5.700 RULE ON SOUND LEVELS FROM WIND GENERATION FACILITIES

5.701 Purpose and Applicability

This rule establishes standards and procedures ~~related~~ applicable to sound emissions from wind generation facilities that apply for a certificate of public good ("CPG") pursuant to 30 V.S.A. § 248 or § 8010 on or after July 1, 2017.

5.702 Definitions

For the purposes of this Rule, the following definitions shall apply:

(A) Board: the Vermont Public Service Board.

(B) CPG: certificate of public good.

(C) CPG Holder: a person or company who has received a CPG pursuant to 30 V.S.A. § 248 or § 8010 for a wind generation facility with respect to a petition filed on or after July 1, 2017.

(D) Department: the Vermont Department of Public Service.

(E) dBA: A-weighted decibel.

(F) kW: kilowatts.

~~(F)~~(G) Petitioner: a person or company who has filed a petition for a CPG pursuant to 30 V.S.A. § 248 or § 8010 to construct and/or operate a wind generation facility.

~~(G)~~(H) Plant capacity: pursuant to 30 V.S.A. § 8002, "plant capacity" means the rated electrical nameplate for a wind generation facility.

~~(H)~~(I) Residence: a permanent structure for human habitation in existence at the time a CPG petition is filed that is occupied by one or more people for a minimum of 90 days each year and that has a permanent potable water supply and wastewater disposal system.

~~(I)~~(J) SCADA: supervisory control and data acquisition or similar system capable of measuring and recording turbine operation and meteorological data in one-minute time intervals.

~~(J)~~(K) Facility or Wind generation facility: a wind-driven electric generation facility for which a petition for a CPG pursuant to 30 V.S.A. § 248 or § 8010 is submitted to the Board on or after July 1, 2017.

~~(K)~~(L) ~~L90~~L_{A90}: Sound level exceeded during 90% of a measurement period.

~~(L)~~(M) ~~L10~~L_{A10}: Sound level exceeded during 10% of a measurement period.

~~(M)~~(N) ~~L50~~L_{A50}: Sound level exceeded during 50% of a measurement period.

(O) Participating landowner: a landowner who has signed a written agreement with a Petitioner stating that the sound emissions standards established by this rule do not apply to the landowner's property.

~~(N)~~(P) Facility-only sound: Sound from a wind generation facility not including background/ambient sound.

5.703 ~~General Rule~~Sound Level Limits

No wind generation facility shall emit sound levels in excess of the following during routine operation between 7 P.M. and 7 A.M.:

Commented [A1]: The Board has included a similar provision in prior CPG conditions. This will provide the necessary regulatory certainty and finality at the time a project is applied for, which must include noise modelling that demonstrates compliance with the noise limit.

Commented [A2]: This additional language complements the "permanent structure" language, and ensures that structures such as yurts are not just placed on otherwise uninhabited land and occupied during a wind proceeding for the sole purpose of creating a smaller setback and/or making the Project infeasible.

Commented [A3]: Edit notation to conform with usage in other rule provisions.

(A) Facilities with a plant capacity of 25 kW or less. Operation of facilities with a plant capacity of 15 kW or less shall not result in Facility-only sound pressure levels in excess of 45 dBA at the exterior of a Residence of a non-participating landowner.

~~(A)~~(B) Facilities with a plant capacity of greater than 25 kW and up to 150 ~~kilowatts~~kW ~~or less~~. Operation of facilities with a plant capacity of greater than 25 kW and up to 150 ~~kilowatts ("~~kW~~") or less~~ shall not result in: (1) audible prominent discrete-frequency tones pursuant to the latest revision of ANSI standard S12.9 Part 4 Annex C at a distance of 100 feet from the exterior of a R~~r~~esidence of a non-participating landowner; and (2) Facility-only sound pressure levels in excess of 4~~0~~5 dBA, at a distance of 100 feet from the exterior of a ~~r~~Residence of a non-participating landowner. In lieu of demonstrating compliance with this limit, a petitioner may propose to locate a wind generation facility such that every ~~sound-producing elemen~~wind turbine ~~t of~~at the facility will be set back no less than ten (10) times the turbine's height, as measured from base to the tip of a blade in the upright, vertical position, from the ~~r~~Residence of a non-participating landowner.

(C) Facilities with a plant capacity of greater than 150 kW. Operation of facilities with a plant capacity of greater than 150 kW shall not result in: (1) audible prominent discrete-frequency tones pursuant to the latest revision of ANSI standard S12.9 Part 4 Annex C at a distance of 100 feet from the residence of a non-participating landowner.; and (2) Facility-only sound pressure levels in excess of ~~40~~45 dBA at a distance of 100 feet from the residence of a non-participating landowner.

~~(B)~~(D) Notwithstanding the limits specified in subsections (A)-(C) above, a Facility shall not be deemed to be in violation of such limits if it is demonstrated that Facility-only sound pressure levels at a Residence of a non-participating landowner are equal to or less than background (ambient) levels in accordance with the standards and procedures set forth in this Rule.

~~(C)~~(E) A petitioner shall bear the burden of showing that a proposed Facility can meet the applicable sound level limits based upon the modelling requirements of section 5.705 below. Where a petitioner has satisfied its burden, a party in the proceeding who proposes any variances to the sound level limits, modelling requirements, or other applicable provisions of this Rule shall bear the burden of showing by clear and convincing evidence that such variances are necessary to avoid an undue adverse impact to public health or safety and is in the public good. ~~The Board shall evaluate appropriate sound standards for proposed wind generation facilities on a case-by-case basis, and may impose lower sound pressure levels, larger setback distances, or different measurement metrics, as appropriate, based on the evidence presented as part of the Board's review of an application for a CPG.~~

5.704 Determining Compliance with the Sound Level Limits

Compliance with the sound level limits of Section 5.703 shall be determined in accordance with the following:

Commented [A4]: The Board should establish a separate category for small, residential-scale wind turbines. The sound limit, setbacks, and monitoring requirements set forth in the Draft Rule would effectively prohibit residential wind projects by making them technically and/or economically infeasible. The sound power levels of small scale wind turbines on the market today are such that meeting 40 dBA or having a setback distance of 10 x the tip of blade height (likely more than 150 feet) would not allow most small wind turbines in residential areas in Vermont where homes are not built on multi-acre parcels.

Commented [A5]: This provision should not apply to other sound sources at the Facility, for example a maintenance building that might have fans, lights, or other devices that could produce some sound.

Commented [A6]: A 40 dBA limit using the 10-minute intervals currently specified in the Draft Rule is effectively 2–3 dBA lower than a 40 dBA limit using a 1-hour Leq. Thus, by simultaneously lowering the numeric limit and shortening the measurement interval, the Board has dramatically lowered the sound limit for wind generation facilities, to a level well below what is supported by public health data. Such a low limit represents a significant obstacle to wind development.

Applying a 45 dBA limit over 10-minute rather than 1-hour intervals would still effectively impose a limit below the threshold scientifically shown to be safe.

Commented [A7]: This provision as written calls into question the predictability of the Draft Rule. If any of the Draft Rule's key provisions may be altered on a case by case basis, wind developers will have spent substantial sums on meeting the Rule, only to then be subject to costly litigation on the very questions the Rule is intended to settle.

Commented [A8]: As REV notes in the letter accompanying this markup, Draft Rule 5.704 as currently written does not improve on the implementation and enforceability of the Board's current standard. REV continues to support a statistical approach to compliance determinations. The Department of Public Service has put forward one such approach, which may be a reasonable one.

(A) Sound level data shall be aggregated in 10-minute measurement intervals within a given compliance measurement period (7 P.M. to 7 A.M.) under the conditions set forth in Section 5.707 of this rule. Each hour of the compliance measurement period shall have six discrete 10-minute measurement intervals.

(B) Facility-only sound levels will be calculated by logarithmically subtracting the background sound levels collected pursuant to Section 5.707(E) from the operational sound levels collected at other times. Facility-only sound levels will be calculated only for operational periods that are within ± 30 minutes of a shutdown periods.

(C) Compliance will be demonstrated when the arithmetic average of the ~~sound level of, at a minimum , twelve 10-minute measurement intervals in a given compliance measurement period is less than or equal to the sound level limit set forth in Section 5.703.~~ Facility-only sound level of twelve 10-minute measurement intervals collected over the course of 14 or less compliance measurement periods is less than or equal to the sound level limit set forth in Section 5.703. For the purposes of calculating the arithmetic average, the ~~loudest valid~~ highest twelve 10-minute measurement intervals under the atmospheric and site conditions set forth in Section 5.707(D) of this Rule shall be used.

~~(C)~~(D) ~~If a given compliance measurement period does not produce a minimum of twelve 10-minute measurement intervals under the atmospheric and site conditions set forth in Section 5.707(D) of this rule, six or more~~ contiguous ~~10-minute measurement intervals from one 12-hour compliance measurement period (7 P.M. to 7 A.M.) may be combined with six or more contiguous 10-minute intervals from another, adjacent compliance measurement period (i.e., the next day). Compliance will be demonstrated when the arithmetic average of the combined 10-minute measurement intervals is less than or equal to the sound level limit set forth in Section 5.703. For the purpose of calculating the arithmetic average, the loudest valid 10-minute measurement intervals shall be used.~~ If after 14 compliance measurement periods, twelve 10-minute measurement intervals under the atmospheric and site conditions set forth in Section 5.707(D) have not been collected, less than twelve, but not less than six 10-minute measurement intervals may be used in the arithmetic average of the Facility-only sound level to determine compliance with the limit set forth in Section 5.703. Alternatively, additional monitoring gathering may continue to collect the twelve, 10 minute measurement intervals.

5.705 Pre-~~Construction~~ CPG Sound Modeling

All petitions to construct and operate a wind generation facility filed on or after July 1, 2017, except for those for a wind generation facility with a capacity of ~~50~~ 150 kW or less, shall include a sound model developed for the proposed facility ~~that reports the expected maximum Facility-only sound levels experienced out to a distance where such levels are no greater than~~ extends out to 30 dBA. A petitioner must submit the following technical information with its petition:

(A) A map depicting the location of all proposed sound sources associated with the wind

Commented [A9]: The periods need to be discrete, otherwise there could be just one 21 minute period where sound levels are high and get 12 10-minute intervals out of it. It would not be appropriate to make a compliance determination based upon a single minute period.

Commented [A10]: Finding six contiguous intervals that satisfy Section 5.707(D) will be difficult if not impossible, especially if only the highest measured intervals may be used as provided in Section 5.704(B).

Moreover, requiring contiguous periods in Section 5.704(C) would be inconsistent with Section 5.704(B), which has no such requirement.

Commented [A11]: This appears to be a typo. Change to 150 kW to conform to § 5.703(A).

Commented [A12]: The deleted language is unnecessary as the parameters of the modelling are defined below. It also contains undefined terms, such as "maximum," raising problems of interpretation.

generation facility, property boundaries for the proposed facility, and all Residences within the greater of the 30 dBA contour or 1.5 miles based upon e-911 data or other available information ~~and property boundaries of all adjacent properties within three miles of the facility~~.

(B) A description of the major sound sources (e.g., turbines and substation transformers), including tonal sound sources, associated with operation ~~and maintenance of~~ the facility. ~~The sound model shall be based on the technical specifications of the turbine model(s) with the highest reported manufacturer sound power ratings under consideration for use at the facility.~~

(C) The predicted equivalent continuous sound levels as defined in ANSI S1.1 from the Facility at a distance of 100 feet from all Residences within the greater of the 30 dBA contour or a 1.5 mile radius of the closest wind turbine. The predictions shall include a sound contour (e.g. isopleth) map depicting the predicted equivalent continuous sound levels expected to be produced by the Facility under conservative conditions using the following parameters: ~~A description of the equivalent sound levels expected to be produced by the sound sources at a distance of 100 feet from the residence of a non-participating landowner. The description shall include a full-page isopleths map depicting the modeled decay rate of the predicted sound pressure levels expected to be produced by the wind generation facility at a distance of 100 feet from each residence of a non-participating landowner within three miles of the facility. The predictive model used to generate the equivalent sound levels expected to be produced by the sound sources shall be designed to represent the "worst case scenario." All model inputs shall be the most conservative available for each of the items listed below unless otherwise approved by the Board, and shall include, at a minimum, the following:~~

(1) The maximum ~~rated~~ apparent sound power output (IEC 61400-11) of the sound sources ~~operating during nighttime stable atmospheric conditions with high wind shear above the boundary layer and consideration of other conditions that may affect in-flow airstream turbulence~~;

(2) A point source modeled at hub height, and in accordance with ISO 9613-2.~~Attenuation due to geometric spreading, assuming that each turbine is modeled as a point source at hub height~~;

(3) Attenuation due to air absorption with conditions set to 10°C and 70% relative humidity;

(4) Attenuation due to ground absorption/reflection~~,~~: based on mixed ground conditions (G=0.5) for propagation over terrain and hard conditions (G=0.0) for propagation over water;

(5) Attenuation due to three-dimensional terrain;

~~(5)~~(6) A receiver height of 4 meters; and

~~(6) Attenuation due to forestation;~~

~~(7) Attenuation due to meteorological factors such as relative wind speed and direction (wind rose data), temperature/vertical profiles and relative humidity, sky conditions, and atmospheric profiles;~~

Commented [A13]: Since the limit set forth in Section 5.703(C) applies 100 feet from non-participating Residences, and not at property lines, it seems unnecessary to require mapping of all property lines in such a wide radius. Moreover, the property boundaries of adjacent properties will already have been depicted.

Commented [A14]: This unnecessarily repeats the parameter specified under Section 5.705(C).

Commented [A15]: The "worst case scenario" is not the same as using the most conservative model inputs available. For example, this provision would require that ground reflection be set to 0, which does not reflect any scenario in the real world. Simply requiring all model inputs to be dialed to their most conservative setting would yield a "penalty" on the order of several dBA, below the already low 40 dBA standard, rendering wind development infeasible.

Moreover, Section 5.706(C) of the Draft Rule already requires rigorous post-construction monitoring and adjustment of the pre-construction modeling. That provides certainty and an incentive for developers to provide reliable sound models.

Commented [A16]: The 3-mile radius proposed by the Board is considerably more than required to reach the 30 dBA level specified in the first paragraph of Section 5.705.

Commented [A17]: This language is consistent with the IEC standard.

Commented [A18]: Modeling under specific meteorological conditions may not be possible.

Commented [A19]: A ground factor of 0.5 is sufficiently conservative to represent "worst case" conditions. Using the "most conservative" input for all types of terrain will produce an unreasonable (and unrealistic) model, and amount to a penalty on the order of several dBA. Combined with the already low 40 dBA limit and the uncertainty adjustments required by the Draft Rule, this requirement will make wind development infeasible.

Commented [A20]: These factors can be excluded to provide additional conservatism.

(7) Addition of an "uncertainty factor" adjustment to the maximum rated output of the sound sources based on the manufacturer's recommendation. ~~and~~

~~(8) An addition to the maximum rated output of the sound sources to account for uncertainties in the modeling of sound propagation for wind energy developments.~~

(D) A description of proposed major sound control measures, including their locations and expected acoustical performance;

(E) A comparison of the expected sound levels from the proposed wind generation facility with the sound level limits of this ~~r~~Rule.

(F) A description and map identifying one or more compliance testing locations on or near the proposed wind generation facility site. The identified compliance testing locations shall be selected to take advantage of prevailing downwind conditions and ~~be able to meet the~~satisfy to the extent practicable the site selection criteria outlined in Section 5.707(D).

(G) A CPG Holder shall update, supplement, and/or amend the sound model due to any ~~changes~~ changes that result in a material increase in the predicted facility sound pressure level ~~to the sound-producing elements of the facility~~ prior to commencing site preparation or construction of the facility. An opportunity to review and comment on any change to the sound model, and to request a hearing, shall be given to all parties to the 30 V.S.A. § 248 proceeding who have standing on the issue of sound. The Board may, in its discretion, grant a hearing if a party who has standing on the issue of sound demonstrates that the revised sound model represents a "substantial change" as defined in Board Rule 5.400. The CPG Holder must receive Board approval of any changes to the sound model prior to commencing site preparation or construction of the facility.

5.706 Post-Construction Sound Monitoring

Sound monitoring shall take place during the times specified in section 5.707(D), in accordance with the requirements of this rule and any requirements of the~~t~~ CPG, which shall specify the minimum number of ~~residences to be monitored~~compliance monitoring locations, the radius from the nearest facility turbine in which monitoring locations may be selected, and the time period of monitoring. The monitoring will be used to verify the accuracy of the pre-construction modeling and facility compliance with CPG conditions and the requirements of this rule. Based upon the results of the initial post-construction sound monitoring or changes to the Facility, ~~In addition to the requirements of this rule and the CPG, at its discretion,~~ the Board may require additional monitoring if the results of the post-construction monitoring show exceedances of the sound level limit. ~~based on the results of the initial post-construction sound monitoring or as a result of changes to the facility or its operation.~~

(A) Monitoring by the State. Post-construction sound monitoring shall be conducted under the direct supervision and control of a State of Vermont agency or agencies designated by the Board. The post-construction sound monitoring shall be paid for by

Commented [A21]: Requiring multiple, cumulative adjustments for uncertainty will effectively set a sound limit well below 40 dBA, which is neither justified or necessary (and will render any commercial wind development in Vermont infeasible). Moreover, since the additional adjustment required in this section is undefined, it will be the subject of significant litigation.

Commented [A22]: As currently worded, the Draft Rule would require an updated sound model due to de minimis changes (e.g., replacing a transformer) or changes that actually reduce sound levels.

Commented [A23]: This is standardless and essentially negates the regulatory certainty and uniformity that a rule is intended to achieve. Additional monitoring should not be an option unless it is demonstrates that some threshold has been met or not met.

the CPG Holder.

(B) Monitoring Locations. A petition for a CPG for a wind generation facility shall include proposed monitoring locations for post-construction monitoring. Such locations shall ~~include residential locations that are anticipated to experience the maximum highest sound levels based on the pre-construction sound modeling for the wind generation facility~~comply with the requirements of Section 5.707(D).

(C) Modification of pre-construction sound model. A CPG Holder is required to identify the appropriate inputs and/or assumptions, and modify the pre-construction sound model if the post-construction sound monitoring indicates that there is a reasonable likelihood that the expected ~~maximum~~ highest sound levels at any of the monitoring locations would be equal to or greater than 3 dBA above those modeled if that location has a model level that exceeds 35 dBA, or would result in an exceedance of the sound level standard specified in Section 5.703. All parties to the 30 V.S.A. § 248 or § 8010 proceeding who have standing on the issue of sound shall be given an opportunity to review and comment on any change to the sound model. The Board may, in its discretion, grant a hearing if a party who has standing on the issue of sound demonstrates that the revised sound model represents a "substantial change" as defined in Board Rule 5.400.

5.707 Sound Monitoring Methodology

(A) Measurement Personnel. Measurements shall be supervised by personnel who are well qualified by training and experience in measurement and evaluation of environmental sound~~, or by personnel trained to operate under a specific measurement plan~~. Board certification through the Institute of Noise Control Engineering would ~~be sufficient to~~ qualify under this section.

(B) Measurement Instrumentation. The sound meter or alternative sound measurement system used shall meet all appropriate industry standards and specifications. Each monitoring site shall include installation of an anemometer and other equipment or sensors capable of gathering and recording ~~sound meter level~~weather conditions at the microphone (wind speed, wind direction, temperature, and precipitation) and ~~installation~~ be equipped with ~~of enhanced~~ wind screens capable of significantly reducing or eliminating wind-induced noise contamination over the ~~sound meter~~ microphone. The measurement instrumentation shall meet the following specifications unless otherwise approved by the Board:

1. A sound level meter or alternative sound level measurement system used shall meet all of the Type ~~0 or~~ 1 performance requirements of American National Standard Specifications for Sound Level Meters, ANSI S1.4.

2. An integrating sound level meter (or measurement system) shall also meet the Type 0 or 1 performance requirements for integrating/averaging in the International Electrotechnical Commission Standard on Integrating-Averaging

Commented [A24]: This term is undefined and unnecessary.

Commented [A25]: Since a Type 0 meter satisfies the performances requirements of a Type 1 meter by definition, it is not necessary to specify here.

Sound Level Meters, IEC Publication 61672-1 ~~and ANSI 1.43~~.

3. A filter for determining the existence of tonal sounds shall meet all the requirements of the American National Standard Specification for Octave-Band and Fractional Octave-Band Analog and Digital Filters, ANSI S1.11 and IEC 61260, Type 3-D performance.

4. The acoustical calibrator used shall be of a type recommended by the manufacturer of the sound level meter and one that meets the requirements of American National Standard Specification for Acoustical Calibrators, ANSI S1.40.

~~5. The microphone windscreen used shall be of a type recommended by the manufacturer of the sound level meter.~~

~~6.~~5. Anemometer(s) used for surface (10 meter (m)) (32.8 feet) wind speeds shall have a minimum manufacturer specified accuracy of ±1 mph providing data in ~~one~~ ten-second integrations and 10 minute average/maximum values for the evaluation of atmospheric stability.

~~7.~~6. Audio recording devices shall be time stamped (hh:mm:ss) ~~and at a minimum 16 bit digital~~, recording the sound signal output from the measurement microphone ~~at a minimum sampling rate of 24 thousand (k) samples per second~~ to be used for identifying events. Audio recording and compliance data collection shall occur through the same microphone/sound meter and bear the same time stamp.

(C) Equipment Calibration

1. The sound level meter shall have been calibrated by a laboratory within ~~12~~ 24 months of the measurement, and the microphone's response shall be traceable to the National Institute of Standards and Technology.

2. Field calibrations shall be recorded before and after each measurement period ~~and at shorter intervals if recommended by the manufacturer~~.

3. Anemometer(s) and vane(s) shall have been calibrated by the manufacturer to maintain stated specification within 12 months of the measurement.

(D) Compliance Measurement Location, Configuration, and Environment

1. Compliance measurement locations shall be ~~at locations that have been~~ approved by the Board during its review of a facility's request for a CPG ~~and that are most likely affected by maximum sound levels from routine operation of the wind generation facility~~ and shall be representative of the non-participating Residences expected to realize the highest Facility-only sound levels, ~~. Locations are ,~~ subject to permission from the respective property

Commented [A26]: This standard is no longer supported by ANSI.

Commented [A27]: This limitation could inadvertently prohibit the use of oversized windscreens.

Commented [A28]: One-second data is not practicable to provide. Even the highest-end equipment often provides only 10-second averages, which are sufficiently precise.

If the Board requires wind data in short-intervals, it should clarify that sonic anemometers are acceptable.

Commented [A29]: Sound level meters are commonly calibrated every 24 months, while field calibrators are calibrated every 12 months.

Commented [A30]: No manufacturers recommend shorter intervals for field calibration.

owner(s).

a. To the greatest extent possible, compliance measurement locations shall be at the center of unobstructed areas that are maintained free of vegetation and other structures or material that is greater than 2 feet in height for a 75-foot radius around the sound and audio monitoring equipment.

b. To the greatest extent possible, meteorological measurement locations shall be at the center of open flat terrain, inclusive of grass and minimum number of obstacles that are less than 6 feet in height for a 250-foot radius around the anemometer location. The meteorological data measurement location need not be coincident with the sound and audio measurement location provided there is no greater than a 5-mile separation between the data collection points and the measurement locations have similar characterization (i.e., same side of the mountain ridge, etc.).

c. Meteorological measurements of wind speed and direction shall be collected using anemometers at a 10-meter height (32.8 feet) above the ground. Results shall be reported, based on ~~1~~ten-second integration intervals, synchronously with ~~hub-level~~wind turbine nacelle measurements and sound level measurements at 10-minute measurement intervals. The wind speed average and maximum for each 10-minute interval shall be reported.

d. The ~~sound~~ microphone shall be positioned at a height of approximately 4 to 5 feet above the ground, and oriented in accordance with the manufacturer's recommendations.

e. When reasonably possible, measurement locations should be at least 50 feet from any sound source. Non-facility sources of sound shall be noted in the analysis. ~~other than the wind energy development's power generating sources.~~

2. The CPG Holder shall provide all relevant turbine operational data for the monitoring period, including the date, time, and duration of any noise reduction operation or other ~~interruptions in operations if present~~ operational changes that occur during the compliance measurement period.

(E) Determination of Background/Ambient Sound Levels. Turbine shutdowns may be conducted to determine background/ambient sound levels.

5.708 Compliance Data Collection, Measurement, and Retention Procedures

(A) Measurements of operational, sound, audio, and meteorological data shall occur as set forth in Section 5.707.

Commented [A31]: It is not clear whether this refers to the ground-level equipment specified in Section 5.707(B) or the 10-meter equipment specified in Section 5.707(D)(1)(c). Each ground-level meteorological station should be as close as possible to the corresponding sound level meter to ensure that conditions are accurately measured.

Commented [A32]: The Board should specify that background/ambient sound levels are determined using a turbine shutdown methodology. The language proposed here is based on the Department of Public Service's proposed rule.

(B) All operational, sound, audio, and meteorological data collected shall be retained by for a period of 1 year from the date of collection and subject to inspection upon request.

(C) Within 72 hours of the completion of the field measurements, the State of Vermont agency or agencies designated by the Board shall certify to the Board ~~After the monitoring period, confirmation~~ that the required monitoring conditions were present ~~shall be certified to the Board.~~ Electronic notice during non-business hours shall be sufficient ~~provided the required monitoring conditions were present during the monitoring period~~.

Commented [A33]: A reasonable period of time should be provided for analyzing data in order to make the required certification.

(D) Monitoring and data collection shall occur at a minimum:

1. Once during the first year of facility operation;

2. Once during each successive fifth year thereafter until the facility is decommissioned; and

3. In response to a complaint if ordered by the Board after notice to the CPG Holder and opportunity to be heard.

(E) All sound ~~level, audio, and~~level and meteorological data collected during a compliance measurement period that meets or exceeds the specified wind speed parameters shall be submitted to the Board for review and approval. All data shall be submitted by the the State of Vermont agency or agencies designated by the Board to the Board within 6~~3~~0 days of completion of the monitoring period as part of the post-monitoring report. Audio recordings will be only be submitted upon request and may be filtered to exclude private conversations and/or submitted under a confidentiality order.

Commented [A34]: Thirty days is a very short timeframe to provide this information, given the amount of data analysis required.

(F) Measurements shall be obtained when the Facility is operating normally and during weather conditions when the w~~i~~nd turbine sound is dominant and overall sound levels are not influenced by non-Facility sounds. ~~most clearly noticeable,~~ Such conditions are generally expected when the measurement location is downwind of the wind generation facility and maximum surface (10 meter) wind speeds are < 6 miles per hour (mph) with concurrent turbine hub-elevation wind speeds sufficient to generate the ~~maximum~~ highest ~~continuous rated~~apparent sound power ±1 dB from the nearest wind turbines to the measurement location. A downwind location is defined as within 45º of the direction between a specific measurement location and the acoustic center of the five nearest wind turbines, or fewer if the wind generation facility does not have five wind turbines.

Commented [A35]: subjective which could be problematic.

(G) In some circumstances, it may not be feasible to definitively satisfy all of the meteorological and operational requirements set forth in Section 5.708(F)~~meet the wind speed and operations criteria due to terrain features or limited elevation change between the wind turbines and monitoring locations~~. In these cases, measurement

periods are acceptable if the following conditions are met:

1. The difference between the L_{A90} and L_{A10} during any 10-minute period is less than 5 dBA; and

2. The surface wind speed (10-meter height) (32.8 feet) is 6 mph or less for 80% of the 10-minute period measurement period and does not exceed 10 mph at any time, or the turbines are shut down during the monitoring period and the difference in the observed L_{A50} after shutdown is equal to or greater than 6 dBA; and

3. Observer logs or recorded sound files clearly indicate the dominance of wind turbine(s).

4. Measurement intervals affected by increased biological activities, leaf rustling, traffic, high water flow, aircraft flyovers, or other extraneous ambient noise sources that affect the ability to demonstrate compliance shall be excluded from all compliance report data. The intent is to obtain 10-minute measurement intervals that entirely meet the specific criteria and represent Facility-only sound pressure levels.

5.709 Reporting of Compliance Measurement Data

Compliance Reports shall be submitted by the State of Vermont agency or agencies designated by the Board within 60 days of completion. The Board ~~to the Board and made~~shall make the report publicly available. ~~within 30 days of the completion of the sound monitoring period or upon request by the Board and shall include, at a minimum, the following~~The report shall include at a minimum the following:

Commented [A36]: Requiring compliance reports to be submitted within 30 days of the completion of monitoring may be unrealistic, given the amount of data to be analyzed.

(A) A narrative description of the sound from the wind generation facility for the compliance measurement period;

(B) The dates, days of the week, and hours of the day when measurements were made;

(C) The wind direction and speed, temperature, humidity, and sky condition;

(D) Identification of all measurement equipment by make, model, and serial number;

(E) All meteorological, sound, windscreen, and audio instrumentation specifications and calibrations;

(F) All A-weighted equivalent $L_{A10,}$ L_{A50} and L_{A90} sound levels for each 10-minute measurement interval;

~~(G) All L_{A10} and L_{A90} percentile levels;~~

~~(H)~~(G) All 10 minute 1/3 octave band ~~linear~~ unweighted and equivalent sound levels

(dB);

~~(I)~~(H) ~~Audio recording devices shall be time stamped (hh:mm:ss) and at a minimum 16-bit digital, recording the sound signal output from the measurement microphone at a minimum sampling rate of 24 thousand (k) samples per second to be used for identifying events. Audio recording and compliance data collection shall occur through the same microphone/sound meter and bear the same time stamp.~~ Should any sound data collection be observed by a trained attendant, the attendant's notes and observations shall be summarized and included with the Compliance Report;

~~(J)~~(I) ~~All~~ concurrent time-stamped, turbine-operational data including the date, time, and duration of any noise-reduction operation or other interruptions in operations, if present; and

~~(K)~~(J) All other relevant information determined necessary by the Board.

Commented [A37]: These requirements are already set forth in Section 5.707(B)(6), and are not relevant to the contents of Compliance Reports.

5.710 Response to Complaints

Complaints raised by residents located near the wind generation facility shall be responded to in a manner consistent with the complaint response procedure(s) issued by the Vermont Department of Public Service pursuant to Section 5c of Public Act 130 (2016 Vt., Adj. Sess.)