

Environmental Noise Assessment

Petrified Forest Verizon Cellular Facility

Santa Rosa (Sonoma County), California

BAC Job # 2019-221

Prepared For:

Complete Wireless Consulting

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Introduction

The Petrified Forest Verizon Wireless Unmanned Telecommunications Facility (project) proposes the installation of cellular equipment within a lease area located at 4500 Porter Creek Road in Santa Rosa (Sonoma County), California (APN: 120-210-009). The outdoor equipment cabinets and an emergency diesel standby generator have been identified as the primary noise sources associated with the project. Please see Figure 1 for the project site location. The studied site drawings are dated October 16, 2019.

Bollard Acoustical Consultants, Inc. has been contracted by Complete Wireless Consulting, Inc. to complete an environmental noise assessment regarding the proposed project cellular equipment operations. Specifically, the following assessment addresses daily noise production and exposure associated with operation of the project outdoor equipment cabinets and emergency generator.

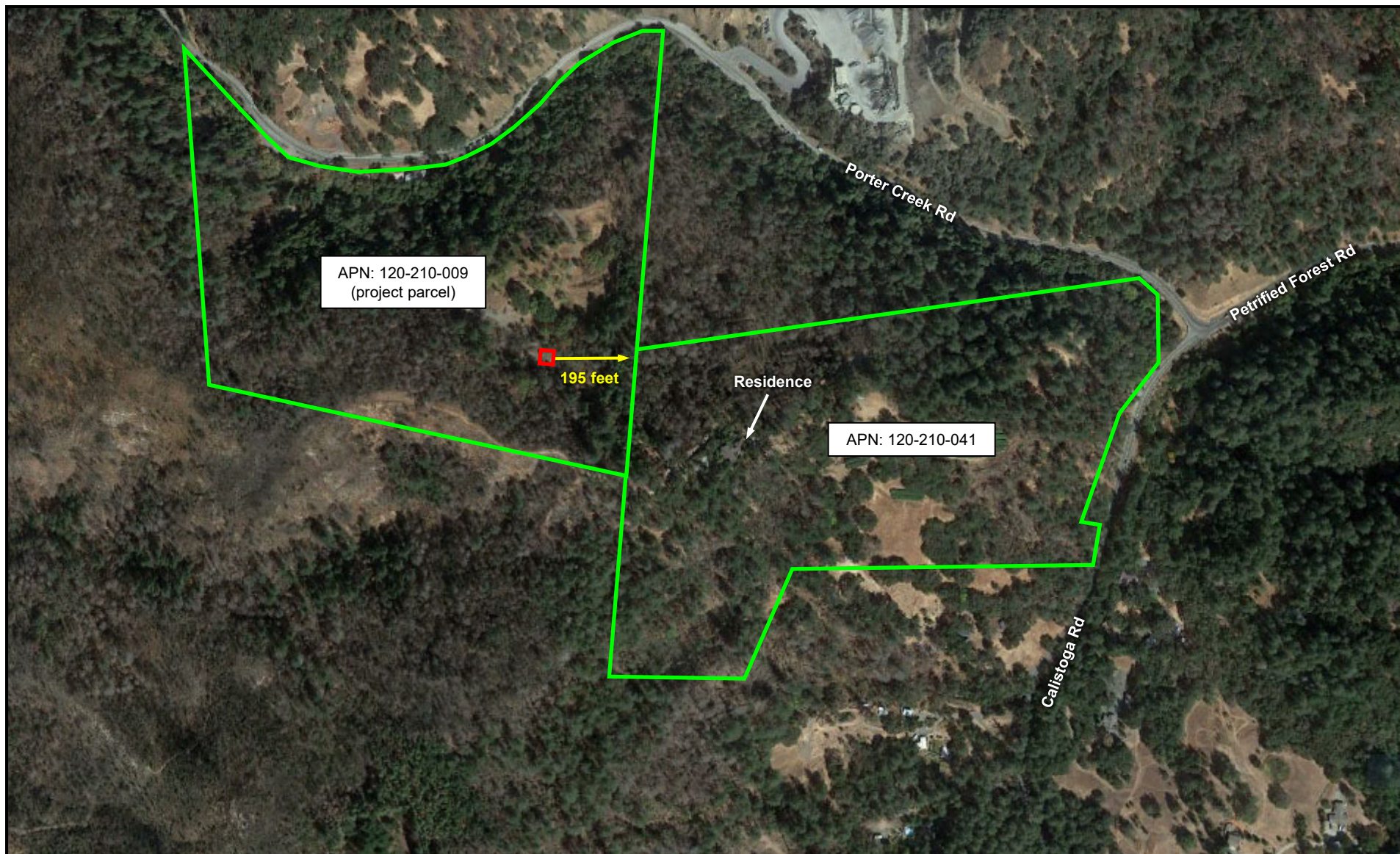
Please refer to Appendix A for definitions of acoustical terminology used in this report. Appendix B illustrates common noise levels associated with various sources.

Criteria for Acceptable Noise Exposure

Sonoma County General Plan

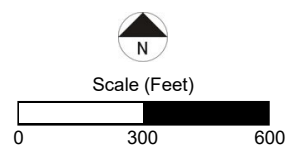
The Sonoma County General Plan Noise Element (Policy NE-1c) pertains to noise generated by non-transportation noise sources, such as those proposed by the project. The objectives and policies of the Noise Element that are applicable to the proposed project equipment are as follows:

- Objective NE-1.1:** Provide noise exposure information so that noise impacts may be effectively evaluated in land use planning and project review.
- Objective NE-1.2:** Develop and implement measures to avoid exposure of people to excessive noise levels.
- Objective NE-1.3:** Protect the present noise environment and prevent intrusion of new noise sources which would substantially alter the noise environment.
- Policy NE-1c:** Control non-transportation related noise from new projects. The total noise level resulting from new sources shall not exceed the standards in Table NE-2 of the recommended revised policies as measured at the exterior property line of any adjacent noise sensitive land use. Limit exceptions to the following:



Legend

- Proposed Verizon Cellular Facility Lease Area
- Parcel Boundaries (Approximate)



Petrified Forest
Verizon Cellular Facility
 Santa Rosa (Sonoma County), California
 Proposed Cellular Facility Lease Area
 & Nearest Parcel Containing a Residence

Figure 1



- (1) If the ambient noise level exceeds the standard in Table NE-2, adjust the standard to equal the ambient level, up to a maximum of 5 dBA above the standard, provided that no measureable increase (i.e., +/- 1.5 dBA) shall be allowed.
- (2) Reduce the applicable standards in Table NE-2 by 5 dBA for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises, such as pile drivers and dog barking at kennels.
- (3) Reduce the applicable standards in Table NE-2 by 5 decibels if the proposed use exceeds the ambient level by 10 or more decibels.
- (4) For short term noise sources which are permitted to operate no more than six days per year, such as concerts or race events, the allowable noise exposure shown in Table NE-2 may be increased by 5 dBA. These events shall be subject to a noise management plan including provisions for maximum noise level limits, noise monitoring, complaint response and allowable hours of operation. The plan shall address potential cumulative noise impacts from all events in the area.
- (5) Noise levels may be measured at the location of the outdoor activity area of the noise sensitive land use, instead of the exterior property line of the adjacent noise sensitive land use where:
 - a. The property on which the noise sensitive use is located has already been substantially developed pursuant to its existing zoning, and
 - b. There is available open land on those noise sensitive lands for noise attenuation.

Table 1
Maximum Allowable Exterior Noise Exposures for Non-transportation Noise Sources
Hourly Noise Metric, dB

30	L ₅₀	50	45
15	L ₂₅	55	50
5	L ₈	60	55
1	L ₂	65	60
Source: Sonoma County 2020 General Plan Noise Element, Table NE-2 (reproduced and summarized)			

Noise Standards Applied to the Project

According to the County of Sonoma Zoning and Land Use Map online viewing application, the project parcel is zoned Resources and Rural Development (RRD 100). The nearest noise-sensitive use has been identified as an existing residence located on an adjacent parcel to the east of the project (APN: 120-210-041). Figure 1 illustrates the location of the parcel and the residence. The Sonoma County General Plan noise level criteria applicable to noise-sensitive uses was applied to the proposed project equipment and conservatively assessed at the property line of this parcel.

Outdoor Equipment Cabinets

Project noise exposure would be generated by the ongoing operation of the cellular equipment cabinets cooling systems. These systems utilize fans to circulate cooling air through the electric circuitry. During warmer periods, the cooling requirements will be greater and the fans will run continuously. During cooler periods, however, the heat transfer requirements are diminished and the fans will run intermittently as needed. Because the fan operation is a normal aspect of the project, and because the fans could run continuously during warm nighttime hours (i.e., more than 30 minutes per hour), the corresponding noise standard of 45 dB L₅₀ during nighttime hours identified in Table 1 would be applicable the outdoor equipment cabinets.

Emergency Generator

The project site drawings dated October 16, 2019 indicate that a Generac Industrial Power Systems Model SD030 diesel standby generator is proposed for use at this facility to maintain cellular service during emergency power outages. The noise emissions of this generator vary depending on the type of enclosure provided with the generator. The following reference noise levels at a measurement distance of 23 feet from the operating generator are provided by the equipment manufacturer (see Appendix C):

- Open Set 82 dBA
- Standard Enclosure 77 dBA
- Level 1 Acoustic Enclosure 70 dBA
- Level 2 Acoustic Enclosure 68 dBA

It is our understanding that the project emergency generator, located within the same lease area as the equipment cabinets, will be equipped with a Level 2 Acoustic Enclosure resulting in a reference noise level of 68 dB at 23 feet. Relative to open set generator configuration, the Level 2 Acoustic Enclosure provides 14 dB of noise reduction.

The generator which is proposed at this site would only operate during emergencies (power outages) and brief daytime periods for periodic maintenance/lubrication. According to the project applicant, testing of the generator would occur twice per month, during daytime hours, for a duration of approximately 15 minutes. The emergency generator would not operate at night, except during power outages.

Exemption to the Sonoma County General Plan Noise Criteria

According to conversations with Sonoma County Permit and Resource Management Department staff (dated August 19, 2019), emergency generators are exempt from County noise level criteria provided that the generators are not part of normal operations and are equipped with best available noise suppression enclosures. As discussed above, it is our understanding that the project emergency generator will be equipped with a Level 2 Acoustic Enclosure, which would provide approximately 14 dB of noise reduction when compared to an open set configuration. In addition, the proposed generator would only operate during emergencies, and brief daytime periods for periodic maintenance. Because the project emergency generator is not part of normal operations, and because the generator is proposed to be equipped with an acoustical enclosure that would significantly reduce equipment noise levels (Level 2 Acoustic Enclosure), noise exposure from project emergency generator operations would be exempt from applicable Sonoma County noise level criteria. As a result, an analysis of project emergency generator noise exposure was not included in this assessment.

Project Noise Generation

The project proposes the installation of two (2) equipment cabinets within the equipment lease area shown on Figure 1. Based on the equipment layout plan, the cabinets assumed for the project are as follows: one (1) Charles Industries 48V Power Plants and one (1) miscellaneous cabinet cooled by a McLean Model T-20 air conditioner. The cabinets and their respective reference noise levels are provided in Table 2. The manufacturer's noise level data specification sheets for the proposed equipment cabinets are provided as Appendix D.

Table 2
Reference Noise Level Data of Proposed Equipment Cabinets

Charles Industries 48V Power Plant	1	60	5
McLean T-20	1	66	5
<i>Note: Manufacturer specification sheets provided as Appendix D.</i>			

Predicted Facility Noise Levels at Nearest Noise-Sensitive Property Line

As indicated in Figure 1, the proposed project equipment lease area maintains a separation of approximately 195 feet from the nearest noise-sensitive property line, APN: 120-210-041. Assuming standard spherical spreading loss (-6 dB per doubling of distance), project-equipment noise exposure at the nearest noise-sensitive property line was calculated and the results of those calculations are presented in Table 3.

Table 3
Summary of Predicted Project Equipment Noise Exposure at Nearest Noise-Sensitive Property

120-210-041	195	35
¹ Parcel boundaries are illustrated on Figure 1. ² Distance was scaled using the provided site plans dated October 16, 2019.		

The proposed outdoor equipment cabinets were conservatively assumed to be in operation for the duration of an hour during nighttime hours. According to the Sonoma County General Plan (Table 1), the corresponding noise level standard given an hour of *nighttime* operation would be 45 dB L₅₀. As shown in Table 3, the predicted combined outdoor equipment cabinet noise level of 35 dB L₅₀ at the nearest noise-sensitive property line would satisfy the General Plan 45 dB L₅₀ nighttime noise level standard by a wide margin. As a result, no further consideration of project equipment noise mitigation measures would be warranted for the project.

Conclusions

According to conversations with Sonoma County Permit and Resource Management Department staff (dated August 19, 2019), emergency generators are exempt from applicable county noise level criteria provided that they are not part of normal operations and are equipped with best available noise suppression enclosures. Because the project emergency generator will not be part of normal facility operations, and because the generator is proposed to be equipped with an acoustical enclosure that would significantly reduce equipment noise levels (Level 2 Acoustic Enclosure), noise exposure from project emergency generator operations would be exempt from applicable Sonoma County General Plan noise level criteria.

Based on the equipment noise level data and analyses presented in this report, project equipment cabinet noise level exposure is expected to satisfy the applicable Sonoma County General Plan noise level criteria at the closest noise-sensitive property line. As a result, no further consideration of equipment noise mitigation measures would be warranted for this project.

This concludes our environmental noise assessment for the proposed Petrified Forest Verizon Cellular Facility in Santa Rosa (Sonoma County), California. Please contact BAC at (916) 663-0500 or darioq@bacnoise.com with any questions or requests for additional information.

Appendix A

Acoustical Terminology

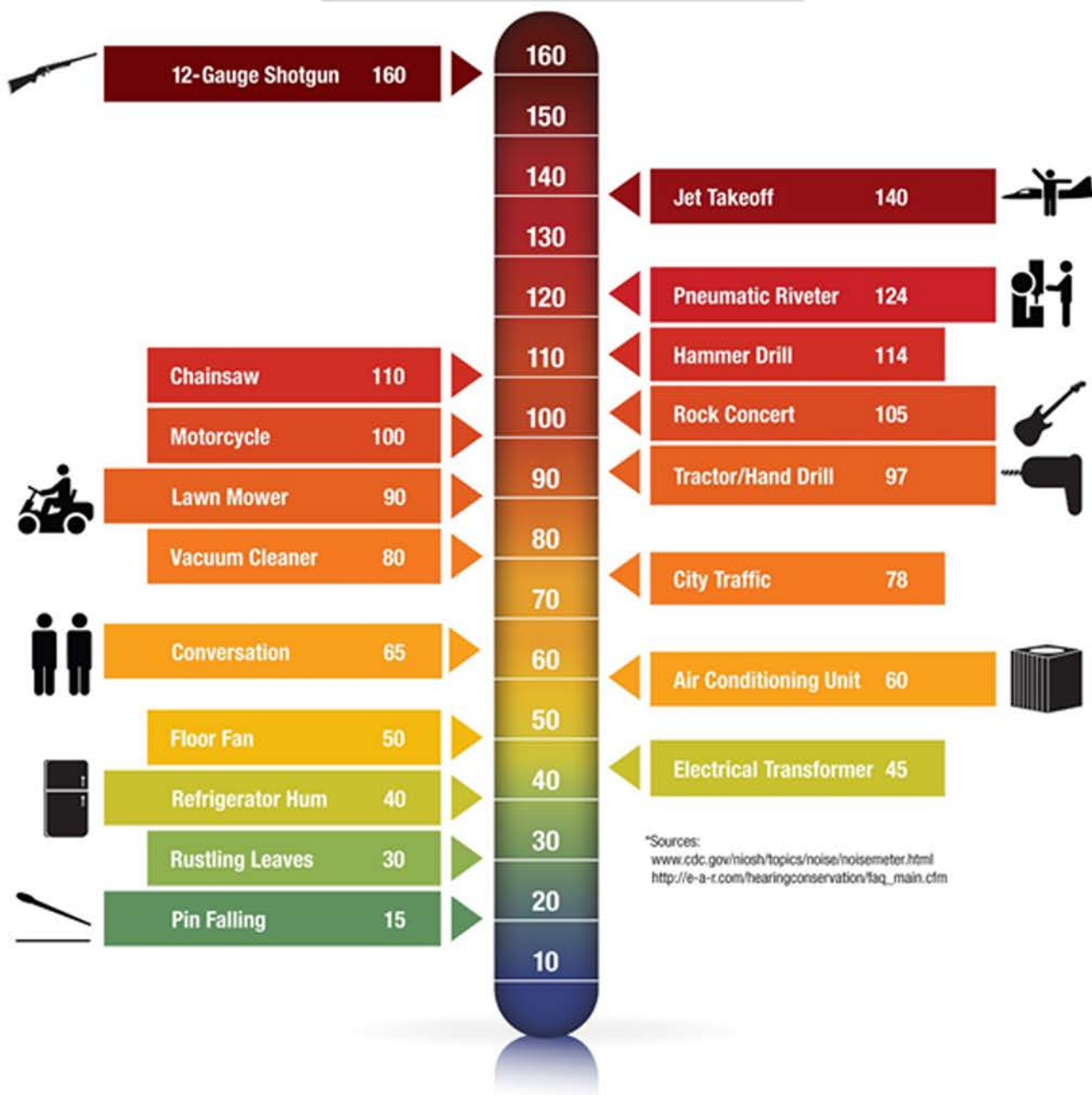
Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT₆₀	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.



Appendix B

Typical A-Weighted Sound Levels of Common Noise Sources

Decibel Scale (dBA)*



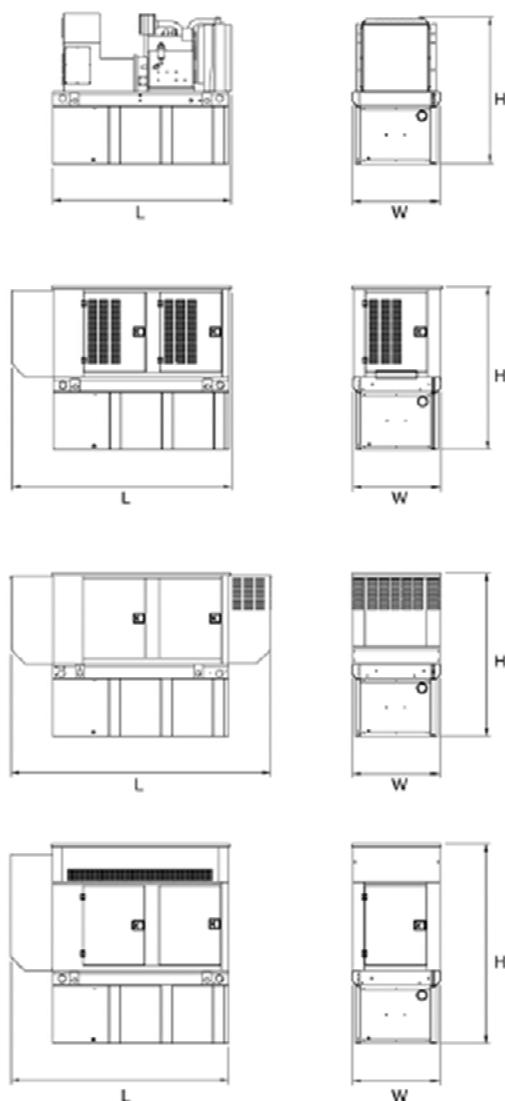
Appendix C

SD030

dimensions, weights and sound levels

30 kW Diesel

5 of 5



OPEN SET

RUN TIME HOURS	USABLE CAPACITY (GAL)	L	W	H	WT	dBA*
NO TANK	-	76	38	46	2060	82
20	54	76	38	59	2540	
48	132	76	38	71	2770	
77	211	76	38	83	2979	
109	300	93	38	87	3042	

STANDARD ENCLOSURE

RUN TIME HOURS	USABLE CAPACITY (GAL)	L	W	H	WT	dBA*
NO TANK	-	95	38	50	2362	77
20	54	95	38	63	2842	
48	132	95	38	75	3072	
77	211	95	38	87	3281	
109	300	95	38	91	3344	

LEVEL 1 ACOUSTIC ENCLOSURE

RUN TIME HOURS	USABLE CAPACITY (GAL)	L	W	H	WT	dBA*
NO TANK	-	113	38	50	2515	70
20	54	113	38	63	2995	
48	132	113	38	75	3225	
77	211	113	38	87	3434	
109	300	113	38	91	3497	

LEVEL 2 ACOUSTIC ENCLOSURE

RUN TIME HOURS	USABLE CAPACITY (GAL)	L	W	H	WT	dBA*
NO TANK	-	95	38	62	2520	68
20	54	95	38	75	3000	
48	132	95	38	87	3230	
77	211	95	38	99	3439	
109	300	95	38	103	3502	

*All measurements are approximate and for estimation purposes only. Weights are without fuel in tank. Sound levels measured at 23ft (7m) and does not account for ambient site conditions.

Tank Options	
☐ MDEQ	OPT
☐ Florida DERM/DEP	OPT
☐ Chicago Fire Code	OPT
☐ IFC Certification	CALL
☐ ULC	CALL

Other Custom Options Available from your Generac Industrial Power Dealer

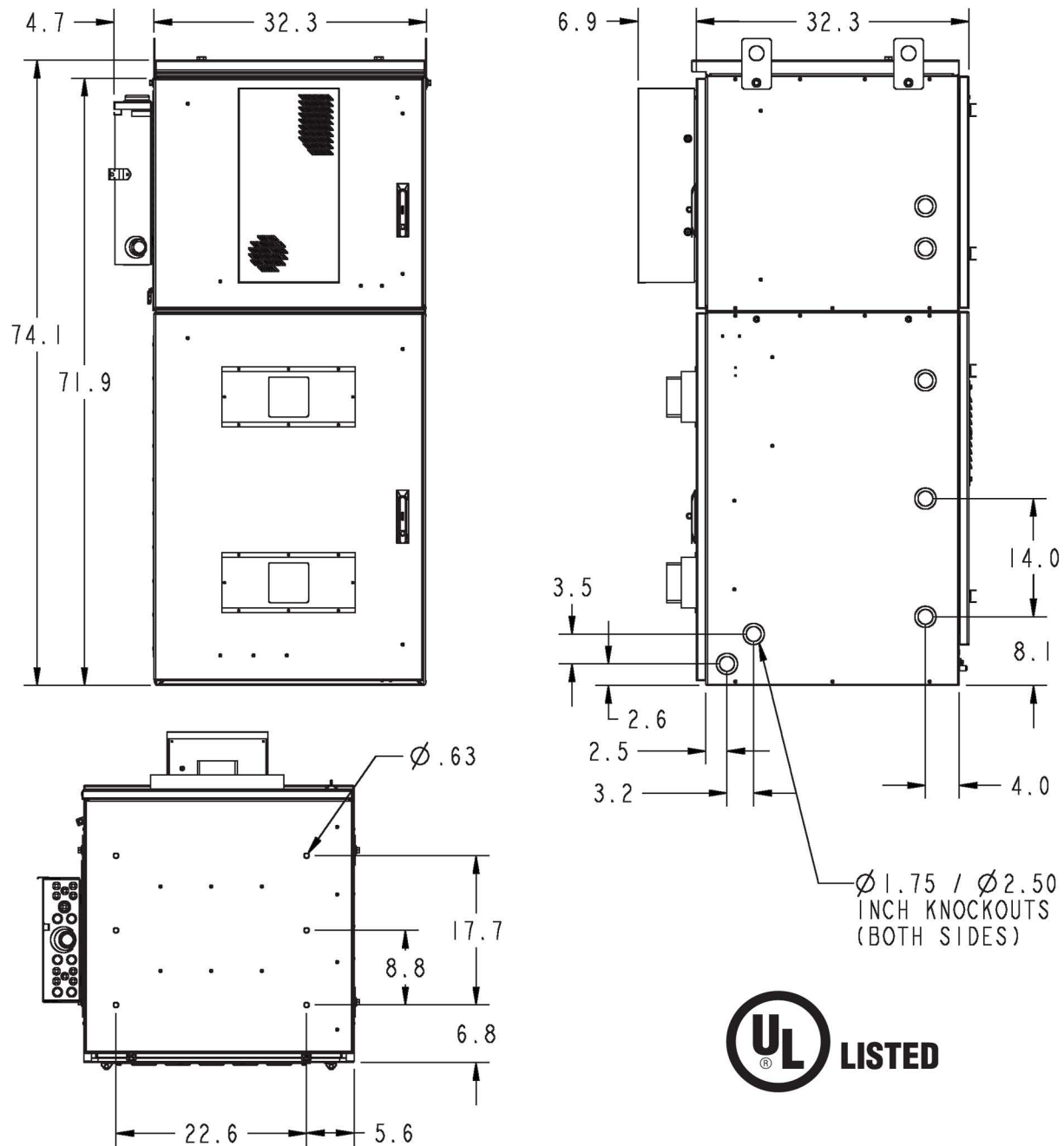
YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

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Appendix D-1



WEIGHT WITH BATTERIES:
2296 LBS.

NorthStar NSB-170FT batteries
at 128 lbs each, Qty 12

WEIGHT WITHOUT BATTERIES:
760 LBS.

MAX NOISE LEVEL:
55-60dB

CHARLES PART #
CUBE-SS4C215XC1



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