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September 20, 2006

Matt Kearns  
Director of Project Development  
UPC Wind Management  
100 Wells Avenue, Suite 201  
Newton, MA 02459-3210

Subject: Information Regarding the Clipper Turbine Acoustic Performance  
Reference: Clipper Liberty 2.5MW Turbine Acoustic Data from Medicine Bow, WY, May-July 2006

Dear: Mr. Kearns,

This letter is provided to UPC Wind Management, LLC to clarify the turbine configuration tested for the purposes of acoustic performance characterization in Medicine Bow, Wyoming in May and June, 2006 and to convey Clipper's plans for further configuration changes to address the specific acoustic tones identified in the report provided by Channel Islands Acoustics.

Acoustic testing was performed by Channel Islands Acoustics in accordance with the International Electrotechnical Commission (IEC) Technical Specifications 61400-14:2005(E)<sup>1</sup> and 61400-11:2002(E)<sup>2</sup>. These standards provide measurement procedures to characterize the noise emissions of a wind turbine in a consistent and accurate manner. This testing determined that there are three frequency ranges of noise that would benefit from further configuration changes to the emitter sources and/or additional noise mitigation features. These frequency ranges are identified on the above referenced report in the notes section.

The first note refers to 1/3-Octave frequency peaks at 80 and 160 Hz, respectively. These frequencies are attributed to the cooling fan operation of the power converter located outside the tower base on the prototype turbine installation. These frequencies are anticipated to fall below audible levels on production turbines where the converter will be located within the tower base.

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<sup>1</sup> International Electrotechnical Commission (IEC) Technical Specification IEC/TS 61400-14:2005(E), *Wind Turbines – Part 14: Declaration of apparent sound power level and tonality values*, First Edition, 2005-03. The IEC web site is [www.iec.ch](http://www.iec.ch).

<sup>2</sup> International Electrotechnical Commission (IEC) Technical Specification IEC/TS 61400-11:2002(E), *Wind Turbine generator systems – Part 11: Acoustic noise measurement techniques*, Second Edition, 2002-12. The IEC web site is [www.iec.ch](http://www.iec.ch).

The second frequency identified, 400 Hz, is associated with a fan-blade-passage frequency in the generators. The data obtained from testing during this period reflects the prototype air-cooling kit features for the generator first implemented in April, 2006. Additional changes to this configuration are planned for production generators to reduce emission at this frequency. In addition, acoustic baffles are planned for installation within the "scoop" portion of the nacelle (the starboard portion where the oil cooler is housed and into which the generator air exhaust ducts vent) that were not available during this testing period. The baffles will eliminate line-of-site to the duct emitters and will include acoustic damping materials.

The last note of the report indicates a range of tones from 800-1000 Hz. These frequencies are also associated with sound emissions from the generator and will benefit from the scoop-mounted baffle in addition to other nacelle-mounted abatement features directed towards closing openings within the nacelle construction. During the May-June test period only a partial-set of these abatement features were present. These abatement features will close openings and gaps that are present e.g. above the aft roll-up service door and between the machine base and the bottom surface of the nacelle.

As of this writing, Clipper is completing commissioning of a second-source converter supplier. Preliminary testing of this converter (also located outside the tower base) will conclude this week and will enable us to resume acoustic testing shortly.

Clipper expects to complete further configuration development and acoustic testing on the Liberty 2.5MW turbine this fall that will demonstrate improved acoustic performance with respect to the above frequencies with the goal of eliminating audible tones.

Best regards,

A handwritten signature in black ink, appearing to read 'D. Petch', written over a light blue horizontal line.

Derek Petch

Director, Program Management