Surrebuttal Hayes 8

Mr. Hankard

(a) Refute Mr. Hankard's opinion that a single calculated decibel level at a residence is more accurate than sound levels represented by a contour map. A contour map is made by setting up a grid pattern and then using the model to calculate the decibel sound levels at the grid points. The more grid points used in making the map, the more accurately the map indicates sound levels across the entire property. The next step is to connect points that have the same values. For example, connect all 43.0, then 42.5, then 42.0, then 41.5, etc. Color coding ranges demonstrates how the sound changes across the entire land owner's property. (see contour map example [Hayes 9]) It does not make sense that one sound level calculation is a more accurate descriptor of sound on a property than several thousand sound level calculations for the same property. Additionally, the sample contour map presented comes from the "Best Practices Guidelines For Assessing Sound Emissions From Proposed Wind Farms" (Title page attached)

This "**Best Practices Guideline**" uses contour maps, as a best practice, to show sound levels for proposed wind farms. Furthermore, Invenergy's application for the Cal Ridge Wind Farm included a contour map of predicted sound contours in it's Cal Ridge application. (page A-3)

(b) Discredit and refute Mr. Hankard's opinion that the Pleasant Ridge model is over predicting sound levels by 2 db.

First, let us consider source of the 41 db. The 41 db was suggested by Mr. Hankard without any documented, verifiable proof. But what we do have are the model predicted maximum sound level values for all homes in the Cal Ridge Wind Farm. The maximum calculated value for 1000 Hz is 40 db. (page 7 – Sound Analysis Report in the Cal Ridge Application [Hayes 10]) Mr. Hartke's home has to be 40 db or less (Report did not list homes with receptor numbers). The 40 db is in print (table 6, 1000 Hz)!

Second, let us consider the source of the 39 db.

The 39 db is an average of 35 sound level measurements made near Mr. Hartke's home in the Cal Ridge windfarm noise level compliance study. The correct, accurate average for these 35 measurements is 39.4 db, not 39 db. Why not report 39.4 db?????

(See Pleasant Ridge exhibit 48, page 44 item number 7 for detailed information on how the 39.4 db averaged value was calculated.)

Furthermore, subtracting an ***averaged* measured sound level** value from the model's single calculated/predicted value is very misleading and is not a scientifically correct comparison. The maximum predicted value and the maximum measured value need to be compared.

Mr. Hankard's opinion is not based on science or even common sense. The only correct method to determine if the model is over predicting for Pleasant Ridge would be to compare **Pleasant Ridge** measured values to **Pleasant Ridge** predicted values. In other words, pick a single home and compare maximum predicted and maximum measured sound level values for that home. For Mr. Hartke's house the maximum possible predicted value is 40 db (probably less) and the maximum measured value from the Cal Ridge Study is 41.8 db (Table 7-5). The model is ***not over predicting*** as Mr. Hankard stated, the model ***is under predicting***. The model predicted 40 db and the Cal Ridge Study measured 41.8 db. The measured value is 1.8 db above the predicted value!!!!!! An obvious possibilty would be that the IPCB maximum nighttime limits would likely be exceeded by homes with predicted values near the maximum value of 41.0 db for the proposed Pleasant Ridge Wind Farm. I am using verifiable, published numbers to support my opinion. Where is Mr. Hankard's value of 41 db in print?

(c) Refute Mr. Hankard's statement that amplitude modulation can be disregarded because amplitude modulation occurs in the infrasound range and people cannot hear infrasound. Mr. Hankard ***is not*** a scientist who specializes in research of the ear and the effects of infrasound on the cochlea of the ear. Dr. Alec N. Salt of

Washington University in Saint Louis has researched infrasound detection by the ear. See paragraphs 2 and 3 in "Wind Turbines can be hazardous to Human Health" article (Hayes 11). Dr. Salt stresses that "the low frequency part of the ear is extremely sensitive to infrasound". Amplitude modulation results in increased infrasound db levels.
And since the ear is sensitive to infrasound, the effects of amplified infrasound as a possible health hazard cannot be disregarded!

In conclusion, I find Mr. Hankard's rounding of 39.4 db to 39 db, his not using the Cal Ridge model predicted maximum value of 40 db for Mr. Hartke's home from the Cal Ridge application, his using an averaged number (39 db) instead of the maximum published Cal Ridge value of 41.8 db to be misleading and unprofessional for an expert witness.

Table 5 summarizes the daytime sound analysis. The daytime sound analysis compares Cadna-A results with the maximum allowable daytime sound emissions per octave band to determine compliance with applicable Illinois sound limits at Class A land uses, such as residences.

Table 5
Summary of Daytime Sound Analysis

Data Type	Octave Band (dB)								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Cadna-A Modeling Results	68	64	54	43	38	40	35	18	0[1]
Maximum allowable daytime sound level	75	74	69	64	58	52	47	43	40
Δ Maximum allowable daytime sound level versus maximum predicted Project related sound levels	-7	-10	-15	-21	-20	-12	-12	-25	-40

[1]*Negative sound levels have been rounded to 0 dB*

Daytime sound analysis results in Table 5, above, indicate that noise from 134 wind turbines are at least 7 dB below the maximum allowable sound limit in all octave bands at all noise-sensitive receivers included in this analysis. Existing daytime ambient sound levels within the Project Area exceed the maximum Project-related sound levels in all eight octave bands. Existing sound levels exceed project-related sound levels by at least 9 dB in all octave bands.

Table 6 summarizes the nighttime sound analysis. The daytime sound analysis compares Cadna-A results with the maximum allowable nighttime noise level per octave band to determine compliance with applicable Illinois sound regulations.

Table 6
Summary of Nighttime Sound Analysis

Data Type	Octave Band (dB)								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Cadna-A Modeling Results	68	64	54	43	38	40	35	18	0[1]
Maximum allowable nighttime sound levels	69	67	62	54	47	41	36	32	32
Δ Maximum allowable nighttime sound levels versus maximum predicted Project related sound levels	-1	-3	-8	-11	-9	-1	-1	-14	-32

[1]*Negative sound levels have been rounded to 0 dB*

Nighttime sound analysis results in Table 6, above, indicate that sound from 134 wind turbines meets the maximum allowable sound limit in all octave bands at all noise-sensitive receivers within 1 mile of the Project Area. Predicted project-related sound levels are anticipated to be at least 1 dB below