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Long-Term Sound Study at St. Francis Hospital Part 1

by

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Abstract

This study consisted of long-term measurements of noise in a hospital setting for the purposes of comparing overall noise levels with patient survey results, and to check for a correlation between the parameter L_{eq} and statistical levels such as L_{10} and L_{33} in a hospital environment. The study was conducted within four different unit corridors at St. Francis Hospital & Medical Center in Hartford, CT, by students of the University of Hartford working in conjunction with Cerami & Associates and Acentech, Inc. The results demonstrated that units that received poor scores on patient surveys tended to have higher long-term average noise levels than units that received good patient survey scores. The results from units measured with Acentech, Inc.'s systems showed a strong correlation between the overall L_{eq} and the statistical L_{33} values, whose overall values matched within 1 dBA.

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1.0 Purpose

The purpose of this investigation was to conduct long-term noise surveys at St. Francis Hospital & Medical Center in Hartford, CT, to compare actual sound levels to results from patient satisfaction surveys. An additional goal of this investigation was to make a comparison between L_{eq} and statistical levels such as L_{10} and L_{33} values in a hospital setting.

2.0 Background Information

2.1 History of the Project

As the United States government has worked to enact health care reform, it has brought attention to the issues of cost versus care quality [6]. Hospitals subject to Inpatient Prospective Payment System (IPPS) are required to submit a Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey [3]. HCAHPS is a national and standardized patient survey regarding hospital care consisting of 27 questions. This survey provides a standard for comparing hospitals, and the public has access to the results. Another important aspect of HCAHPS surveys is how they affect Medicare reimbursement. Hospitals with high survey scores may receive a Medicare bonus while hospitals with low survey scores can have a reduction in their reimbursement [3].

St. Francis Hospital and Medical Center (SFHMC) uses the HCHAPS survey to gauge the level of patient satisfaction. One particular question on the survey is “How often was the area around your patient room quiet at night?” The patient choices for a response are: Always,

Usually, Sometimes or Never. The responses to this question have shown differences in perceived noise levels within different units at SFHMC in areas adjacent to patient rooms.

Acentech Inc. (Cambridge, MA) and Cerami & Associates (New York City) are two consulting firms who specialize in acoustics, audiovisual, and vibrations. Both firms approached the University of Hartford to conduct long-term noise measurements in hospitals. The University of Hartford has a professional relationship with SFHMC and a location for the long-term hospital noise study was established.

2.2 Health and Safety Issues

Excessive noise in hospital sound environments can increase stress and reduce communication among staff members. A noisy environment can cause a sensory overload resulting in stress, which in turn can lead to physiological and behavioral changes. In addition to stress, a noisy soundscape results in a reduction in communication. Reduced communication in hospitals can result in performance errors [7].

Excessive noise in hospitals can also potentially negatively impact the healing of patients. A Harvard study evaluating sleep disruption due to hospital noises states, “This study systematically quantifies the disruptive capacity of a range of hospital sounds on sleep, providing evidence that is essential to improving the acoustic environments of new and existing health care facilities to enable the highest quality of care” [1]. Hospitals with noisy soundscapes can disrupt the sleep patterns of patients and this increases patient healing time. Improving the acoustics of hospitals can potentially reduce the length of a patient’s stay.

2.3 Environmental Issues

A facility's Institutional Review Board (IRB) is responsible for reviewing and overseeing human subject research. IRB approval at St. Francis was necessary before taking measurements of hospital activity noise. All those involved in this research (including the authors) were required to complete a research ethics course conducted by the Collaborative Institutional Training Initiative (CITI) before seeking IRB approval. For this research project, the CITI course taken was for student-class projects that qualify as "no more than minimal risk" [2].

This research was approved by SFHMC's IRB and concluded to not constitute human subject research [9]. The approval allowed the research to include taking long-term average sound level measurements within hallways of the hospital but not audio recordings.

2.4 Contemporary Issues

Hospitals throughout the country have begun campaigning to reduce their overall noise levels. Some of these campaigns include Silent Hospitals Help Healing, also known as "SHHH" and another program called "TOO LOUD". The "SHHH" Program works to reduce noise levels by educating staff about noise control and by identifying sources of disruptive noise [5]. The "TOO LOUD" campaign addresses the issue of nighttime hospital noise. For example, this campaign requires nurses and patients to turn off their cellphones and pagers after 10:00 pm [8].

3.0 Procedure

3.1 Terms and Parameters Measured

L_{eq} is the parameter used to define the overall average value for the sound pressure level over a given time period of interest and can be found with the following equation:

$$L_{eq} = 10 * \log\left(\frac{1}{T}\int_{t=0}^{T} 10^{0.1*L(t)}\right)$$

where $L(t) = the\ continuous\ sound\ level\ as\ a\ function\ of\ time\ and\ T = total\ time$. [4]

L_n is called a statistical noise level descriptor and is defined as "the A-weighted sound level exceeded n% of the time during the measurement period" [4]. For example, L_{10} corresponds to the sound level exceeded by just 10% of all the measurements made during that time period, and so forth with L_{90}, and L_{33}, which are other levels of interest in this study. L_{10} is called the annoyance level, L_{90} is the background level, and L_{33} is a parameter that is usually used to describe environmental noise, but has been cited as a useful parameter to describe overall levels of hospital noise [7].

3.2 Equipment

Sound equipment loaned to the University by Cerami & Associates, Inc. (New York City), and Acentech Inc. (Cambridge, MA) was used to record the long-term sound measurements for two week intervals. Cerami, Inc. provided two NTi Audio model XL2 analyzers and one Norsonic model 140 sound level meter. The equipment from Acentech, Inc. included four Windows laptops with outboard microphone pre-amplifiers and six PCB Piezotronics microphones,

models 378B02 and 130E20. The laptops utilized MATLAB Version R2012b running code developed in-house by Acentech, Inc. Figure 1 shows one of the systems provided by Acentech, Inc.

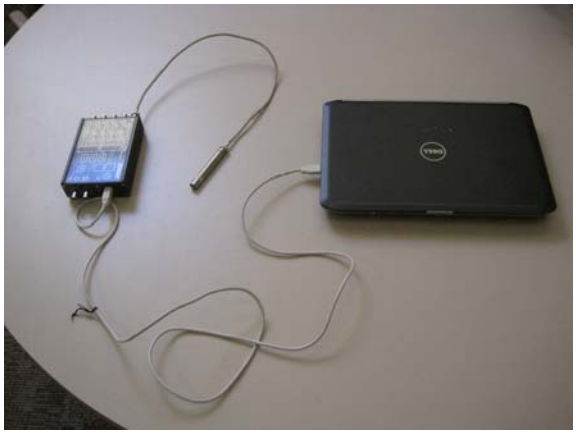

Figure 1 Sample Acentech System

3.3 Measurement Locations

The measurements in this project consisted of two sets of measurements, each lasting for a period of two weeks within two different hospital units within SFHMC. For each measurement period, one unit was chosen which received relatively high ratings on patient surveys and one unit was chosen which received relatively low ratings in the category of how quiet the unit seemed to patients.

In order to determine which wards in the hospital were to be observed and measured in this study, an initial site visit was conducted in which hospital personnel led a tour of the hospital through several units which received high and low scores on patient satisfaction surveys described above. During this visit, SFHMC hospital personnel pointed out known noise contributors and areas in each unit, including medication stations, nurses' stations, particularly busy hallways, double occupancy rooms, elevators, and a physical therapy gym. This led to

strategic choices of where to place the long-term measurement microphones, which are listed in Table 1. More specifically, Figure 2 through Figure 5 show the chosen units with each microphone location marked with a red x, and each laptop or sound level meter stored in a secure location near a power outlet marked with a green shamrock.

Measurement Period	March 4 – March 18, 2013		March 18 – April 1, 2013	
Unit	10-9	3-5	7-1	9-7
Survey Results	Poor	Good	Poor	Good
Relative Size	Large	Small	Small	Large
Acentech Mic Locations	1a, 1b, 2a, 2b, 3	4	-	1, 2a, 2b, 3, 4
Cerami Mic Locations	C1	C2, C3	C1, C2, C3	-

Table 1 Units Tested and Corresponding Microphone Locations

For the first round of testing, Units 10-9 and 3-5 were measured. Unit 10-9 was chosen as the first unit to be measured which received among the worst scores on the patient surveys regarding noise. Unit 10-9 is a step down unit (a unit which provides care intermediate between that of intensive and in-patient) which has one nurses' stations, a frequently used public address (PA) system, and a mixture of private and double rooms. Unit 3-5 was chosen as the first unit to be measured which received among the best scores on the patient surveys regarding noise. Unit 3-5 is called a 23-hour unit, where patients are assigned if complications arise from cardiac surgery and stay 23 hours or less. This unit is closed on the weekends.

In Unit 10-9, there were five measurement locations, including one location with two microphones (one from Cerami and one from Acentech) for cross-referencing purposes. These locations can be seen in Figure 2. The doubled up location (1b and C1) was placed at the busiest location within this unit, being close to an office, the staff lounge, some patient rooms, the

service elevators, and a crossing hallway that led to the main nurses' station in the unit. Location 1a was chosen in the SE corner of the unit, by a double room and two single rooms. Receiver location 2b was placed by the main nurses' station. Receiver location 3 was placed by a medication station Receiver location 2a was chosen around the corner from a work desk/bench.

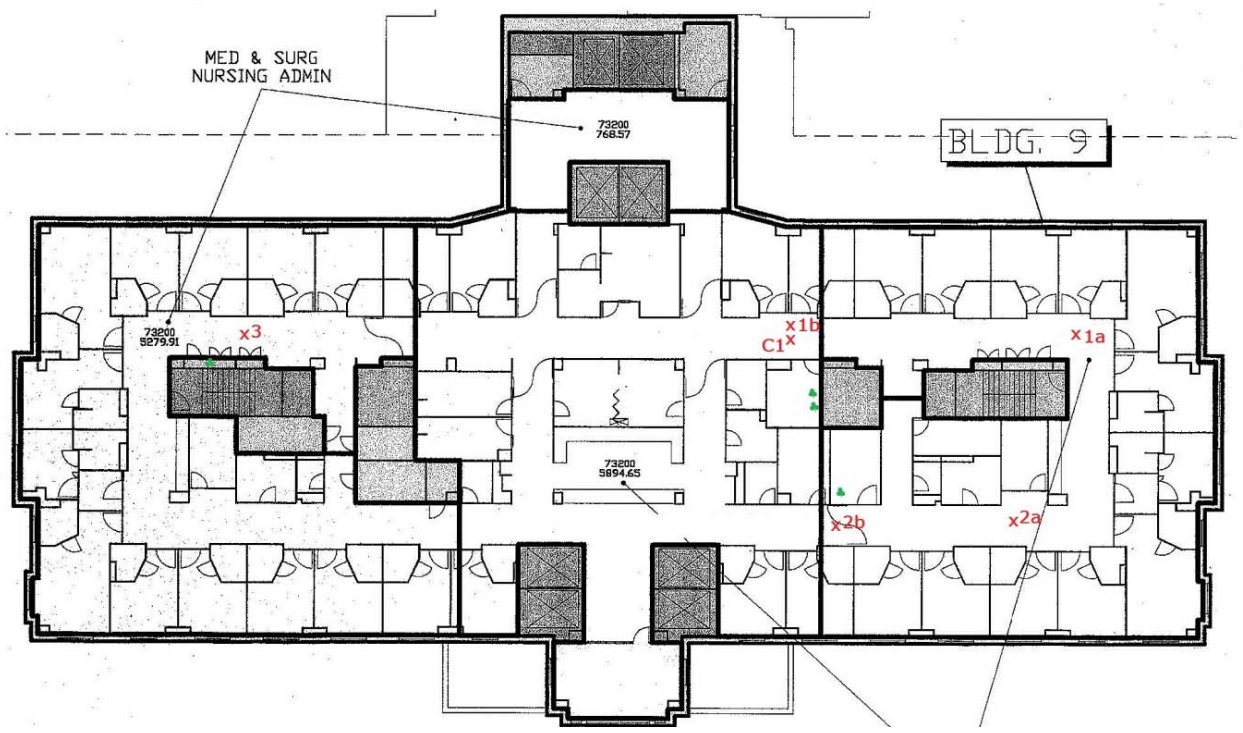

Figure 2: Unit 10-9 Floor Plan with Microphone and Laptop/Meter Locations

Two Cerami meters and one Acentech laptop were placed in Unit 3-5. The measurement locations can be seen in Figure 3. The location for C2 and Acentech's system 4 was chosen by the doors to four patient rooms. This was chosen to be another overlapping measurement location for additional crosschecking between the two recording systems. The location for receiver C3 was chosen very near the nurses' station in the unit.

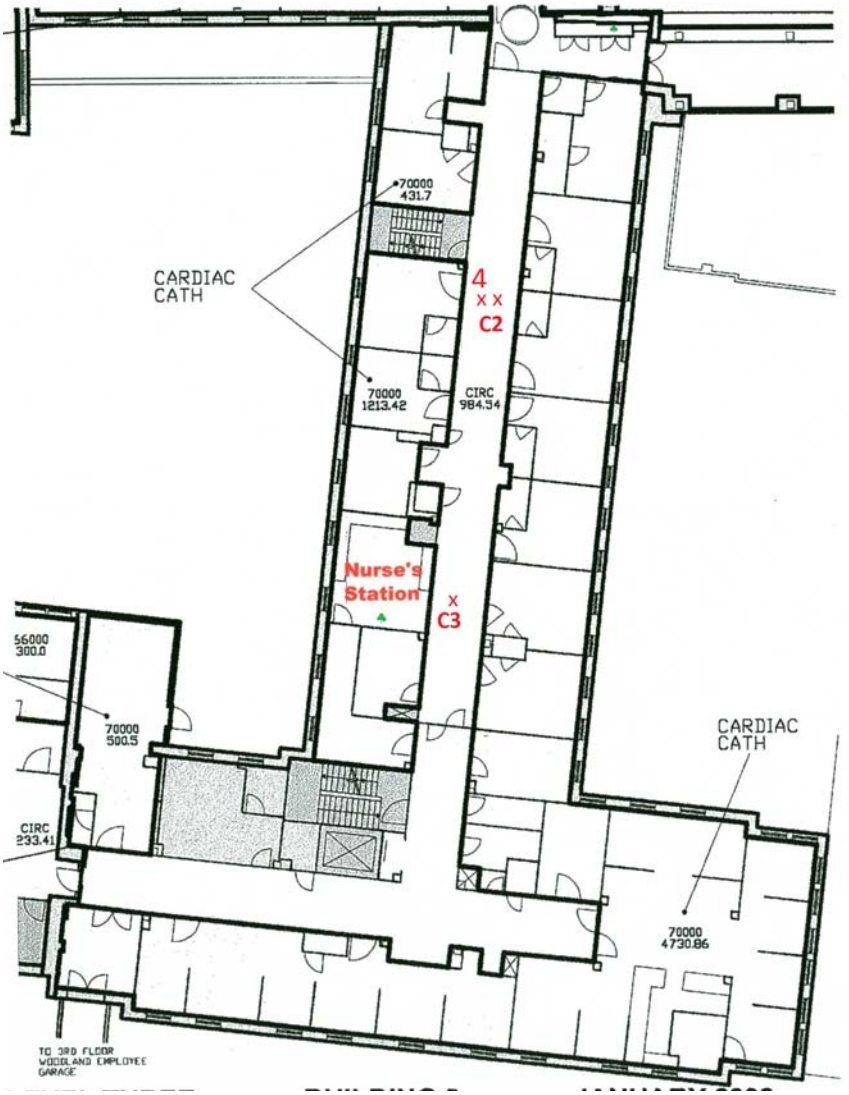

Figure 3: Unit 3-5 Floor Plan with Microphone and Meter/Laptop Locations

For the second round of testing, Units 9-7 and 7-1 were measured. Unit 9-7 was chosen as the second unit to be measured that received among the best scores on the patient surveys regarding noise. Unit 9-7 is an orthopedic unit that has three nurses' stations, a physical therapy gym, and all private rooms. Unit 7-1 was chosen as the second unit to be measured that received among the worst scores on the patient surveys regarding noise. Unit 7-1 is a medical unit, which consists of one long hallway with one primarily used entrance and exit.

There are stairs at the south end of the unit, but most traffic enters and exits through the north corridor.

The measurement locations for Unit 9-7 can be seen in Figure 4. Location 1 was chosen at the crossing of a secondary hallway with the main one. Location 2a was chosen to be outside the door to the physical therapy gym. Location 2b was chosen at another crossing of a secondary hallway with the main hall but closer to the nurses' station, which is in operation 24 hours a day. Location 3 was chosen by the north nurses' station, which is in operation infrequently, and location 4 was chosen by the primary nurses' station on the west side.

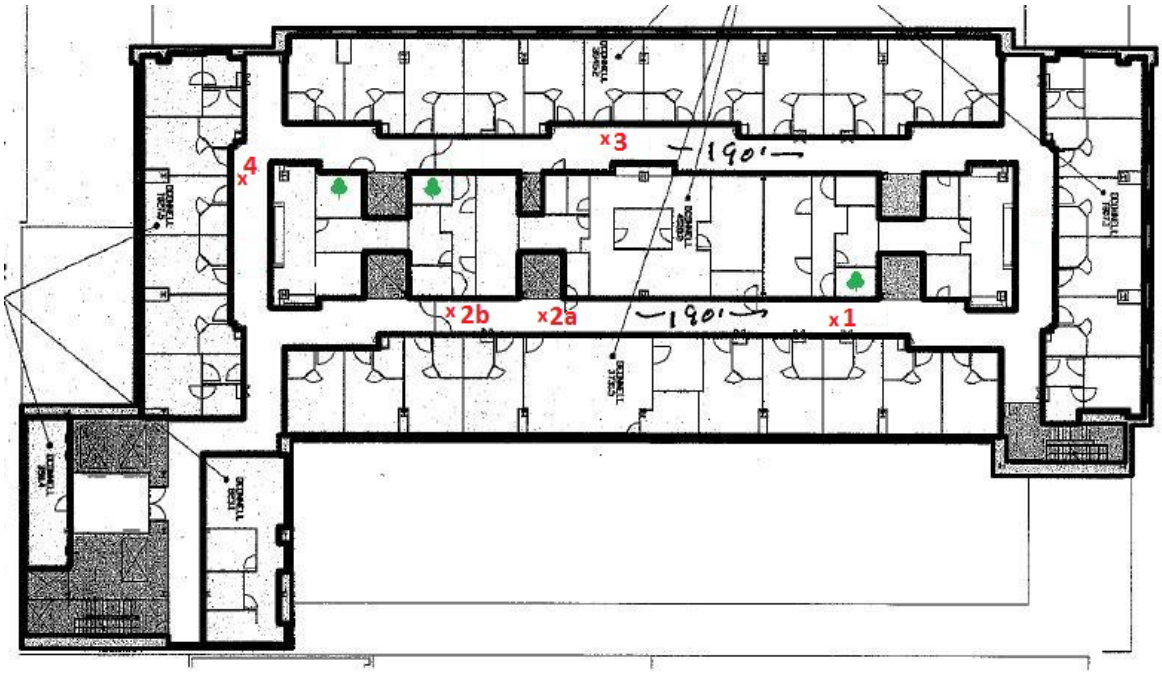

Figure 4: Unit 9-7 Floor Plan with Microphone and Laptop Locations

The measurement locations for Unit 7-1 can be seen in Figure 5. Location C1 was chosen to be close to patient rooms and medicine stations. Location C2 was chosen in front of the only

nurses' station in the unit. Location C3 was chosen by the patient showers in the unit and close to the entrance to pick up as much traffic noise as possible.

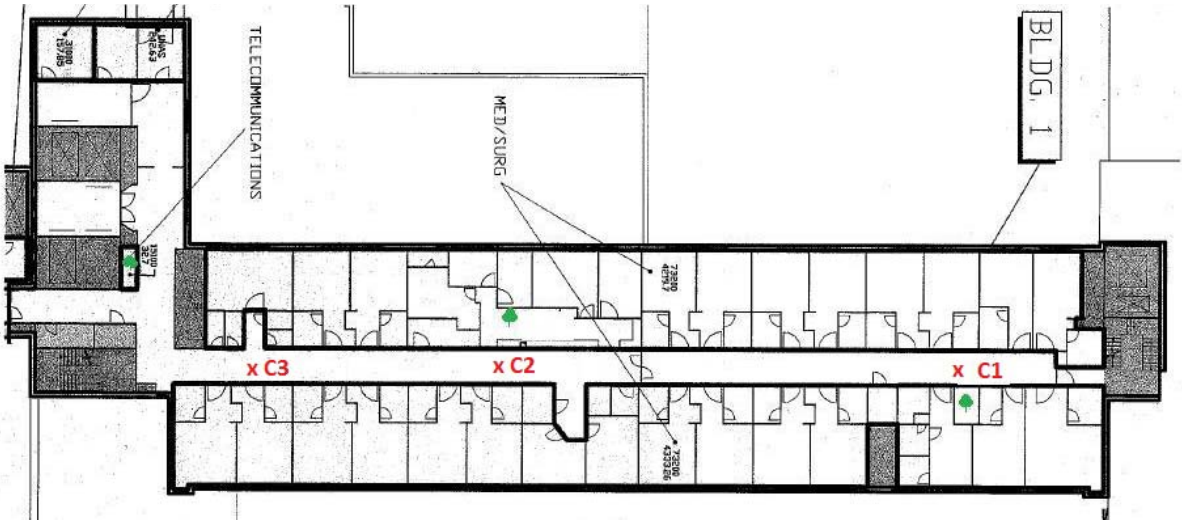

Figure 5: Unit 7-1 Floor Plan with Microphone and Meter Locations

3.4 Set Up, Recording, and Observations

On the first Monday of each two-week measurement period, the equipment was set up in the units that were to be tested. The laptops and sound level meters were placed in secure locations near power outlets. Microphone extension cables were run from the measurement locations along the ceiling grids, attached with cable ties, and connected to the measuring devices. In most instances, the laptops or sound level meters were placed inside a room, so the cables had to be run above the lay-in ceiling tiles in order to access the room. In the case of unit 7-1, there was asbestos above the ceiling tiles, so locations for the meters attached to microphones C1 and C2 were chosen in places where there were no doors to the hallway. Table 2 shows the heights of the installed microphones and their proximities to speakers in the ceiling.

Once the cables were attached to the sound level meters and laptops, the microphones were then installed and calibrated with a known signal source using a Brüel & Kjær Acoustical Calibrator type 4231. Figure 6 shows an example of an installed microphone and cable.

Testing Period	Unit	Microphone Location	Floor to mic distance	Distance to Closest PA speaker
3/4/13 – 3/18/13	10-9	1a	7’6”	7’7”
3/4/13 – 3/18/13	10-9	1b	7’4”	9’2”
3/4/13 – 3/18/13	10-9	2a	7’5”	5’2”
3/4/13 – 3/18/13	10-9	2b	7’6”	9’0”
3/4/13 – 3/18/13	10-9	3	7’7”	5’2”
3/4/13 – 3/18/13	3-5	4	7’7”	3’3”
3/4/13 – 3/18/13	10-9	C1	7’2”	9’2”
3/4/13 – 3/18/13	3-5	C2	7’8”	3’3”
3/4/13 – 3/18/13	3-5	C3	7’8”	13’11”
3/18/13 – 4/1/13	9-7	1b	7’8”	5’11”
3/18/13 – 4/1/13	9-7	2a	7’2.5”	3’2”
3/18/13 – 4/1/13	9-7	2b	7’2”	8’3”
3/18/13 – 4/1/13	9-7	3	7’7”	8’6”
3/18/13 – 4/1/13	9-7	4	7’6”	7’7”
3/18/13 – 4/1/13	7-1	C1	6’10.5”	13’8”
3/18/13 – 4/1/13	7-1	C2	7’4”	1’7”
3/18/13 – 4/1/13	7-1	C3	7’4”	11’1”

Table 2 Heights of Microphones and Distances to Closest Speakers

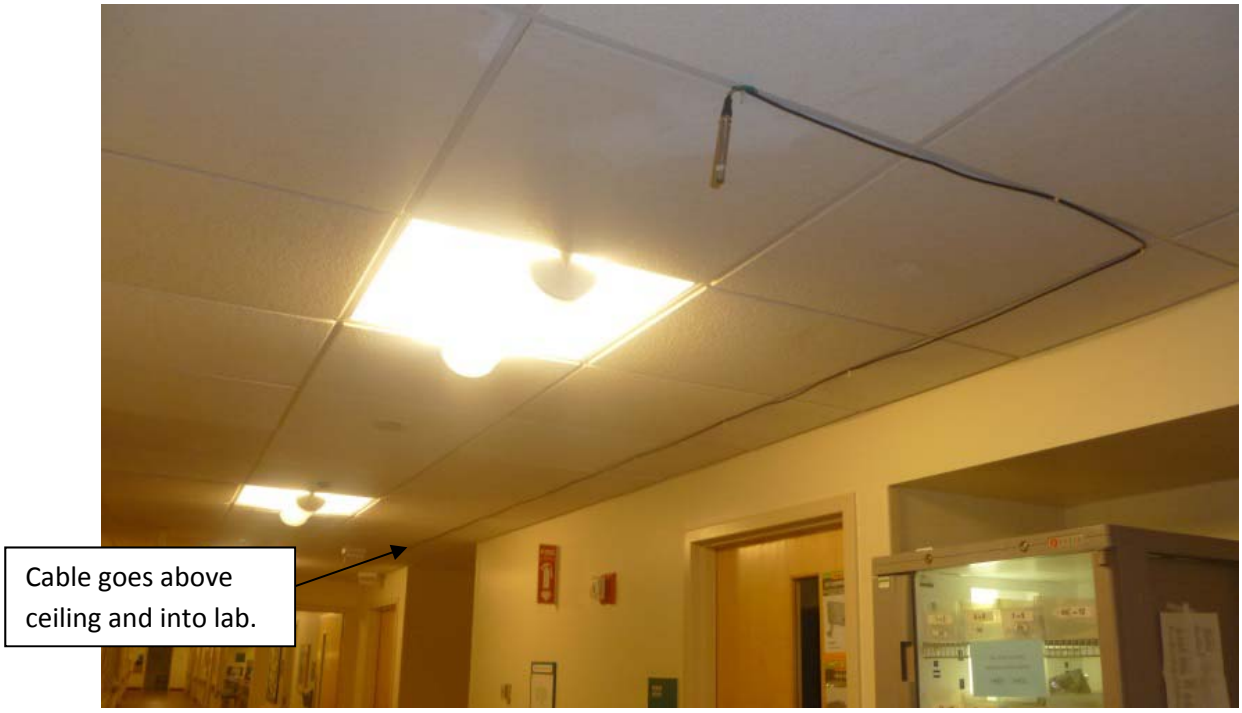

Figure 6: Microphone Location 2A in Unit 10-9

After the microphones were put into place and the recording devices started, the systems were left running for 2 weeks at each location. During the span of each two week measurement, on-site observations were made on five different occasions. These observations included the use of Brüel & Kjær (B&K) Type 2250 hand held sound analyzers. On each visit, at each measurement location, three one-minute measurements were taken with the B&K 2250's running in 1/3 octave spectral analysis mode. During these measurements, any instances of noticeable sound were noted along with the corresponding time at which they occurred. General activity in the unit when the B&K meters were not recording was also noted.

4.0 Results

	Acentech L_{eq} (dBA)- First 2 Weeks						Cerami L_{eq}- Second 2 Weeks	
Unit	10-9					3-5	3-5	
System	1 Ch1	1 Ch2	2 Ch1	2 Ch2	3	4	C2	C3
3/5/13	51	51	51	51	51	50		
3/6/13	51	51	51	51	50	47		
3/7/13	51	51	51	51	50	47		
3/8/13	51	51	50	50	50	43		
3/9/13	50	51	50	51	50	41		
3/10/13	50	50	50	50	48	42		
3/11/13	51	51	49	50	50	50		
3/12/13	50	51	49	50	50	46		
3/13/13	51	51	50	51	50	46		
3/14/13	51	51	50	51	50	46		
3/15/13	51	51	50	51	50	43		
3/16/13	51	50	50	50	49	41		
3/17/13	50	50	50	50	50	42		
2 Week L_{eq} Average	51	51	50	51	50	45	44	51
2 Week L_{33} Average	51	51	50	52	50	45	41	49
2 Week L_{10} Average	55	55	54	56	54	48	45	53
2 Week L_{90} Average	51	51	50	51	50	44	37	44

Table 3 Overall Sound Level Measurements from first 2 week interval

	Acentech L_{eq} (dBA)- Second 2 Weeks					Cerami L_{eq}- Second 2 Weeks		
Unit	9-7					7-1		
System	1 Ch2	2 Ch1	2 Ch2	3	4	C1	C2	C3
3/18/13	46	48	48	48	53			
3/19/13	46	49	49	49	54			
3/20/13	46	49	50	50	55			
3/21/13	46	49	50	50	55			
3/22/13	46	48	49	49	53			
3/23/13	46	48	48	49	53			
3/24/13	46	48	48	48	52			
3/25/13	46	49	49	49	54			
3/26/13	46	50	50	51	55			
3/27/13	49	50	50	52	55			
3/28/13	49	50	50	51	55			
3/29/13	48	49	50	50	54			
3/30/13	46	49	49	49	53			
3/31/13	46	48	49	48	53			
4/1/13	46	51	52	n/a	n/a			
2 Week L_{eq} Average	47	49	49	49	54	51	57	51
2 Week L_{33} Average	48	50	50	50	55	n/a	54	48
2 Week L_{10} Average	51	54	54	53	59	52	59	52
2 Week L_{90} Average	50	50	50	54	52	43	49	44

Table 4 Overall Sound Level Measurements from second 2 week interval

Unit	10-9	3-5	9-7	7-1
Survey Results	Poor	Good	Good	Poor
Average L_{eq} (dBA)	50	47	50	53
Average L_{33} (dBA)	51	45	51	51
Average L_{10} (dBA)	55	49	54	54
Average L_{90} (dBA)	51	42	51	45

Table 5 Averaged Sound Level Measurements

Unit	10-9	9-7
Survey Results	Poor	Good
Average L_{eq} (dBA)	50	50
Average L_{eq} w.out nurses station (dBA)	50	49

Table 6 Averaged Sound Level Measurements without nurses' station

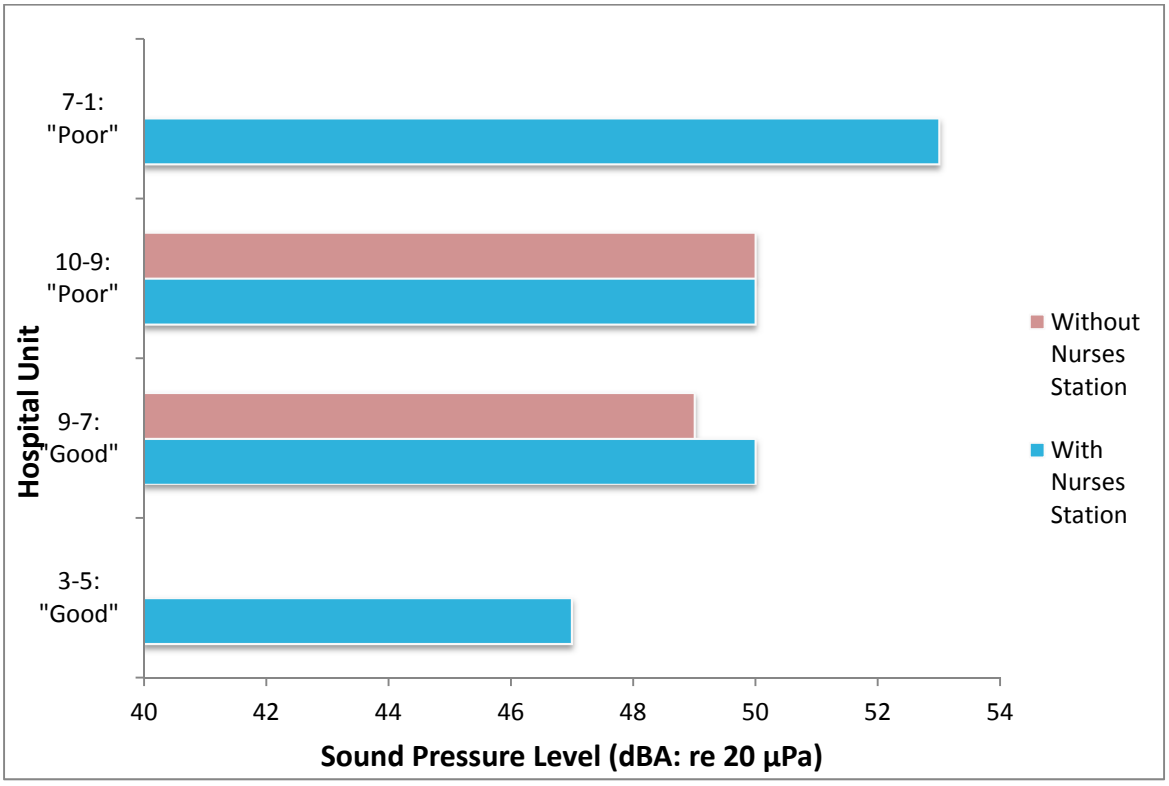

Figure 7 L_{eq} levels of "Good" and "Poor" Hospital Units

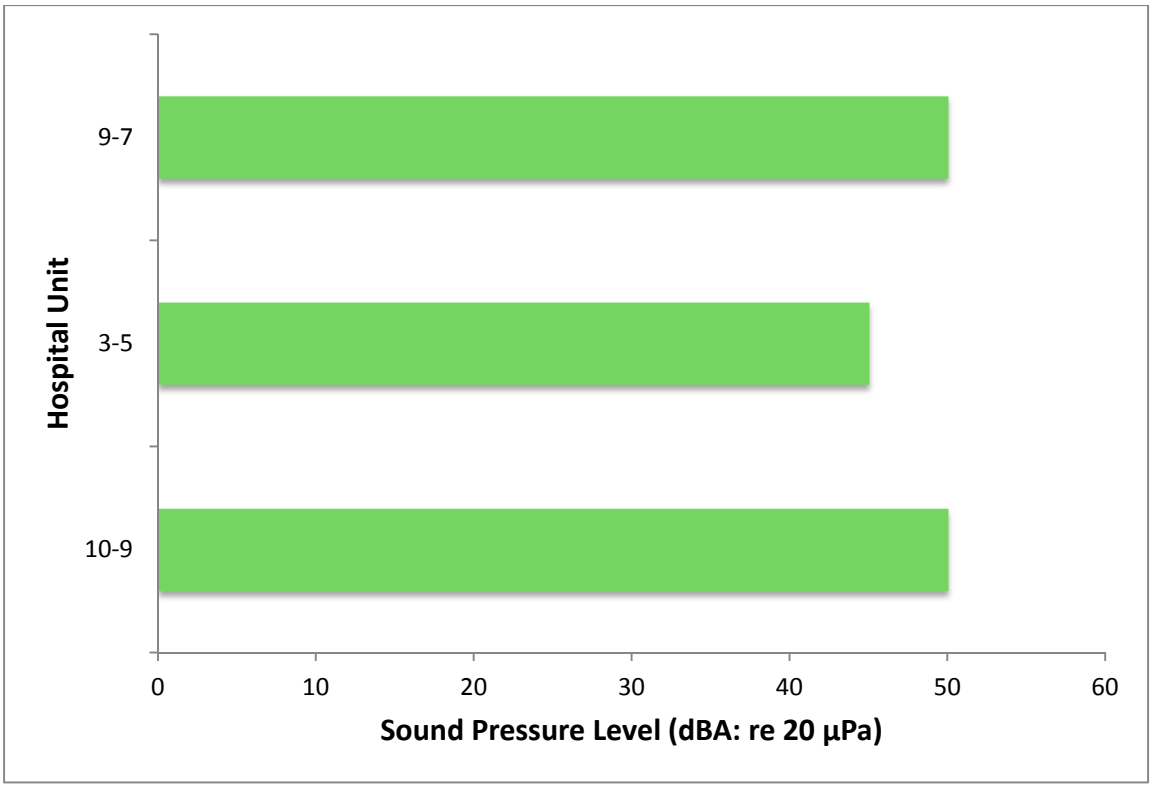

Figure 8 L_{eq} of Hospital Units (Only includes Acentech Inc. Data)

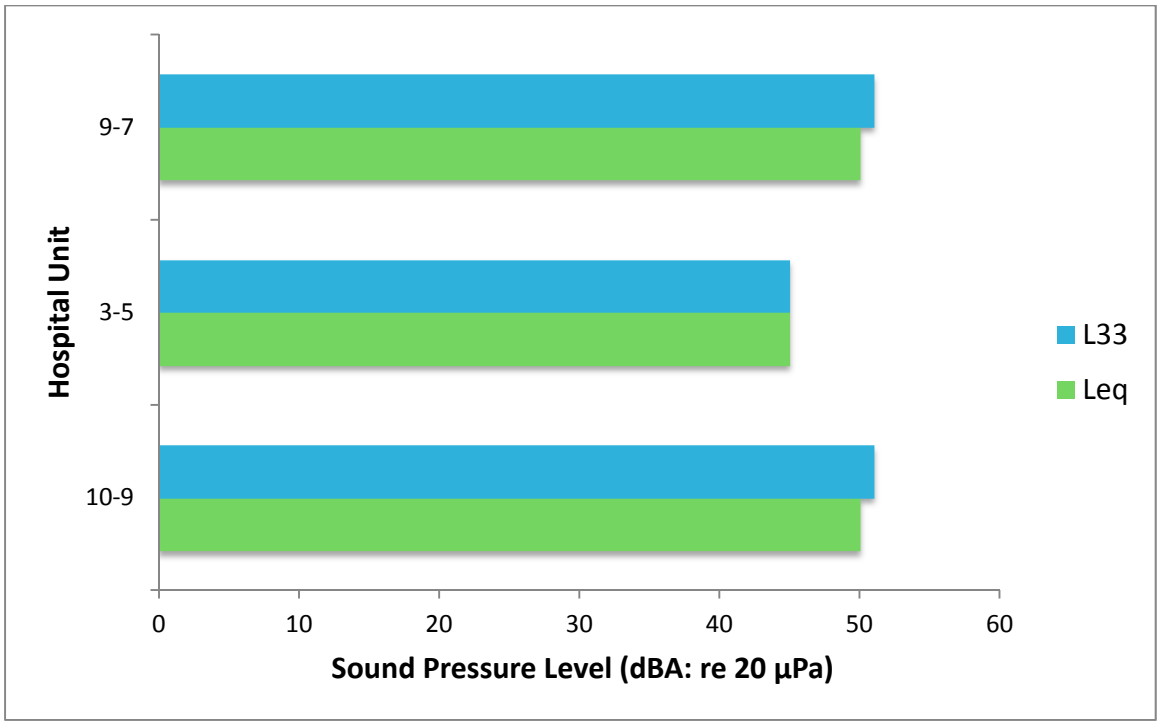

Figure 9 L_{eq} and L_{33} of Hospital Units (Only includes Acentech Inc. Data)

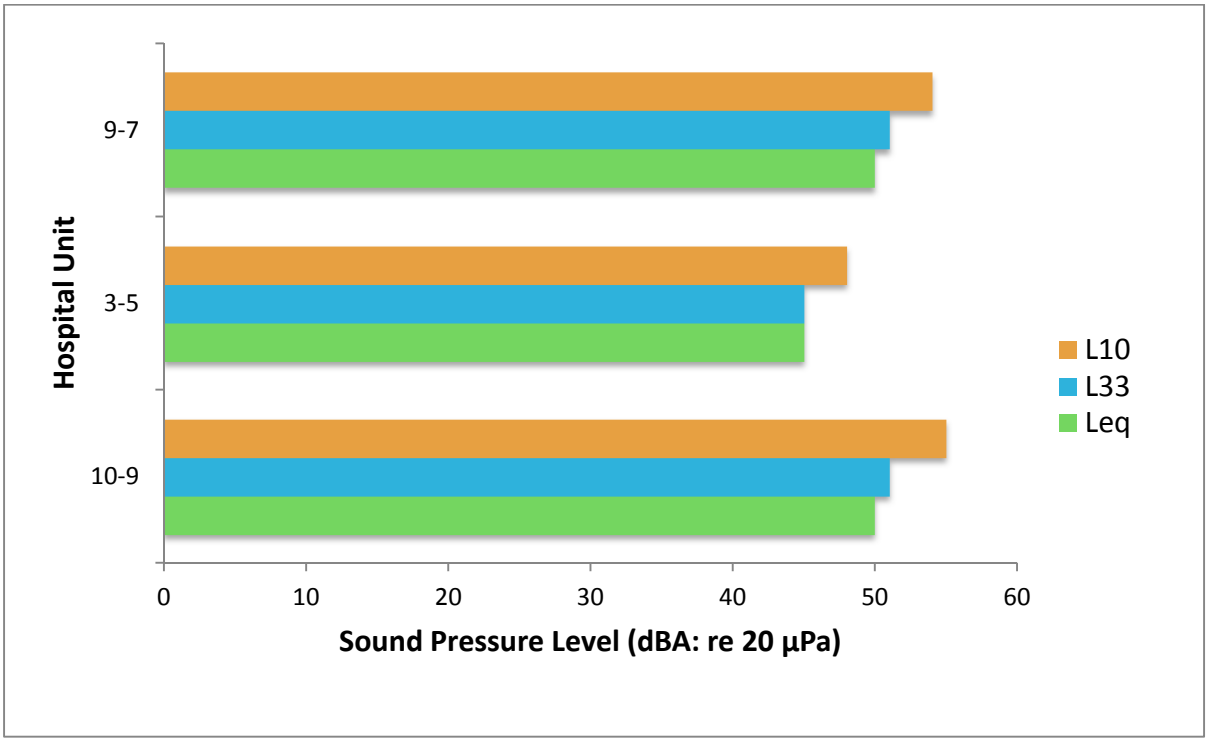

Figure 10 L_{eq}, L_{33}, and L_{10} of Hospital Units (Only includes Acentech Inc. Data)

5.0 Discussion and Conclusions

Generally, the results of this study correlated with the results from patient surveys. As can be seen in Figure 7, the overall average L_{eq} value for unit 7-1 was the highest among the four wards, and the value for 3-5 was the lowest. These values correlate with the results from the patient surveys, in which 7-1 received poor scores and 3-5 received good scores.

The overall average L_{eq} values for units 10-9 and 9-7 match, which on the surface does not correlate to the patient survey results, since 9-7 received better scores than 10-9; however, each of these averaged values include data taken from the measurement location by the main nurses' station in the units. When this data is excluded from the average and only the data from

the measurement positions by patient rooms is included, the average L_{eq} value for 9-7 goes down, but the value for 10-9 remains at 50 dBA (re: 20 µPa). This shows that by the patient rooms, 9-7 is generally quieter than 10-9, which agrees with the results from the surveys, which were filled out by patients who resided in those patient rooms.

Another outcome of this investigation was the identification of noise sources within the wards. These noise sources were identified during the observation periods when the handheld B&K meters were used to make measurements. A detailed list of these observations can be found in the Appendix. Due to the design constraint of a recorded audio prohibition placed on the project by the IRB, these observations and measurements were critical to determining the influence of certain noise sources to the overall sound levels. The observations include the time stamp on the measurement corresponding to any incident noises observed during the measurements. The data from the long term measurements at those particular times can be extracted, compared to the B&K data, and analyzed to find the 1/3 octave bands at which that particular noise source occurs.

This process was completed once using this data from this study, using an observation in which the public address (PA) system in unit 10-9 was the only significant incident noise detected during the measurement. The graph showing the spectral similarity between the data from Acentech's system and the University of Hartford's B&K meter for that one minute can be seen in Figure A1 in the Appendix. From this data, it was found that the predominant spectral range of the PA system in unit 10-9 lies between 500 and 2500 Hz, consistent with speech frequencies. Future studies could analyze the entire two week measurement period and use

this information to find out how much of an influence the PA system or other noise sources contribute to the overall sound levels in the unit. Based on the observations, it is hypothesized that the PA is one of the largest contributors to noise in unit 10-9.

Another goal of this investigation was to make a comparison between L_{eq} and statistical levels such as L_{10} and L_{33} values in a hospital, and this correlation is depicted in Figure 9 using Acentech Inc. data. L_{eq} is the parameter used to define the overall value for the sound pressure level over a given time period of interest [3]. This parameter places an emphasis on high-level, single event noises because these fluctuations increase the overall average. L_{33} corresponds to the sound level exceeded by just 33% of all the measurements made during that time period. These parameters show the distribution of how many high-level versus low-level sounds that occurred during the time span.

The overall L_{eq} and L_{33} for unit 3-5 was 50 dBA (re: 20 µPa). Also, the L_{eq} for units 10-9 and 9-7 was 50 dBA (re: 20 µPa), and the L_{33} for both units was 51 dBA (re: 20 µPa). These results show that the L_{eq} and L_{33} were within 1 dB of each other at SFHMC. By contrast, the L_{10} levels were consistently higher than the L_{eq} and L_{33} levels in all measured units. This supports previous research stating L_{33} results were consistently within 1 dB of L_{eq} results in a hospital setting located in Georgia [5]. It appears that in general, hospitals have similar low, medium, and high-level sound distribution as supported by the L_{33}, a specific statistical level. As a result, the correlation between L_{eq} and L_{33} shows the distribution of noise fluctuations in hospitals appears to be the same regardless of the location.

6.0 Recommendations for Future Work

Through the observations taken during measurement period site visits to the hospital, several noise sources in St. Francis were recorded. All of these observations can be seen in the Appendix, in Table A1-Table A18. A summary of the noise sources observed can be seen below in Table 7, classified as major and minor based on the number of occurrences during the visits.

These observations and the measurements from the B&K meters which correspond to the notations can be useful to analyze spectral data and target these particular noise sources in an effort to reduce their impact on the overall noise levels in the units. For example, during the visits, there were some measurements/observations in which the only prevalent noise source in the one minute measurement was an instance when the PA system was utilized. Figure A1 in the Appendix shows the data from both the B&K meter and the Acentech system for one of these particular one-minute intervals. This data shows a good correlation between the data from the two systems, and it also shows a spike in the frequency range of 400-3150 Hz, which can be interpreted as the operating frequencies of the PA system. When this instance of PA system noise is compared with the overall measurements from the two weeks, as in Figure A2 in the Appendix, it can be seen that there are higher levels in this same frequency range.

For potential future work, this process can be repeated for all of the various noise sources noted in the observations. This work is important, because by identifying the frequency ranges of these noise sources, it is possible to scientifically determine their impact on overall sound levels in the units. It is also possible to use this frequency information to develop designs to target the noise sources directly.

More future work would include developing such designs, implementing them, and re-testing to determine the effectiveness of the designs.

Major Noise Sources	Minor Noise Sources
Public Address (PA) systems	Squeaky shoes
Televisions in Patient Rooms	Ice machines
Custodial carts	HVAC Systems
Nurses/general talking	Monitors
Phones	Elevators
Restroom noises	Patient alarms

Table 7 Noise Sources in the Four Units Tested as Observed During Visits

References

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Appendix

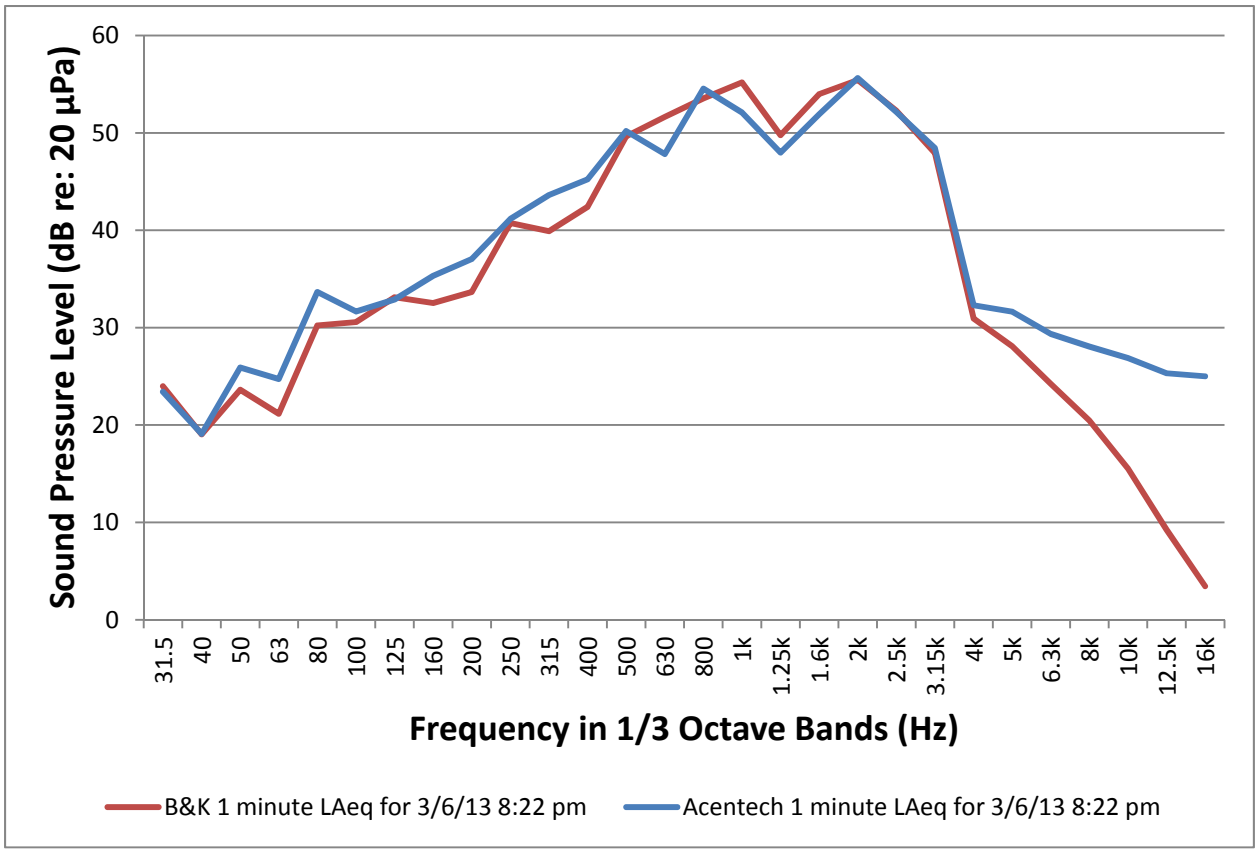

Figure A1 Comparison of LA_{eq} Data from Acentech System 1 Channel 2 and B&K Meter 3, Unit 10-9, March 6th 2013, 20:22

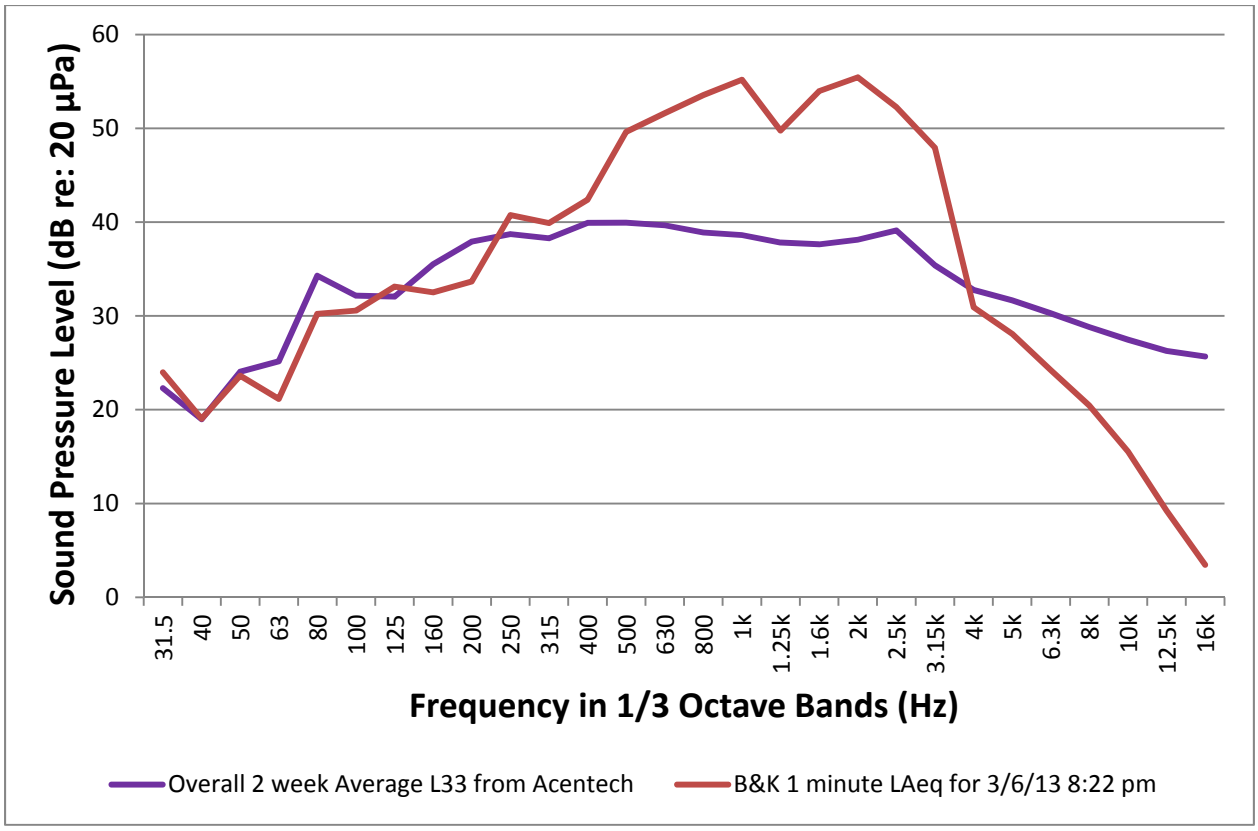

Figure A2 Comparison of LAeq Data from B&K Meter 3, Unit 10-9, March 6th 2013, 20:22 with Averate L33 Data from Acentech System 1 Channel 2

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	8:00pm

Project Number	Location	Date	Notes
1	10-9 1a	Wednesday March 6, 2013	8:09pm 0:00 - 0:45 patient alarm 0:40 PA
2	10-9 1a	Wednesday March 6, 2013	8:12pm Nurses and Patient Alarms Constantly 0:06-0:09- PA 0:30- Nurse 0:59- PA
3	10-9 1a	Wednesday March 6, 2013	8:15pm 0:43- PA 0:51- PA Nurses, Patients, Alarm Constantly
4	10-9 1b	Wednesday March 6, 2013	8:18pm 0:00-0:11- Cart 0:04- Custodian Talking Nurses Talking
5	10-9 1b	Wednesday March 6, 2013	8:21pm 0:13-0:19- PA 0:25 and 0:34- Laugh Nurses Talking
6	10-9 1b	Wednesday March 6, 2013	0:02- 0:06- PA
7	10-9 3	Wednesday March 6, 2013	0:00-0:15 Nurses Talking 0:02- Caugh 0:52- Squeaky Sneakers Nurses talking loudly throughout
8	10-9 3	Wednesday March 6, 2013	0:04-0:07- PA TV
9	10-9 3	Wednesday March 6, 2013	0:14- Nurses station talking at bench 0:33- cough
10	3-5 C3	Wednesday March 6, 2013	Ice machine is constant 0:45-0:55- small movement at nurses station
11	3-5 C3	Wednesday March 6, 2013	Ice machine is constant 0:23 beeper 0:27- 0:28- printer 0:50-1:00- printer
12	3-5 C3	Wednesday March 6, 2013	Ice Machine General Shuffling

Table A1 Parlock's notes on 3/6/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	8:00pm

Project Number	Location	Date	Notes
1	10-9 2a	Wednesday March 6, 2013	8:10pm 0:50- PA TV's Loud Door Slamming Elevator Beep Speaking from Patients and nurses
2	10-9 2a	Wednesday March 6, 2013	8:13pm 48 dBA to 62 dBA spike from overhead Beeping from heart monitor Talking All doors are open
3	10-9 2a	Wednesday March 6, 2013	8:15pm Clearly hear patient TV's Toliet flushing from restrooms located in the hallway Beeping from heart monitor
4	10-9 2b	Wednesday March 6, 2013	8:18pm People talking at front desk Patient TV's Beeping from heart monitor Cart passing in background Toilet flushing from restrooms located in hallway
5	10-9 2b	Wednesday March 6, 2013	8:20pm Level is louder than 2a because of chatter from front desk
6	10-9 2b	Wednesday March 6, 2013	8:23pm PA Nurse talking to patient in nearest room
7	3-5 C2	Wednesday March 6, 2013	Overall Quiet TV from patient room
8	3-5 C2	Wednesday March 6, 2013	TV from patient room
9	3-5 C2	Wednesday March 6, 2013	TV from patient room 0:20-0:40sec- Shuffling of papers at the desk area

Table A2 Stahura's notes on 3/6/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	3:00pm

Project Number	Location	Date	Notes
1	10-9 1a	Thursday March 7, 2013	0:21-0:57 - Patient Alarm
2	10-9 1a	Thursday March 7, 2013	General Noises: TV, patients talking softly in rooms
3	10-9 1a	Thursday March 7, 2013	0:02- 0:07 - PA 0:38-0:47- PA 0:58-0:60- PA
4	10-9 1b	Thursday March 7, 2013	Loud Patient in room Nurses by lounge
5	10-9 1b	Thursday March 7, 2013	0:54 carts by elevator Patients in rooms and doctors
6	10-9 1b	Thursday March 7, 2013	0:21 nurses by lounge 0:53 in room with walkie
7	10-9 3	Thursday March 7, 2013	TV on in the room 0:24 one beep 0:56 nurses talking around corner
8	10-9 3	Thursday March 7, 2013	0:40 loud cough?
9	10-9 3	Thursday March 7, 2013	0:00-0:01- PA 0:15-0:20- PA 0:54- talking down the hall
10	3-5 C3	Thursday March 7, 2013	Talking at nurses station Ice Machine
11	3-5 C3	Thursday March 7, 2013	No Ice Machine Nurses at station and down hall
12	3-5 C3	Thursday March 7, 2013	No Ice Machine Nurses at station and down hall 0:10 phone

Table A3 Parlock's notes on 3/7/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	3:00pm

Project Number	Location	Date	Notes
1	10-9 2a	Thursday March 7, 2013	0:20- cart rattling Door Shutting 0:50-1:00- Cleaning lady walking by
2	10-9 2a	Thursday March 7, 2013	Talking amongst patients and doctors People walking by
3	10-9 2a	Thursday March 7, 2013	0:20- PA 0:40-PA Talking amongst patients and doctors
4	10-9 2b	Thursday March 7, 2013	People at front desk talking Mumbling from patient near by
5	10-9 2b	Thursday March 7, 2013	0:00-0:05- elevator beep People at front desk talking
6	10-9 2b	Thursday March 7, 2013	Cart went by Talking at front desk Elevator beep
7	3-5 C2	Thursday March 7, 2013	3:25pm Talking in room 3305, door open Cart passing in backgroud
8	3-5 C2	Thursday March 7, 2013	3:28pm Talking in room 3305, with door CLOSED Cart in background 0:40- Wheelchair passed
9	3-5 C2	Thursday March 7, 2013	Heart Monitor Patient TV Talking from Nurses down the hallway

Table A4 Stahura's notes on 3/7/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	10:30am

Project Number	Location	Date	Notes
1	10-9 1a	Saturday March 9, 2013	10:32 0:00-0:53 loud patient talking in patient room talking down the hall consistently
2	10-9 1a	Saturday March 9, 2013	10:35 :24 chair scrape :33-:37 coughing custodian cart noises constantly
3	10-9 1a	Saturday March 9, 2013	10:37 :00-:15 patient alarm :38, :43, :49, :55 phone ringing
4	10-9 1b	Saturday March 9, 2013	10:39 patient talking in room softly
5	10-9 1b	Saturday March 9, 2013	10:41 patient talking in room softly
6	10-9 1b	Saturday March 9, 2013	10:43 :00 ~ :10 patient and guest walking by talking :44 PA
7	10-9 3	Saturday March 9, 2013	10:45 talking in 2 rooms and at nurses' bench
8	10-9 3	Saturday March 9, 2013	10:48 :20 door to one room shut talking at nurses' bench throughout :52 PA
9	10-9 3	Saturday March 9, 2013	10:52 nurses talking at bench
	3-5 C3	Saturday March 9, 2013	UNIT CLOSED
	3-5 C3	Saturday March 9, 2013	
	3-5 C3	Saturday March 9, 2013	

Table A5 Parlock's notes on 3/9/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	10:30am

Project Number	Location	Date	Notes
1	10-9 2a	Saturday March 9, 2013	10:34am 0:40-0:60- cart passing by Talking from nurses and patients throughout measurement
2	10-9 2a	Saturday March 9, 2013	10:36am 0:40-0:60- People approaching the microphone, talking General talking from desk, patients and nurses
3	10-9 2a	Saturday March 9, 2013	10:38am 0:15-0:50- Phone in hallway was ringing. No one answered the phone Cleaning lady passing by
4	10-9 2b	Saturday March 9, 2013	10:42am 0:15- elevator beeping 0:30- nurse passing by 0:45-0:55- nurse caughing
5	10-9 2b	Saturday March 9, 2013	10:44am 0:20- elevator beeping Nurses and patients talking
6	10-9 2b	Saturday March 9, 2013	0:00-0:30- nurse and patient walking past microphone, a vistor leaving the nearest room and talking, visitor sanitizing hands Constant chatter from front desk
	3-5 C2	Saturday March 9, 2013	*Closed for the weekend*. No measurements taken
	3-5 C2	Saturday March 9, 2013	*Closed for the weekend*. No measurements taken
	3-5 C2	Saturday March 9, 2013	*Closed for the weekend*. No measurements taken

Table A6 Stahura's notes on 3/9/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	10:30am

Project Number	Location	Date	Notes	
1	10-9 1a	Monday March 11, 2013	10:38 loud priest in room :55- :60 custodian cart	
2	10-9 1a	Monday March 11, 2013	10:39 :00-:10 2 custodians in 2 rooms loud priest, 1 custodian consistently talking and making noise	
3	10-9 1a	Monday March 11, 2013	10:41 :58-:60 loud priest leaves room, and tells me "have a good day"	
4	10-9 1b	Monday March 11, 2013	10:43 beeps down the hall from the medicine station quiet talking in office	
5	10-9 1b	Monday March 11, 2013	10:45 :25-:29 loud cart by service elevator	
6	10-9 1b	Monday March 11, 2013	10:47 :00-:10 loud talking in patient room	
7	10-9 3	Monday March 11, 2013	10:52 :08, :26 cart noises :35- :60 loud talking tv in rooms on softly, consistently	
8	10-9 3	Monday March 11, 2013	10:53 tvs in rooms (softly) soft talking in rooms	
9	10-9 3	Monday March 11, 2013	10:54 tvs in rooms (softly) soft talking in rooms	
10	3-5 C3	Monday March 11, 2013	11:00 :45-:50 squeaky shoes- nurse	NO Patients in rooms that day
11	3-5 C3	Monday March 11, 2013	11:02 :01 phone :16 PA :21 cart	
12	3-5 C3	Monday March 11, 2013	11:04 :25-:50 delivery man ppl walking past	

Table A7 Parlock's notes on 3/11/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	10:30am

Project Number	Location	Date	Notes
1	10-9 2a	Monday March 11, 2013	0:28-0:31 PA Talking near nurses station patient caughing
2	10-9 2a	Monday March 11, 2013	0:15-0:60 custodian caughing Custodian was approaching mic location,taking out garbage 0:55 asked what I was doing by a nurse
3	10-9 2a	Monday March 11, 2013	overall quiet can slightly hear talking from front desk
4	10-9 2b	Monday March 11, 2013	Overall louder than 2A talking from front desk
5	10-9 2b	Monday March 11, 2013	0:10 beeping from elevator flushing of toilet at 0:45
6	10-9 2b	Monday March 11, 2013	0:20-0:25 patient talking 0:30-0:40 nurse laughing and talking in nearby room
7	3-5 C2	Monday March 11, 2013	NO DATA- ONLY 6 sec worth
8	3-5 C2	Monday March 11, 2013	11:02 am cart in background 0:50 overall quiet
9	3-5 C2	Monday March 11, 2013	phone rang at 0:20 and 0:30 patient talking on phone 0:20-0:40 person walking by 0:45-0:60
10	3-5 C2	Monday March 11, 2013	Peopler walking by at 0:25, 0:45, 0:50

Table A8 Stahura's notes on 3/11/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	10:00pm

Project Number	Location	Date	Notes
1	10-9 1a	Wednesday March 13, 2013	10:04 pm 1 room with door closed 1 double room and 1 single room silent (sleeping?) nurses talking at nurses' station
2	10-9 1a	Wednesday March 13, 2013	10:07 pm :08-14 PA loud nurse in room nurses talking at nurses' station
3	10-9 1a	Wednesday March 13, 2013	10:09 pm :14-:19 PA coughing nurses talking at nurses' station
4	10-9 1b	Wednesday March 13, 2013	10:11 pm nurse walked by, talking tv on in room
5	10-9 1b	Wednesday March 13, 2013	10:13 :43 nurse walked by, talking two nurses in room talking tv on in room
6	10-9 1b	Wednesday March 13, 2013	10:16 :32-:37 PA :42 elevator ding 3 nurses in room tv on in room
7	10-9 3	Wednesday March 13, 2013	10:22 tv on in empty room bed being prepared to move :55 PA
8	10-9 3	Wednesday March 13, 2013	10:24 tv on in empty room talking in a different room
9	10-9 3	Wednesday March 13, 2013	10:27 tv on in empty room talking in a different room
10	3-5 C3	Wednesday March 13, 2013	10:46 hiccups soft talking at nurses' station
11	3-5 C3	Wednesday March 13, 2013	10:48 hiccups beeping at nurses' station soft talking at nurses' station
12	3-5 C3	Wednesday March 13, 2013	10:51 hiccups ~:36 doctor walked by, talking louder talking at nurses' station

Table A9 Parlock's notes on 3/13/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	10:00pm

Project Number	Location	Date	Notes
1	10-9 2a	Wednesday March 13, 2013	10:07pm 0:00-0:08 nurse came by talking -Patient TV, talking nurses and patients in nearby room throughout the entire time
2	10-9 2a	Wednesday March 13, 2013	10:09pm -Patient room TV -Talking by nurses in hallway
3	10-9 2a	Wednesday March 13, 2013	10:11pm -Patient room TV -General talking from front desk
4	10-9 2b	Wednesday March 13, 2013	General talking from front desk
5	10-9 2b	Wednesday March 13, 2013	0:10-0:14- PA system -General talking from front desk area -Nearby heart monitor
6	10-9 2b	Wednesday March 13, 2013	0:50-0:60- copier -General talking -neart monitor
7	3-5 C2	Wednesday March 13, 2013	Heart monitor -Talking from front desk -Cleaning lady opening garbage bags
8	3-5 C2	Wednesday March 13, 2013	0:50- Rachel's hiccup -heart monitor -talking from the front desk
9	3-5 C2	Wednesday March 13, 2013	0:00-0:20- patient coughing -heart monitor -chatter from front desk

Table A10 Stahura's notes on 3/13/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	1:45pm

Project Number	Location	Date	Notes
1	9-7 S1C1	Tuesday March 19, 2013	Bad cable in Acentech system.
2	9-7 S1C1	Tuesday March 19, 2013	
3	9-7 S1C1	Tuesday March 19, 2013	
4	9-7 S1C2	Tuesday March 19, 2013	13:54 HVAC :01-:06 custodian cart noises
5	9-7 S1C2	Tuesday March 19, 2013	13:56 HVAC broom and dustpan noises intermittently (0:05, 0:14?)
6	9-7 S1C2	Tuesday March 19, 2013	13:58 HVAC
7	9-7 S2C1	Tuesday March 19, 2013	14:00 HVAC, broom noises, custodian in physical therapy gym
8	9-7 S2C1	Tuesday March 19, 2013	14:03 talking and door opening (:00-:15)
9	9-7 S2C1	Tuesday March 19, 2013	14:06 door, more talking at Nurses' Station around corner
10	7-1 C3	Tuesday March 19, 2013	14:27 lots of talking, walking by
11	7-1 C3	Tuesday March 19, 2013	14:29 lots of talking, walking by squeaky door to stairs
12	7-1 C3	Tuesday March 19, 2013	14:31 lots of talking :01, :57-1:00 PA
13	7-1 C2	Tuesday March 19, 2013	14:36 loud talking at Nurses' Station
14	7-1 C2	Tuesday March 19, 2013	14:37 loud talking at Nurses' Station :47 food cart :58 custodian cart
15	7-1 C2	Tuesday March 19, 2013	14:39 :00-:02, :29-:35 PA :08-:11 Nurses' Station walkie
16	7-1 C1	Tuesday March 19, 2013	14:43 TV on in room down hall :39-:57 medicine station noises
17	7-1 C1	Tuesday March 19, 2013	14:44 doctor talking with nurse, 2 nurses talking :19-:21, :30 PA :50-1:00 nurse & doctor talking

Table A11 Parlock's notes on 3/19/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	1:45pm

Project Number	Location	Date	Notes
1	9-7 3	Tuesday March 19, 2013	0:10- person walking around general talking from front desk -NOTE: 9-7 is more quiet than usual for the first week because doctors are at a conference
2	9-7 3	Tuesday March 19, 2013	0:45- door shut general talking from front desk
3	9-7 3	Tuesday March 19, 2013	general talking from front desk
4	9-7 4	Tuesday March 19, 2013	*This location has the noise traffic light system* -general talking from front desk area -nurses talking to patients in a nearby room
5	9-7 4	Tuesday March 19, 2013	general talking from front desk area -patient completing PT in hallway
6	9-7 4	Tuesday March 19, 2013	general talking from front desk area -patient completing PT in hallway -custodian sweeping
7	9-7 S2C2	Tuesday March 19, 2013	elevator beep 0:50 door shutting wheels from an empty body cart being moved -custodian walking by
8	9-7 S2C2	Tuesday March 19, 2013	hammering sound? -custodian with garbage bags -people walking by -general talking from nurses and patients
9	9-7 S2C2	Tuesday March 19, 2013	custodian cleaning nearby -general talking
10	7-1 C1	Tuesday March 19, 2013	0:30-0:45- nurses talking -TV sets -general talking from patients and nurses
11	7-1 C1	Tuesday March 19, 2013	PA system: 0:10, 0:30, 0:50 -general talking -TV's from patient rooms

Table A12 Stahura's notes on 3/19/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	1:00pm

Project Number	Location	Date	Notes
1	9-7 S1C2	Thursday March 21, 2013	super quiet, all I could hear was the HVC 0:50- someone walked by
2	9-7 S1C2	Thursday March 21, 2013	0:20-0:50- someone walked by 0:50-0:60- talking from back desk area
3	9-7 S1C2	Thursday March 21, 2013	HVAC system -talking from front desk
4	9-7 S2C1	Thursday March 21, 2013	general talking from front desk 0:40-0:60- nurse knocked on the door of a patient room and talked
5	9-7 S2C1	Thursday March 21, 2013	general talking from the front desk 0:55- nurse talking in hallway -nurses talking in hallway
6	9-7 S2C1	Thursday March 21, 2013	general talking from front desk -patient in nearby room talking 0:50 custodian walked by
7	9-7 S2C2	Thursday March 21, 2013	0:10-0:50- high frequency heart monitor? Steady tone. -general talking
8	9-7 S2C2	Thursday March 21, 2013	0:50-0:60- heart monitor beeping from nearby room -general talking
9	9-7 S2C2	Thursday March 21, 2013	0:20-0:50- cart was approaching (extremely close to me) and was steered into the nearest room
10	9-7 3	Thursday March 21, 2013	0:10-0:35- ice machine -overall quiet
11	9-7 3	Thursday March 21, 2013	general talking from front desk -hum of ice machine
12	9-7 3	Thursday March 21, 2013	ice machine hum 0:30-0:50- nurses talking at front desk 0:50-0:60- nurses talking close by
13	9-7 4	Thursday March 21, 2013	talking from front desk area
14	9-7 4	Thursday March 21, 2013	talking from front desk area
15	9-7 4	Thursday March 21, 2013	talking from front desk area 0:00-0:20- nurse singing
16	7-1 C1	Thursday March 21, 2013	0:15- PA -general talking from nurses
17	7-1 C1	Thursday March 21, 2013	0:01, 0:47- PA 0:20-0:45 talking from nurses
18	7-1 C1	Thursday March 21, 2013	0:10-0:45- nurses talking / walking by
19	7-1 C2	Thursday March 21, 2013	0:50-0:60- cart passing by
20	7-1 C2	Thursday March 21, 2013	0:00-0:10 Cart passed by 0:55-0:60- Person talking into the PA system + the PA system, VERY LOUD -general talking
21	7-1 C2	Thursday March 21, 2013	0:19- PA -heart monitor 0:50- person walking by
22	7-1 C3	Thursday March 21, 2013	TV sets, heart monitor -general talking from patient rooms 0:30-0:40- cart
23	7-1 C3	Thursday March 21, 2013	TV sets talking from nearby patient rooms visitor on the phone in hallway
24	7-1 C3	Thursday March 21, 2013	TV people walking by patients and nurses talking

Table A13 Stahura's notes on 3/21/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	3:00pm

Project Number	Location	Date	Notes
1	9-7 S1C2	Saturday March 30, 2013	15:02 minimal talking
2	9-7 S1C2	Saturday March 30, 2013	15:04 trash bag replacement in bathroom :33-:55 garbage can on wheels in hall
3	9-7 S1C2	Saturday March 30, 2013	15:05 talking at ends of the hallway
4	9-7 S2C1	Saturday March 30, 2013	15:07 patient in gym on PT stairs talking to doctor cart on other side of the unit :47
5	9-7 S2C1	Saturday March 30, 2013	15:08 patient and doc in gym, stairs, walker :55 door closing, toilet flushing
6	9-7 S2C1	Saturday March 30, 2013	15:10 patient and doctor coming out of gym, talking :53 door opening
7	9-7 S2C2	Saturday March 30, 2013	15:12 talking in nearby patient room
8	9-7 S2C2	Saturday March 30, 2013	15:13 talking in nearby patient room, light talking at nurses station
9	9-7 S2C2	Saturday March 30, 2013	15:14 :44-:50 laughing at nurses station (west) talking at west nurses station
10	9-7 3	Saturday March 30, 2013	15:19 tv in patient room down hallway
11	9-7 3	Saturday March 30, 2013	15:21 tv in patient room down hallway :14 distant flushing sound :51-1:00 rustling and ice sound
12	9-7 3	Saturday March 30, 2013	15:22 :00-:22 ice and running water in Nourishment room
13	9-7 4	Saturday March 30, 2013	15:25 talking at nurses station, tv in patient room
14	9-7 4	Saturday March 30, 2013	15:27 talking at nurses station, tvs, talking in patient room
15	9-7 4	Saturday March 30, 2013	15:29 talking at nurses station, tvs in patient rooms, elevator :16 & :18 phone ring
16	7-1 C1	Saturday March 30, 2013	15:34 tv on quietly in patient room :00-:25 nurse and family member talking :40-1:00 family member and patient talking
17	7-1 C1	Saturday March 30, 2013	15:35 very quiet talking nearby, TV in patient room :59 coughing
18	7-1 C1	Saturday March 30, 2013	15:37 very quiet talking nearby, tv in patient room
19	7-1 C2	Saturday March 30, 2013	15:39 talking at nurses station, tv in patient room
20	7-1 C2	Saturday March 30, 2013	15:42 :24-:28 PA :41 ice machine talking at nurses station, door shutting
21	7-1 C2	Saturday March 30, 2013	15:46 :04-:09 printer talking at nurses station, doors closing
22	7-1 C3	Saturday March 30, 2013	15:51 soft talking in a different room, loud tv in room
23	7-1 C3	Saturday March 30, 2013	15:53 loud tv in room, someone talking by nurses station
24	7-1 C3	Saturday March 30, 2013	15:56 soft talking in a different room, loud tv in room :54-:56 PA

Table A14 Parlock's notes on 3/30/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	8:00pm

Project Number	Location	Date	Notes
1	9-7 S1C2	Sunday March 31, 2013	20:33 HVAC very quiet distant talking quiet buzzing from blood pressure machine charging
2	9-7 S1C2	Sunday March 31, 2013	20:35 HVAC very quiet distant talking :14 single beep quiet buzzing from blood pressure machine charging
3	9-7 S1C2	Sunday March 31, 2013	20:36 quiet buzzing from blood pressure machine charging
4	9-7 S2C1	Sunday March 31, 2013	20:38 tv on at end of hall talking at nurses station around corner
5	9-7 S2C1	Sunday March 31, 2013	20:39 tv on at end of hall talking at nurses station around corner
6	9-7 S2C1	Sunday March 31, 2013	20:41 tv on at end of hall talking at nurses station around corner
7	9-7 S2C2	Sunday March 31, 2013	20:43 tv on at end of hall talking at nurses station around corner :45-:53 walk by
8	9-7 S2C2	Sunday March 31, 2013	20:43 :11 phone twinkle ringtone tv on at end of hall :50-:53 patient talking talking at nurses station around corner
9	9-7 S2C2	Sunday March 31, 2013	20:45 :07, :56 phone twinkle ringtone tv on at end of hallway nurses talking around corner
10	7-1 C3	Sunday March 31, 2013	20:50 2 tvs on in 2 different rooms :20-:35 talking very close to microphone (inquisitive family member)
11	7-1 C3	Sunday March 31, 2013	20:52 2 tvs on :03-:08 patient hacking/coughing in patient room :49-:52 PA
12	7-1 C3	Sunday March 31, 2013	20:54 2 tvs on

Table A15 Parlock's notes on 3/31/13

Tiffany Stahura
2
8:30pm

Location	Date	Notes
9-7 3	Sunday March 31, 2013	HVAC
9-7 3	Sunday March 31, 2013	HVAC
9-7 3	Sunday March 31, 2013	HVAC -nurses talking from front desk
9-7 4	Sunday March 31, 2013	general talking from front desk -nurse and patient talking in nearby room -patient TV's
9-7 4	Sunday March 31, 2013	0:40-0:60 - talking from 2 nurses at front desk -nurse and patient talking in nearby room -patient TV's
9-7 4	Sunday March 31, 2013	0:00-0:60- talking from nurses -nurse + patient in nearby room
7-1 C1	Sunday March 31, 2013	general walking around -patient TV's 0:35-0:45- patient talking on phone in nearby room
7-1 C1	Sunday March 31, 2013	0:28-0:30- PA (much quieter at night!) general walking around -patient TV's
7-1 C1	Sunday March 31, 2013	0:00-0:20- heart monitor buzzing -patient TV, patient snoring -people walking around
7-1 C2	Sunday March 31, 2013	general talking from front desk 0:18- door slamming 0:45- door slamming 0:40-0:42- PA
7-1 C2	Sunday March 31, 2013	0:06-0:20 - phone ringing 0:20-0:28- answering phone 0:45-0:55- people talking
7-1 C2	Sunday March 31, 2013	0:00-0:35- 2 nurses talking people answering the phone patient TV

Table A16 Stahura's notes on 3/31/13

Engineer Name:	Rachel Parlock
Meter Number:	3
Arrival Time:	11:00am

Project Number	Location	Date	Notes
1	9-7 S1C2	Monday April 1, 2013	11:14 talking at nurses station down hall papers shuffling :49, :59 beep
2	9-7 S1C2	Monday April 1, 2013	11:15 :27-:29 bed movement at end of hall talking at end of hall
3	9-7 S1C2	Monday April 1, 2013	11:17 talking at end of hall :05 beep :26-:39, :42-:47 ice machine (distant) :34-:60 printer (distant
4	9-7 S2C1	Monday April 1, 2013	11:19 talking in patient room talking at nurses station :26 door being opened :31, :52 door being closed
5	9-7 S2C1	Monday April 1, 2013	11:21 talking from one end of the hallway to the other talking in patient room and at nurses station :47-48 door closing :56-57 flushing
6	9-7 S2C1	Monday April 1, 2013	11:22 talking in patient room and at nurses station :18-:25 alarm :25-:32, :50-:60 bed moving at end of hall
7	9-7 S2C2	Monday April 1, 2013	11:24 :00-:06 custodian cart :52 nurse walk by talking at nurses station
8	9-7 S2C2	Monday April 1, 2013	11:25 tv on down hall :17-:20 laughing around corner :39 door opening :43-:45 clanging :50 door slam :59 something fell
9	9-7 S2C2	Monday April 1, 2013	11:26 :29-:36 nurse walk by :38-:46 PA talking in patient room
10	7-1 C3	Monday April 1, 2013	11:31 shower on talking in patient room :24(ish) nurse spoke directly into microphone
11	7-1 C3	Monday April 1, 2013	11:33 shower on patient alarm on throughout :38 loud talking at nurses station talking in patient room
12	7-1 C3	Monday April 1, 2013	11:35 patient alarm on throughout :10, :30-:35 PA :00-:16 bed moved talking at nurses station

Table A17 Parlock's notes on 4/1/13

Engineer Name:	Tiffany Stahura
Meter Number:	2
Arrival Time:	11:00am

Project Number	Location	Date	Notes
1	9-7 3	Monday April 1, 2013	0:00-0:60- 2 janitors speaking in spanish HVAC air circulation
2	9-7 3	Monday April 1, 2013	0:00-0:60- 2 janitors speaking in spanish HVAC air circulation
3	9-7 3	Monday April 1, 2013	0:00-0:60- 2 janitors speaking in spanish HVAC air circulation person working at nearby dsk, rustling papers
4	9-7 4	Monday April 1, 2013	HVAC air 0:09- phone rings 0:40-0:60 talks on the phone
5	9-7 4	Monday April 1, 2013	janitors talking HVAC air 0:00-0:10- nurses continue talking on the phone 0:10-0:60- nurses at desk talking
6	9-7 4	Monday April 1, 2013	0:50-0:60- body with cart passing by no nurses talking HVAC
7	7-1 C1	Monday April 1, 2013	0:00-0:60 beeping of heart monitor 0:00-0:60 nurses talking in middle of hallway
8	7-1 C1	Monday April 1, 2013	0:00-0:60 beeping of heart monitor 0:40-0:60- nurses talking to patient
9	7-1 C1	Monday April 1, 2013	0:00-0:60 beeping of heart monitor 0:50 PA Nurses talking to patients in hallway
10	7-1 C2	Monday April 1, 2013	0:00-0:60 nurses talking at desk 0:50 phone beeped at desk
11	7-1 C2	Monday April 1, 2013	0:00-0:60 nurses talking at desk 0:22 / 0:23- PA 0:48-0:50 beep monitor
12	7-1 C2	Monday April 1, 2013	0:00-0:60 nurses talking at desk 0:20-0:28- empty cart approaching People walking by

Table A18 Stahura's notes on 4/1/13