Reasons to vote "No"

By John Hayes- a person whose family and friends will be affected by the "proposed Wind Farm"

- I would like to thank the committee for the opportunity to provide testimony about this life changing issue: The Pleasant Ridge Wind Farm.
- **Background:** I have lived in Fairbury for the last 44 years and taught in the Prairie Central School District for 30 years and 8 years in Gilman.
- I have a bachelor degree from Illinois State University with a major in Chemistry and a minor in Math.
- I have a Masters degree from Eastern Illinois University in Physical Science(Physics and Chemistry) with all science classes being in the area of Physics except one chemistry class. In other words, my masters work was in Physics! The classes I took covered all major areas of Physics including waves, **sound**, ultrasound, **infrasound**, and many other areas of Physics.
- In addition, I completed three summer long workshops whose purpose was improve the teaching of Physics in the United States.

- I suspect my testimony may be referred to as invalid because I do have certification as a medical doctor, an acoustician, an appraiser, or other specialized certifications. The testimony I will present does not require a special certification. My science background is more than sufficient to read scientific study conclusions.
- In addition, my background does give me the knowledge to determine what constitutes a valid, unbiased scientific study.

Overview: I will provide evidence that the Pleasant Ridge Wind Farm does not comply with some of the county's *"Standards For Special Use"*.

- Standard 2 states "will not be detrimental to or endanger the public health, safety, morals, comfort or general welfare"
- **PUBLIC HEALTH** : Ellenbogen, Invenergy's witness: No evidence linking wind turbines to physiologic changes in humans: headaches, sleep disorders, etc.
- The Geese Study proves turbines cause physiological change in geese; humans and geese are both mammals, but geese possibly could react differently to turbines than humans. Unfortunately this is not absolute proof.
- *The Cape Bridgewater Study* proves that Wind Turbines produce physiological changes in humans. (This study was published after Ellenbogen presentation)

The Cape Bridgewater's Conclusion:

- *Short side note*: After Dr. Punch's testimony and cross, I checked a few people in attendance to determine if they understood the importance of the Cape Bridgewater Study. My concern was that the nearly constant interruption distracted the audience enough that they missed the message. Unfortunately I was correct. I will do my best to make sure everyone knows why this *peer reviewed study* is a new benchmark that connects Wind Turbines to a physiological response in humans. (Invalidates Ellenbogen's earlier testimony)
- I will start with a very simple summary of the study. Six self reported people were experiencing headaches, pressure in the head, ears, chest, ringing in the ears, heart racing, or sensation of heaviness. You also might recall the testimonies of Paula Kelson and Ambiro Cavazos' who reported similar sensations were experienced by 5 of the 12 visitors during short duration visits to nearby wind farms.
- Dr. Steven Cooper found that the six Cape Bridgewater residents were able to detect turbine emissions even when they could not hear or see the turbines.

- As part of the study, these 6 people keep a diary where they regularly rated the severity of the sensations they felt using a numbered scale. The highest severity ratings occurred when the turbine changed power output by 20% or more. In other words, when starting up, stopping, increasing power, or decreasing power, people reported the highest sensation ratings, even without hearing or seeing the turbines.
- This experiment is the first one to prove cause and effect for turbines. These people were reporting increases in sensations(headaches, etc) that matched perfectly with turbine power output change; despite the fact that it was not possible for these six people to know that the turbines were changing power output. Something from the turbines (which is the cause) was producing the symptoms (which is the effect) in the six residents. Maybe the following analogy will help clarify what was occurring with these residents.

- Analogy: A friend of mine in another state makes a bobble head doll that looks like me. At 8:00 am he strikes it and I get a headache. I had no idea that he struck the doll, only that I got a headache at 8:00 am. At 9:00 am he strikes it again, and again I get a headache. I have no idea why I am getting headaches, but every time my friend hits the doll, I get a headache. After talking to my friend, I determine that the hitting of the doll and my headaches are connected. This is similar to what happened during The Cape Bridgewater study. When the turbines changed power output by 20% (increase output, decrease output, start up, or stop) the residents diaries recorded an increase in sensations (headaches, pressure in the head, ears, chest, ringing in the ears, heart racing, or sensation of heaviness).
- Proof that the operating turbine was causing physiological changes in the residents.

- This study proves conclusively that *turbines do affect* the public health and comfort or general welfare.
- Further evidence for ***PUBLIC HEALTH*** non compliance!
- I was unable to find any study on Wind Turbines and sleep disturbance. I did find a study by Dr. Ellenbogen and others investigating hospital sounds and sleep disturbance. A small part of the study indicates that sounds from wind turbines are related to sleep interruptions.
- Page xi, letter D "With regard to other stimuli, those with shifting contours (towel dispenser, door close, toilet flush, ice machine) tended to be more arousing than those with continuous contours(traffic and laundry cart)." One possible application of this result could be that a sleeping person is more likely to be aroused by the pulsating sound of a turbine blade than continuous road traffic. People who live heavily used roads are more likely to get used to this type of sound and not a repeating, pulsating sound.

- Page 29, last paragraph "A newly reported concern for rural settings-where readings have shown very low ambient sound levels--is the installation of wind turbines. Some citizens, even those who had expressed support for turbine installations, have reported sleeplessness and other health and quality-of-life problems. Because the characteristic sounds include significant low frequency exposures, consideration may be needed in planning adequate hospital building envelopes in some rural settings. Future research should explore sleep disruption from low frequency sounds especially as related to wind and turbine rotational speeds.
- This last sentence contains the phrase: "explore sleep disruption from low frequency sounds especially as related to wind and turbine rotational speeds. Ellenbogen and his coauthors are acknowledging that turbine sound can disrupt sleep. If sleep disruption did not exist, then there would be nothing to explore!

- This statement about turbines and sleep disruption is in Ellenbogen's Noise Study. The statement clearly communicates that Wind Turbines *do cause sleep interruptions* and hospitals in rural settings may need special building design to keep turbine noise from entering the hospital!

- I found the following statement by Ellenbogen in an online article about his Noisy Hospital Study: (10th paragraph)
- The other surprises: The sleepers heart rates temporarily jumped as much as 10 beats per minute as they were aroused, the researchers reported. And they didn't remember most of the disruptions even though brain recordings clearly showed their sleep was interrupted, which suggests that patients' complaints are underestimating the problem.
- "My god, we delivered 100 sounds to this person and woke them up 40 times and they're reporting to us just a couple of awakings", Ellenbogen said with disbelief.
- The above study research indicates noise (Wind Turbine Noise is noise) can result in interrupted sleep and the sleeper may not even be aware their sleep was interrupted by the noise source. There are many reported cases of sleep interruptions from a Wind Turbine. I believe, from the study results, that additional people are having interrupted sleep and are not aware of this fact and therefore are not reporting turbines as interrupting there sleep. Interrupted sleep is harmful to health!
- This violates the "STANDARDS FOR SPECIAL USE".

This study by Ellenbogen and others acknowledges that turbine noise can cause sleep interruption. *Ellenbogen's testified that turbine noise does not interrupt sleep*. This study, that Ellenbogen coauthored in 2012, brings up the increasing concerns of low frequency ***turbine noise*** disrupting sleep, especially in rural areas.

- Ellenbogen's testimony at the Pleasant Ridge Windfarm hearings is contradicted by the beliefs he supported in his Research Study. His change of opinion concerns me greatly. Based on Ellenbogen's beliefs presented in this study and the fact Ellenbogen was compensated for his testimony, lead me to strongly question the validity of his testimony.

- Another reason to vote NO! is the fact that the predicted ISO model's decibel values due not include sound increases due to Amplitude Modulation and Resonance. Mr. Hartke testified that sound levels inside the bedrooms of his home were louder than sound levels outside his home. How can this be explained?????? There is only one valid scientific explanation. The answer is the well known and documented scientific property of *Resonance!*
- Unfortunately for Mr. Hartke, his bedrooms naturally vibrate at a sound frequency given off by the turbines and the sound energy produced standing waves in the bedrooms which resulted in an increase in loudness of the turbine noise. The noise drove his family out their bedrooms into the family room in an effort to get sleep! Resonance caused sound levels to exceed IPCB limits which was indicated by Mr. Hartke's testimony of excessive noise levels.

- One of the purposes of the CAL RIDGE STUDY was to prove that the sound levels at Mr. Hatrke's house did not exceed IPCB maximum values. The data provided by the study did not contain *all* vital information needed to determine the validity of the study. The power output of individual turbines was not included, only that the farm as a whole was operating at an average of 98% capacity. With a wind farm of approximately 100+ turbines, the problem turbines near Mr. Hartke home could have been operating considerably below 98% , while many other turbines could have been operating at 100% capacity. If true, this study would be misleading!

- I would encourage the County Board to request the operating output megawatts of all individual turbines during the Cal Ridge study! Invenergy needs to be more transparent!

Table 7-5: Analysis of Complaint Times During Noise Study

Date and Hour of Complaint	Turbine 57 Speed (rpm)	Turbine 75 Speed (rpm)	Site Power (% full)	P2 500 Hz Noise Level (dB)	P2 1k Hz Noise Level (dB)	Notes
8/24/2013 6:55	13	12	68	36	33	Relatively low turbine operations
8/26/2013 4:00	14	0	76	38	29	Relatively low turbine operations
8/27/2013 7:00	8	13	50	41	36	Relatively low turbine operations
8/28/2013 3:00	0	15	77	43	33	Moderate turbine operations
9/2/2013 6:50	11	12	48	37	30	Relatively low turbine operations
9/7/2013 4:00	0	0	40	31	23	Turbine 56 only was on, as noted by resident
9/19/2013 0:00	0	0	48	37	28	Turbine 56 only was on, as noted by resident
9/19/2013 23:00	15	15	99	46	41	Near maximum turbine operations
9/22/2013 23:00	0	0	37	36	30	Turbine 76 only was on, as noted by resident
9/24/2013 1:00	14	15	69	38	31	Moderate turbine operations
9/28/2013 23:00	14	14	75	44	38	Near maximum turbine operations
10/26/2013 20:00	13	13	81	40	33	Moderate turbine operations
10/30/2013 21:00	15	15	99	47	43	Ground wind 8 m/s
10/31/2013 21:00	13	12	71	42	36	Moderate turbine operations
11/1/2013 21:00	13	13	70	43	37	Moderate turbine operations
11/4/2013 5:00	14	15	99	44	38	Near maximum turbine operations
11/4/2013 21:00	15	15	99	46.5	41.2	Near maximum turbine operations
11/4/2013 22:00	15	15	99	46.5	41.2	Near maximum turbine operations
11/7/2013 17:00	15	15	99	---	---	No noise data at Prime 2
11/8/2013 0:00	13	14	86	---	---	No noise data at Prime 2
11/9/2013 3:00	15	15	99	49	45	Ground wind 7 m/s
11/9/2013 22:00	15	15	99	46.9	41.8	Hour noted in Section 7.1
11/15/2013 4:00	13	14	89	43	37	Near maximum turbine operations

Table 7-6: Comparison of Complaint Times Prior to Noise Study

Date and Hour of Complaint	Turbine 57 Speed (rpm)	Turbine 75 Speed (rpm)	Site Power (% full)	Notes
5/9/2013 21:00	15	15	87	Near maximum turbine operations
5/11/2013 23:00	15	15	98	Near maximum turbine operations
5/12/2013 2:00	14	15	94	Near maximum turbine operations
5/19/2013 23:00	15	15	99	Near maximum turbine operations
5/20/2013 22:00	15	15	95	Near maximum turbine operations
5/23/2013 2:00	10	13	53	Moderate turbine operations
5/26/2013 23:00	15	15	99	Near maximum turbine operations
5/27/2013 3:00	13	13	70	Moderate turbine operations
5/27/2013 4:00	14	14	96	Near maximum turbine operations
5/27/2013 5:00	14	13	85	Near maximum turbine operations
5/27/2013 6:00	15	15	96	Near maximum turbine operations
6/16/2013 4:00	12	13	80	Moderate turbine operations
6/19/2013 1:00	12	11	49	Moderate turbine operations
6/19/2013 23:00	12	11	63	Moderate turbine operations
6/21/2013 1:00	14	14	84	Near maximum turbine operations
6/24/2013 23:00	14	14	84	Near maximum turbine operations
6/25/2013 0:00	14	14	81	Near maximum turbine operations
6/25/2013 22:00	12	12	77	Moderate turbine operations
6/25/2013 23:00	14	13	89	Near maximum turbine operations
6/26/2013 5:00	14	14	90	Near maximum turbine operations
7/1/2013 23:00	13	12	85	Near maximum turbine operations
8/2/2013 7:00	11	13	85	Near maximum turbine operations

Table 7-1: Prime 2 Measured and Analyzed Noise Levels

Month	Day	Hour	Noise Levels with All Sources		Noise Levels without Vehicles		Thresholds		Ground Wind Speed	Ground Wind Direction	Turbine 57	Turbine 75	Turbine 56	Turbine 76	Site Power
			500 Hz	1,000 Hz	500 Hz	1,000 Hz	500 Hz	1,000 Hz	(m/s)	(N=0, deg)	(rpm)	(rpm)	(rpm)	(rpm)	(megawatt)
11	20	3	42	36	41.1	33.2	44	36	0.4	131	13	14	13	13	179.638
11	10	4	46	41	45.8	39.6	47	41	0.5	229	n/a	n/a	n/a	n/a	n/a
11	10	2	45	40	44.4	38.6	46	40	0.8	225	n/a	n/a	n/a	n/a	n/a
11	10	3	46	41	45.4	39.4	47	41	0.9	225	n/a	n/a	n/a	n/a	n/a
11	5	22	47	44	46.3	41.4	48	43	0.9	225	15	15	13	15	201.991
11	9	23	42	37	42.1	35.9	45	38	1.2	143	14	15	15	15	202.314
11	9	23	46	42	45.2	40.3	47	42	1.2	225	15	15	15	15	202.518
11	9	22	42	37	41.7	34.9	44	37	1.3	150	14	15	14	14	197.872
11	10	5	46	42	45.2	39.0	47	41	1.3	225	n/a	n/a	n/a	n/a	n/a
11	10	0	46	41	45.1	39.6	46	41	1.4	225	n/a	n/a	n/a	n/a	n/a
11	4	0	42	36	41.8	35.0	44	38	1.5	135	13	14	14	15	198.159
11	4	1	42	37	42.1	36.3	44	39	1.6	139	15	15	15	15	202.844
11	10	1	45	40	44.5	39.2	46	41	1.6	225	n/a	n/a	n/a	n/a	n/a
11	11	4	46	41	46.0	38.5	48	41	1.8	135	14	14	13	13	198.563
11	4	2	42	37	42.0	36.2	45	38	1.9	150	15	15	15	15	202.953
11	4	3	44	38	43.8	37.0	46	39	2.0	135	14	15	15	15	203.010
11	15	2	44	38	43.0	35.5	45	38	2.1	120	13	14	13	14	187.073
11	16	5	44	42	43.7	37.2	45	39	2.1	113	14	14	14	14	188.501
11	15	1	43	38	42.2	34.9	44	37	2.2	150	12	14	12	13	190.428
11	16	0	44	37	43.0	36.3	45	38	2.3	128	13	14	13	14	189.555
11	14	23	44	40	43.9	38.5	46	40	2.5	128	15	15	14	15	202.404
11	15	4	44	40	43.2	36.7	45	40	2.7	113	13	14	14	14	193.396
11	5	2	46	39	45.2	37.5	48	42	2.7	143	13	14	13	13	180.329
11	1	2	46	41	44.7	39.7	46	41	2.8	240	14	15	14	15	194.021
11	11	3	46	41	45.4	37.7	48	41	2.9	128	14	14	13	12	194.332
11	4	23	47	42	46.3	40.3	48	42	2.9	120	14	15	15	15	199.455
11	4	22	47	42	46.5	41.2	48	42	3.0	113	15	15	15	15	203.045
11	4	4	44	40	43.7	38.1	47	40	3.0	158	15	15	15	15	203.025
11	4	5	44	40	43.7	38.0	46	39	3.1	148	14	15	15	15	202.002
11	14	2	47	42	45.4	40.8	49	43	3.1	173	15	15	15	15	202.869
11	1	3	45	40	45.0	39.7	47	43	3.3	225	15	15	15	15	201.498
11	14	22	46	42	43.9	39.1	48	42	3.4	143	15	15	15	15	202.911
11	16	0	46	41	44.4	40.2	46	42	3.4	158	15	15	15	15	202.984
11	1	1	47	43	45.4	41.0	48	42	3.4	229	15	15	15	16	199.684
11	12	4	45	40	44.2	38.4	47	42	3.5	113	14	14	14	13	179.387
11	1	4	45	41	44.7	39.1	47	41	3.5	225	15	14	15	15	203.039
11	13	22	48	42	47.0	41.5	49	43	3.6	113	15	15	15	15	202.889
11	14	5	47	43	46.2	40.6	48	42	3.7	120	15	15	0	15	202.899
11	15	22	44	42	43.5	38.8	45	40	3.8	158	15	15	15	15	203.000
11	14	3	46	44	45.5	39.9	48	42	3.8	113	14	15	1	14	202.979
11	16	2	44	41	44.2	39.6	46	41	3.8	143	15	15	15	15	203.038
11	12	3	45	40	44.8	39.1	47	43	3.9	113	14	15	15	14	198.832
11	15	23	44	42	44.3	40.6	46	42	3.9	158	15	15	15	15	203.000
11	12	2	46	42	45.3	41.1	48	44	4.0	113	15	15	15	15	202.811
11	14	4	47	43	46.4	40.7	49	43	4.0	113	15	15	0	15	202.891
11	16	3	44	40	43.9	38.6	46	40	4.0	158	15	15	14	15	201.482
11	13	23	48	43	46.7	40.8	49	42	4.1	128	15	15	15	15	202.873
11	1	5	45	42	44.9	39.9	47	42	4.2	225	15	15	15	15	203.000
11	16	1	44	40	44.2	39.8	46	41	4.2	154	15	15	15	15	203.001
11	12	5	45	40	43.5	37.0	46	39	4.3	113	14	14	14	13	173.635
11	14	0	47	42	46.7	40.9	49	43	4.4	203	15	15	15	15	202.859
11	16	23	47	44	46.4	41.2	48	43	4.4	128	15	15	15	15	200.209
11	14	1	47	42	46.7	41.1	49	43	4.4	203	15	15	15	15	202.887
11	16	4	45	41	44.7	39.9	46	42	4.8	158	15	15	15	15	202.885
11	17	2	45	41	44.9	40.1	47	43	4.8	120	15	15	14	15	199.998
11	16	5	45	42	45.0	40.4	47	41	5.0	158	15	15	15	15	203.108
11	12	1	46	44	46.0	43.4	48	46	5.2	113	15	15	15	15	202.804
11	6	0	47	45	46.6	44.1	49	47	5.6	128	15	15	15	15	203.088
11	6	2	47	47	47.2	45.6	49	48	5.7	120	15	15	15	15	203.141
11	6	1	46	46	47.5	45.6	49	48	5.8	120	15	15	15	15	203.138
11	6	3	48	46	47.4	45.4	49	48	6.0	113	15	15	15	15	203.163
11	12	0	47	46	46.6	45.9	48	48	6.1	113	15	15	15	15	202.810
11	6	4	48	47	48.2	46.1	51	49	6.7	113	15	15	15	15	203.187
11	6	5	49	48	48.8	47.2	51	50	6.7	113	15	15	15	15	203.149
11	9	3	49	49	48.6	45.7	51	48	7.0	143	15	15	15	15	202.922
11	11	23	48	48	47.6	46.8	49	48	7.0	113	15	15	15	15	202.803
11	11	22	50	50	49.6	48.3	51	50	7.5	113	15	15	15	15	202.814

= Hours influenced by 500 Hz Tone

Comparing common data points between Tables 7-1 and 7-5

Common dates/times for P2	Graph 7-1 db level 500 Hz	Graph 7-5 db level 500 Hz	Graph 7-1 db level 1000 Hz	Graph 7-5 db level 1000 Hz	Ground wind speed m/s
11/15/4:00	43.2	43	36.7	37	2.7
11/9/3:00	48.6	49	45.7	45	7
11/4/22:00	46.5	46.5	41.2	41.2	3
11/4/5:00	43.7	44	38	38	3.1
11/9/22:00	46.3	46.9	41.4	41.8	0.9

Mr. Hankard used values of 41.49 and 47.49 as standards to meet the IPCB limits of 41 and 47. As a result Mr. Hankard concluded that all sound levels did not exceed IPCB limits. *Clearly invalid conclusion*!

- Another concern I have with the Cal Ridge Study concerns the statement in Conclusions:

"At location Prime 2, which is located similar distances to the nearest turbines as are the subject residences, no turbine-only noise levels exceed the IPCB limits."

There are problems with the data supporting the above statement. First of all, Mr. Hankard was using 41.49 db as the standard to meet the maximum nighttime level of 41 db at 1000 Hz. Therefore, on November 9 at 22:00 hours the value of 41.4 db Mr. Hankard considered meeting (table 7-1 p. 27 on next slide). The IPCB table clearly shows a maximum value of 41 db. Even more concerning is the fact in table 7-5 p. 41, the data value listed for the above exact time has a value that exceeds Mr. Hankards standard of 41.49. A value of 41.8 db is listed. Clearly above the legal limit. How can the same microphone record two different data results at the same time? I find it interesting that the value of 41.8 db in the complaint table miraculously became 41.4 db in the analysis table; a value Mr. Hankard considered legal.

I realize, Mr. Hankard's job was to show compliance with the IPCB limits. I find that rounding data to achieve compliance and the appearance that data might have been changed to show compliance to be very misleading.
Couple this evidence with the negative peer reviews of the Cal Ridge Study by Stephen Ambrose and others, I believe this study has little validity.

I hope you will vote NO! Then rewrite the county ordinance to protect the health and welfare of everyone in Livingston County from future wind farm projects. I sincerely thank you for your time and patience in this matter.

The Hayes family