Environmental Noise Assessment Report

Site Number: CVL01762
19406 Burning Bush Rd., Nevada City, CA 95959

January 22, 2018

VICINITY MAP

Prepared for:

AT&T Mobility, LLC

5001 Executive Parkway 4W550C

San Ramon, CA 94583

Prepared by:

Shore 2 Shore Wireless Inc.

1.0 Executive Summary

AT&T proposes to locate an emergency back-up generator at an unstaffed wireless telecommunications facility at site number CVL01762. This site is located at 19406 Burning Bush Rd., Nevada City, CA 95959. This study evaluates potential noise impacts from the proposed emergency generator in vicinity to the project location. Acoustic modeling was performed to predict sound level impacts from the proposed equipment installation at the property line based on the Inverse Square Law of propagation. Based on the results of this study, S2S concludes that the emergency generator proposed for installation at CVL01762 will produce 40.90 dBA at the nearest property line when running at full capacity during power loss and during scheduled startup testing which is limited weekday mornings between 8am and 10am and lasts for 10 minutes at a time. The HVAC unit would generate 33.60 dBA to the same point. This report does not accommodate additional noise values that would be proposed by future co-location facilities. As each co-locator has widely varying equipment and configurations, future carriers will need to review and mitigate additional additive noise levels when proposed. Further mitigation of sound levels can be proposed at that time to modify and or reduce noise generated at the property line.

2.0 Background

All sounds originate from a source. The sound energy, produced by a source, creates variations in air pressure which travel in all directions much like a wave ripples across the water. The “loudness” or intensity of a sound is a function of the sound pressure level, defined as the ratio of two pressures: the measured sound pressure from the source divided by a reference pressure (i.e. threshold of human hearing). Should level measurements are most commonly expressed using the decibel (dB) scale. The decibel scale is logarithmic to accommodate the wide range of sound intensities the human ear is capable of responding to. On this scale, the threshold of human hearing is equal to 0 dB, while levels above 140 dB can cause immediate hearing damage. For reference, a quiet rural area has an average noise level of 30 dB, with bird calls registering around 44 dB, and the average ambient noise of a suburban neighborhood at around 50 dB.

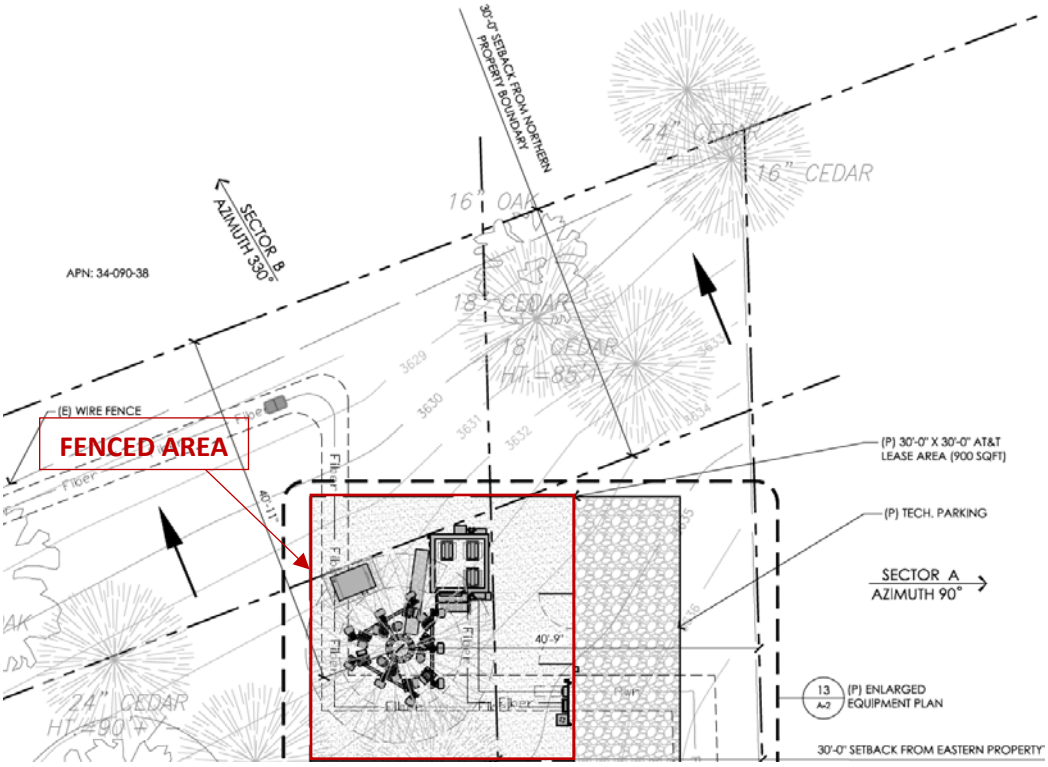
One property of the decibel scale is that the combined sound pressure level of separate sound sources is not simply the sum of the contributing sources. For example, if the sound of one source of 70 dB is added to another source of 70 dB, the total is only 73 dB, not a doubling to 140 dB. In terms of human perception of sound, a 3 dB difference is the minimum perceptible change for broadband sounds (i.e. sounds that include all frequencies). A difference of 10 dB represents a perceived halving or doubling of loudness.

3.0 Modeled Post Construction Noise Levels

The nearest property line to the proposed noise source is measured at 30’ due North of the project location as referenced in Exhibit 1. The nearest neighboring residence to this location is 450’ South East. The areas between the proposed location include the proposed equipment shelter, existing trees, and dense undergrowth. These obstructions are dB absorbent, which is to say, they offer additional reduction to noise levels year-round / day and night. The generator proposed is listed on the following page in Exhibit 2 and maintains an average (Leq) of 65 dB under full load during daytime testing. The HVAC unit attached to the equipment cabinet which operates occasionally during night and day at an average (Leq) of 56 dB. As neither sound emitter operates at the same frequency, the results of each average (Leq) are not additive, and result in a maximum equipment noise level (Lmax) of 65 dBA during daytime hours, and 56 dBA at night. This noise level is immediately reduced 19% by the proposed

redwood fence, and further reduced due to normal sound propagation loss. The resultant Modeling Results are attached in Exhibit 3.

Exhibit 1



4.0 RESULTS AND CONCLUSIONS

The Generator and HVAC unit proposed (See Exhibit 2) have a combined average daytime (L_{eq}) of 65 dB noise level under full load. With a resultant (L_{max}) (See Exhibit 3) of 40.90 dB at the nearest property line. The Nevada County maximum daytime noise level standard is 75 dB (L_{max}) predictive modeling indicates that the proposed emergency back-up generator and HVAC unit will produce an (L_{max}) of 40.90 dBA at the nearest property line which is 34.10 dB below the daytime noise threshold.

During nighttime hours the Generator will be restricted from testing and maintenance. Thus the HVAC unit will be the only active source with an average nighttime (L_{eq}) of 56 dB noise level under full load/ Note that this unit will run intermittently, not continually, to cool the cabinet, with peak usage during day time hours during the hot summer months. The unit has a resultant (L_{max}) (See Exhibit 3) of 33.60 dB at the nearest property line. The Nevada County maximum nighttime noise level standard is 40 dB (L_{max}) predictive modeling indicates that the proposed emergency back-up generator and HVAC unit will produce an (L_{max}) of 33.60 dBA at the nearest property line which is 6.40 dB below the nighttime noise threshold.

Significant reduction in noise beyond the modeled (L_{max}) levels can be expected due to the reflective equipment structure and surrounding absorbent materials. Lmax modeling methodologies are based on the manufacturer-provided equipment specifications and distance to the property alone using a

mathematical calculation of dB loss over distance using Inverse Square Law (Learn more about this formula at https://www.engineeringtoolbox.com/inverse-square-law-d_890.html), and do not include external absorbent materials. However this will account for a measured drop well below the theoretical average noise level (L_{max}) of the background environment at the neighboring residence. Manufacturer specifications include a decibel rating, which reflects the maximum decibel output the equipment will produce when running at full capacity (l_{eq}).

5.0 LIMITATIONS

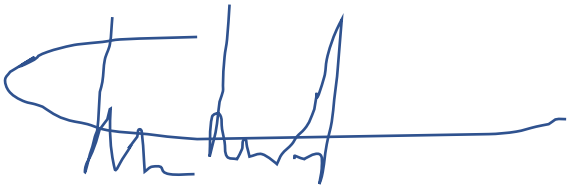
This report was prepared for the use of AT&T Mobility. The conclusions provided by Shore 2 Shore are based solely on the information provided by the client. The observations in this report are valid on the date and time of the investigation. Reported noise levels contained herein are a factor of meteorological and environmental conditions present at the time of the site survey, and represent "typical" site noise levels. Measurement and calculations contained in this report should be considered accurate to within one decibel. Any additional information that becomes available concerning the site should be provided to Shore 2 Shore so that our conclusions may be revised and modified, if necessary. This report has been prepared in accordance with Standard Conditions for Engagement and authorized proposal, both of which are integral parts of this report and has been designed to address the noise contributions of the proposed emergency back-up generator at the nearest property line.

6.0 REVIEWER CERTIFICATION

I, Chris Hatch, state that:

I am a representative of Shore 2 Shore Wireless Inc. which provides acoustic survey and engineering management services to the wireless communications industry. I have reviewed the data collected during the site survey which is incorporated into this Site Compliance Report such that the information contained in this report is true and accurate to the best of my knowledge.

Sincerely,
By Shore 2 Shore Wireless



Chris Hatch
Engineering Manager

Exhibit 3

Property Line Modeling Results

SOURCE REFERENCE

Source	ID	Reference Noise Level			Averaged Maximum Level			Attenuation	Freq.	Direct	Height		Coordinates		
		Day	Evening	Night	Day	Evening	Night						X	Y	Z
		(Leq) dBA	(Leq) dBA	(Leq) dBA	(Lmax) dBA	(Lmax) dBA	(Lmax) dBA		(Hz)		(Ft.)		(Ft.)	(Ft.)	(Ft.)
Generac DG035 35kW Generator	S1	65.0	65.0	0.0	65.0	65.0	0.0	20	500	1	3.00	g	-21.00	0.00	0.00
Marvair AVPA12AC	S1	56.0	56.0	56.0	56.0	56.0	56.0	20	900	1	3.00	g	-21.00	0.00	0.00

NOISE EXPOSURE AT SOUND WALL

Source	ID	Source Level (Leq)		Absorbtion % STC	Modeled Level (Lmax)			Freq. (Hz)	Direct	Height (Ft.)		Coordinates		
		Day	Night	Wood Fence	Day	Night						X (Ft.)	Y (Ft.)	Z (Ft.)
Nearest Property Line HVAC Only	R1	56.00	56.00	19%	45.36	45.36		500	1	5.00	r	0.00	-3.00	0.00
Nearest Property Line Generator Only	R1	65.00	0.00	19%	52.65	0.00		900	1	5.00	r	0.00	-3.00	0.00
Nearest Property Line Combined	R1	65.00	56.00	19%	52.65	45.36		500 / 900	1	5.00	r	0.00	-3.00	0.00

* Genertor restricted to daytime testing and operation outside of Emergency use, reference and modeling noise level for night time use reduced to 0.00 to reference this restriction

NOISE EXPOSURE AT NEAREST PROPERTY LINE

Source	ID	Modeled Level (Lmax)		Limit. Value (Lmax)		Limit Test (Model Lmax < Limit Lmax)			Freq. (Hz)	Direct	Height (Ft.)		Coordinates		
		Day	Night	Day	Night	Day	Night	Pass / Fail					X (Ft.)	Y (Ft.)	Z (Ft.)
Nearest Property Line HVAC Only	R1	33.60	33.60	75.00	40.00	-41.40	-6.40	Pass	500	1	5.00	r	0.00	-27.00	0.00
Nearest Property Line Generator Only	R1	40.90	0.00	75.00	40.00	-34.10	-40.00	Pass	900	1	5.00	r	0.00	-27.00	0.00
Nearest Property Line Combined	R1	40.90	33.60	75.00	40.00	-34.10	-6.40	Pass	500 / 900	1	5.00	r	0.00	-27.00	0.00

* Genertor restricted to daytime testing and operation outside of Emergency use, reference and modeling noise level for night time use reduced to 0.00 to reference this restriction

Approximate sound transmission loss values for common materials.

Material	Thickness	Weight	% Transmission Loss (dB(A))
	mm (inches)	kg/m2 (lbs	
Concrete Block, 200mm x 200mm x 405 (8" x	200mm (8")	151 (31)	34
Dense Concrete	100mm (4")	244 (50)	40
Light Concrete	150mm (6")	244 (50)	39
Light Concrete	100mm (4")	161 (33)	36
Wood, Fir	12mm (O.5")	8.3 (1.7)	18
Wood, Fir	25mm (1.0")	16.1(3.3)	21
Wood, Fir	50mm (2.0")	32.7 (6.7)	24
Wood, Redwood	12mm (O.5")	8.3 (1.7)	19
Wood, Redwood	25mm (1.0")	16.1(3.3)	22
Wood, Redwood	50mm (2.0")	32.7 (6.7)	26

Exhibit 2

POLAR POWER INC.

Exceeding Military Standards without the Cost

All Weather Enclosure

for 6 kW to 15 kW Polar Power's DC Generators

Telecommunications

Prime Power

Solar Hybrid Power Systems

Uninterrupted Power Systems

Description

In foul weather a generator is needed the most; utility power can be interrupted or the solar and wind power can diminish in capacity. This is the time when telecommunications are needed the most to support emergency services and keep families in contact with each other. Polar's unique All Weather Enclosure is designed to keep the generator operational in high winds, rain, snow, and extreme temperatures.

Screens and baffles are in place to keep the weather elements out, along with rodents and other animals, who can interfere with the operation of the generator.

Polar's All Weather Enclosure keeps the generator noise to a minimum. The noise level is dependent on the engine and power level selected. Using our electric radiator, the typical noise level for the diesel engine is 65 dBa at 7 meters.

All aluminum construction is used for corrosion resistance and long service life. We used thick aluminum sheets of 2.3 mm (0.090") for strength.

Polar's light weight enclosure facilitates transportation to the site via small vehicle, helicopter, or multi-person carry.

The aluminum enclosure accepts Polar's electric radiator or the engine belt driven fan assembly. The electric radiator reduces fuel consumption by up to 15% and noise by up to 30%.

Polar Power Inc.
249 E. Gardena Blvd
Gardena, CA 90248 USA
Tel: (310) 830 - 9153
sales@polarpowerinc.com

www.polarpower.com

Made in USA

Exhibit 2

All Weather Enclosure

for Polar Power's DC Generators

Features

Forklift slots serve as helicopter/crane lifting points.

The enclosure design is designed to retain spilled oil, fuel, and coolant as required at certain installation sites.

The fuel tank is optional to our All Weather Enclosure. A 54 gal. fuel tank can mounted under the enclosure. Customers have installed on site fuel tanks ranging from 20 to 1,000 gallons according to their site refueling requirements. Certain installations even prefer that the fuel tank is remote to the enclosure.

Oil drain is accessible from the outside of the enclosure depending on engine style.

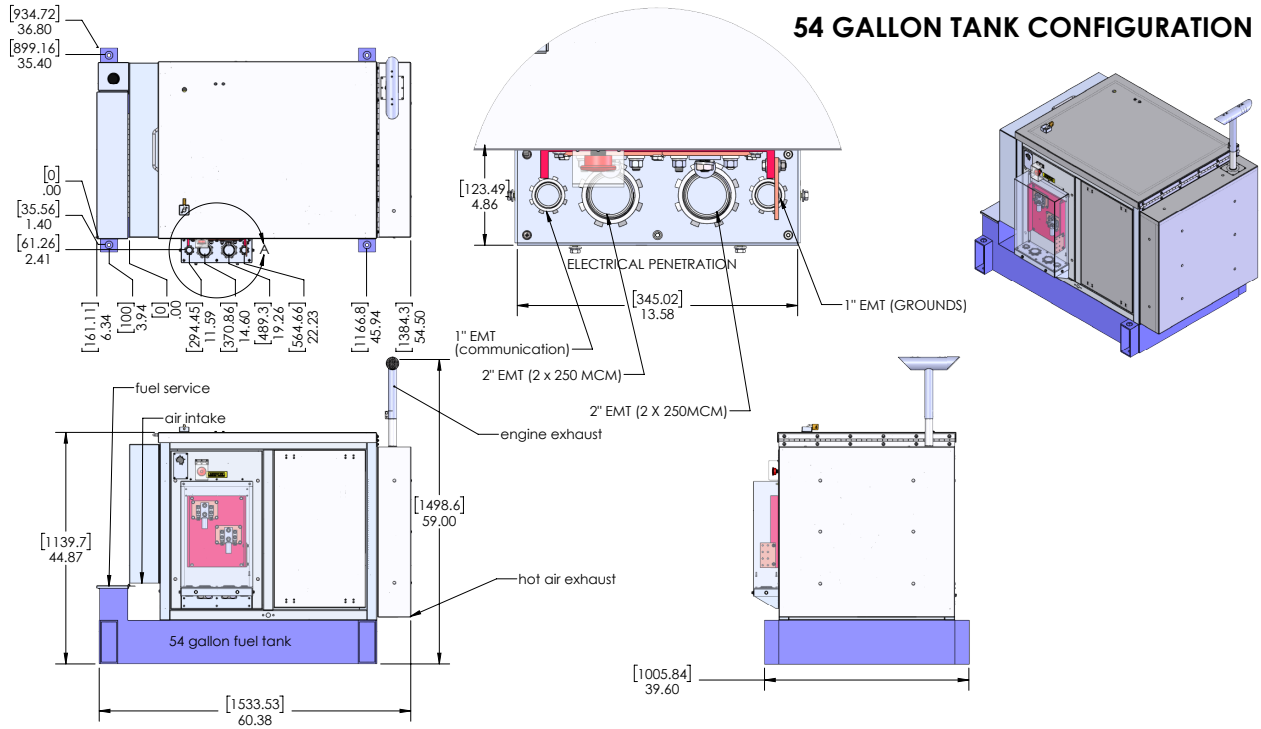
The Power Terminal is accessible through the external junction box.

Fuel connections are accessible through standard ¼" NPT fittings.

Dual Access: Operators can gain access to the DC generator either through the bolt-on side panels or the hinged top.

Propane or Natural Gas model

Dimensions 15 kW diesel



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Gardena, CA 90248 USA
Tel: (310) 830 - 9153
sales@polarpowerinc.com

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Made in USA

Marvair®
AIRXCEL™, Inc.
ISO 9001:2008 REGISTERED COMPANY

ComPac® I & ComPac® II 2 to 6 Ton Vertical Wall Mount Air Conditioners

R-410A Refrigerant

Models AVPA24-30-36-42-48-60-72 (Single Stage Compressor)
Models AVPSA36-42-48-60 (2-Stage Compressor)
Models HVEA24-30-36-42-49-60 (Single Stage Compressor)
Models HVESA36-42-49-60 (2-Stage Compressor)

General Description

AVPA36ACA-100C

The Marvair® ComPac® I and ComPac® II air conditioners are used primarily to cool electronic and communication equipment shelters. Due to the high internal heat load, these shelters require cooling even when outside temperatures drop below 60°F (15°C). The ComPac I and ComPac II air conditioners have the necessary controls and components for operation during these (less than 60°F [15°C]) temperatures. All models use the non-ozone depleting R-410A refrigerant.

The primary difference between the ComPac I and the ComPac II units is that the ComPac® II air conditioner has a factory installed economizer. When cool and dry, the economizer uses outside air to cool the shelter. The economizer provides temperature control, energy cost savings, and increased reliability by decreasing the operating hours of the compressor and the condenser fan. The ComPac I and ComPac II air conditioners are problem solvers for a wide range of conditions and applications. To insure proper operation and optimum performance, all economizers are non-removable, factory installed and tested. In addition, factory and field installed accessories can be used to meet specific requirements.

The HVEA and HVESA models are Marvair's most efficient wall mount air conditioners. Electronically commutated outdoor fan motors combined with highly efficient scroll compressors result in Energy Efficiency Ratios (EER's) of up to 13.1.

Models AVPSA36-42-48-60 and HVESA36-42-49-60 have a 2-stage compressor with first stage cooling approximately 65% of the total cooling capacity. The 2-stage compressor provides lower start-up amps which can be critical when operating with a generator. The two stage compressor can also reduce energy costs and is able to more precisely match the cooling capacity of the air conditioner with the heat load in the shelter. Both ComPac I and ComPac II units are available with 2 stage compressors. See page 3 for a description of the operation of the 2-stage units when they are used with the CommStat 3 SC™ thermostat/ controller in a lead/lag installation.

Safety Listed and Energy Certified

All ComPac air conditioners are built to UL standard 1995, 2nd edition and CAN/CSA C22, No. 236-5, 2nd edition. For energy efficiency and performance, the units are tested and rated in accordance to the ANSI/ARI (Air-Conditioning and Refrigeration Institute) Standard 390- 2003 (Single Package Vertical Units). All units meet or exceed the efficiency requirements of ANSI/ASHRAE/IESNA 90.1.2007. The ComPac I and ComPac II air conditioners are commercial units and are not intended for use in residential applications.

*ComPac® II air conditioner only

Exhibit 2

Standard Features

Designed for Operation in Low Ambient Conditions

- Low ambient control cycles condenser fan to maintain proper refrigerant pressures. Allows operation in mechanical cooling (compressor) down to 0ºF (-18ºC). Note: low temperature operation is affected by ambient conditions, e.g. wind and humidity.
- Three minute by-pass of the low pressure switch for start-up of compressor when outdoor temperatures are below 55°F (13°C).
- Factory built-in economizer.*

High Efficiency

- High efficiency compressor.
- Lanced fins and rifled tubing on many condenser & evaporator coils.

Built-in Reliability

- High pressure switch and low pressure switch with lockout protects refrigerant circuit.
- Three minute delay on make for short cycle protection.

Remote Alarm Capability

- Dry contacts can be used for remote alarm or notification upon air conditioner lockout.

Ease of Installation

- Sloped top with flashing eliminates need of rainhood.
- Built-in mounting flanges facilitate installation and minimize chance of water leaks.
- Supply and return openings exactly match previous models.
- Factory installed disconnect on all 208/230v units, optional 460V units.

Rugged Construction

- Copper tube, aluminum fin evaporator & condenser coils.
- Factory installed heaters on discharge side of evaporator coil (optional)
- Baked on neutral beige finish over galvanneal steel for maximum cabinet life. (Other finishes are available.)

Ease of Service

- Service access valves are standard.
- Standard 2” (50 mm) pleated filter changeable from outside.
- All major components are readily accessible.
- Front Control Panel allows easy access and complies with NEC clearance codes on redundant side-by-side systems.
- LEDs indicate operational status and fault conditions.

*ComPac® II air conditioner only

A Marvair® First – Factory Installed Economizer

Marvair’s ComPac® II air conditioner has been the industry standard since its introduction in 1986. Tens of thousands of ComPac II air conditioners are in operation from the metropolitan areas of North America to the deserts of the Mid-East to the Siberian tundra. Here’s how the economizer works:

On a signal from the wall mounted indoor thermostat that cooling is required, either mechanical cooling with the compressor or free cooling with the economizer is provided. A factory installed enthalpy controller determines whether the outside air is sufficiently cool and dry to be used for cooling. If suitable, the compressor is locked out and the economizer damper opens to bring in outside air. Integral pressure relief allows the interior air to exit the shelter, permitting outside air to enter the shelter. The temperature at which the economizer opens is adjustable from 53°F (12°C) at 50% Relative Humidity to 78°F (26°C) at 50% Relative Humidity.

After the enthalpy control has activated and outside air is being brought into the building, the mixed air sensor measures the temperature of the air entering the indoor blower and then modulates the economizer damper to mix the right proportion of cool outside air with warm indoor air to maintain 50-56°F (10 - 13°C) air being delivered to the building. This prevents shocking the electronic components with cold outside air. The compressor is not permitted to operate when the economizer is functioning.

If the outside air becomes too hot or humid, the economizer damper closes completely, or to a minimum open position with an optional minimum position potentiometer, and mechanical cooling is activated.

Exhibit 2

Marvair

156 Seedling Drive
Cordele, Georgia 31015
229-273-8058

Marvair Outdoor Sound Data for the ComPac I/II Air Conditioners (dBA)							
Distance From Unit (Feet)	Model Number						
	AVPA12AC*	AVPA24AC*	AVPA36AC*	**AVPA42AC***	AVPA48AC*	AVPA60AC*	**AVPA72AC***
5	66	66	70	70	70	70	69
10	63	63	67	66	67	66	64
20	58	58	63	62	64	63	60
30	56	56	60	60	62	60	58
40	54	54	58	59	60	59	56
50	53	53	57	57	58	57	55
60	52	52	57	56	57	56	53
70							
80							

Notes: (1) Test Date: Feb-March 2011
(2) Background Sound Level: 30-33 dBA
(3) Sound Level Meter 1 Meter Above Ground Directly in Line with Outdoor Coil
(4) All units - 410A Refrigerant
* All Voltages