19 – C-weighted peak sound level	Pass
Section 20 – Overload indication	Pass
Section 21 – High-level stability	Pass

Declaration of Conformity

The sound level meter submitted for testing has successfully completed the Class 2 tests of ANSI/ASA S1.4-3 (2014) / IEC 61672-3 (2013) (limited to sections 11, 12 , 13, 14, 15, 16, 17, 18, 19, 20 and 21), for the environment conditions under which the tests were performed.

Certificate No. : P02QC2023080802 24/04/25 Page 1 of 4