TAB 2

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petition of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of a 3.2 MW Wind Renewable Generating Project on New Haven Road in Prospect, Connecticut

Docket/Petition No. 980

February 13, 2011

Prefiled Testimony of Arline Bronzaft, PH.D.

1. Please state your name and address for the record.

Arline L. Bronzaft, Ph.D., 505 East 79th Street, 8B, New York, NY, 10075.

2. Please describe your educational background and professional qualifications.

B. A. Hunter College; M.A. Columbia University; Ph.D. Columbia University.

Have conducted landmark research on the adverse effects of noise on children's learning and studied effects of airport-related noise on quality of life of nearby residents. Have chapters on noise impacts in nine books; have written articles on noise in academic journals and for the popular press; have been frequently interviewed on noise effects in the media.

My *Curriculum Vitae,* which provides further detail, is attached as Exhibit A.

3. Have you testified in Court proceedings, other contested matters, or before legislative bodies or administrative agencies as an expert witness with respect to noise issues? If so, please briefly describe such matters.

Yes. I have provided expert witness testimony in cases involving windmill noise, noisy boilers, fire alarms, truck sounds, loud music, power plants, transfer station, motocross raceways, etc. I assisted in revising the New York City Noise Code several years ago; served on Public Official committees examining noise impacts; and have testified on

noise at New York City Council hearings.

4. Have you been engaged by one of the parties to the present proceedings to testify as an expert witness? If so, by which party.

Yes. I have been engaged by Save Prospect Corp to testify as an expert witness in these proceedings.

5. Please describe the general subject matter of your testimony.

The subject matter of my testimony will center on the potential harm of the proposed Prospect wind turbine project on nearby residents.

6. What did you do in the course of your engagement as an expert witness in this case?

I examined various materials relating to the application filed by BNE Energy, Inc., as well as the various reference materials and articles that I refer to herein. Specifically, I have been asked to review the Wind Prospect document prepared by VHB/Vanesse Hangen Brustlin, Inc., review the report prepared by Michael Bahtiarian, review journal articles and books dealing with noise impacts on health, and then prepare a report that relates the two noise reports and the literature on noise to the Wind Project undertaking.

7. Please summarize the opinions you are prepared to express regarding the potential noise impacts of the proposed prospect wind turbine project that is the subject of BNE's application?

Based upon my review of the noise reports in this case, the literature linking noise to adverse mental and physical health and well-being and my many years of experience in the noise field, it is my opinion that residents in the area of the proposed wind turbine project may very well suffer ill effects from the noise generated by the

turbines, including physiological health impacts, stress and a diminished quality of life. This opinion is strengthened by the failure of BNE Energy to adequately conduct the appropriate sound levels, as underscored by the existing literature on the effects of noise including those from wind turbines as well as Mr. Bahtiarian's report. The BNE Energy report does not permit one to adequately address the potential impacts of wind turbine sounds on nearby residents and cannot be the basis to move ahead with the proposed project.

8. How would you describe the state of noise pollution in our society including the growing numbers of citizen complaints about noise?

That our society is becoming noisier and that more people are being disturbed by noise is evidenced by the growing number of books, chapters and articles being written about noise and their call for greater quiet in our lives. In May 2010, Dwight Garner of the New York Times (Meditations on Noise, May 18, 2010) reviewed three books dealing with noise and the quest for quiet: Garret Keizer's The Unwanted Sound of Everything We Want, George Prochnik's In Pursuit of Silence, and George Michelsen Foy's Zero Decibels. I contributed a chapter on noise to two books in 2010 (Shah, V., 2010; Chasin, M, 2010) as well as an article on noise to The Corsini Encyclopedia of Psychology (Weiner, I. B. and Craighead, W. E., 2010). In the last few years other books have been written about noise; noise chapters are increasingly appearing in books dealing with environmental hazards; and the media has paid close attention to stories addressing the harmful effects of noise on people. One journal, Noise and Health is devoted to articles that address the health impacts of noise.

The United States Environmental Protection Agency has recently added a noise section on its website (www.epa.gov/air/noise.html). The National Academy of

Engineering (The National Academies Press, 2010) published "Technology for a Quieter America" in an effort to educate people to the ways to control noise in order "...to improve the noise climate in the Untied States." In addition, the presence of anti-noise organizations worldwide (www.nonoise.org., www.quiet.org., www.ukna.org.uk,, www.noboomers.com.) clearing demonstrates a growing noise problem. The websites of these organizations inform us that noise complaints are not restricted to major metropolitan areas but have also been registered in quieter suburban areas and communities. While historically, complaints have not been a very good measure of noise disturbance because too few people actually complained, believing complaints "fell on deaf ears," (Borsky 1980), today more citizens are indeed speaking out against noise intrusions. These are intrusions from overhead flights, nearby road traffic, boom cars, neighbors, motocross raceways, etc. Citizen voices were especially influential in stopping the plans of the U.K. to build a third runway at Heathrow Airport. In New York City, noise is cited as the number one complaint to the 311 Hotline Complaint line, with several hundred thousand complaints annually. In response to these noise complaints and the urging by concerned citizen groups to update its noise code, New York City revised its over thirty year old noise code in July 2007. New York City is not alone in passing more stringent noise ordinances with cities nationwide passing legislation to lessen the din in their cities (http://www.noiseoff.org)

Thus, with so many articles and books being written dealing with noise pollution and so many voices being raised against noise, one cannot say that anyone complaining about noise is unusual or being unreasonable.

9. Please explain the difference between "sound" and "noise."

Sound and Noise do indeed differ. Let me attempt to clarify the difference. Simply put, noise is unwanted, unpredictable and uncontrollable sound. Whereas the human ear reacts to sound through processes that involve the ear and parts of the temporal lobe of the brain, it is the added interpretation by higher centers in the brain that deem the incoming sounds to be wanted or annoying, pleasant or unpleasant; thus transforming sounds into noises. Reactions to sounds that are very loud are less dependent on the individual's feelings or personal taste regarding the sound. Although individuals can still differ in judging the pleasantness of loud sounds, with, for example, the young loving loud rock music and their parents typically detesting it, exposures to very high decibel levels can destroy the hair cells of the inner ear, leading to some loss in hearing, independent of personal reaction to the sound.

Irrespective of value judgments regarding the desirability of a particular loud sound, continuous exposure to very loud sounds has been responsible for hearing impairment in many millions of Americans. The National Institutes of Health (1990) estimated that of the 28 million Americans who suffer some hearing damage, at least 10 million could be attributed to loud sounds, and today, undoubtedly the number would be greater. However, sounds that may not be that loud but are still unwanted and uncontrollable can have dire consequences for the listener, especially if the intrusive sounds occur over a period of time. If the source of the noise is an agent or agency that has demonstrated little concern for the individual suffering from the impacts of the noise, and, as a result, has done nothing to abate the noise, then the noise becomes even more disturbing.

10. Should noise be viewed as a stressor? If so, please explain the effects of noise exposure.

Yes, noise should be viewed as a stressor. Individuals exposed to unwanted sounds or rather noises, whether from an overhead jet, a neighbor's loud stereo, or a wind turbine, react to these noises as they would any stressor. These intrusive sounds result in stress which, in turn, brings about a complex set of physiological reactions: a change in heart rate or rhythm, a rise in blood cholesterol, a rise in blood pressure, excessive hormonal secretions. Additionally, individuals frequently feel helpless in the face of pervasive, consistent noise over which they have no control, adding to the stress elicited by the noise and bringing about more physiological reactions.

11. Are there non-auditory effects of persistent, intrusive noise? If so, please explain.

When intrusive noise persists, the body continues to react to these intrusions physiologically and over time there is the possibility of permanent bodily damage - damage to the circulatory, cardiovascular and gastrointestinal systems. Studies reporting these non-auditory effects include the following: Jarup, et al. (2008); Babisch (2006); Ising & Kruppa (2004); Passchier-Vermeer & Passchier (2000). The studies cited in these compilations indicate that individuals living near noisy airports and highways have more cardiovascular and circulatory ailments. Although additional research is needed on the effects of noise on the immune system, studies have reported serum immunoglobulin concentrations falling in relation to noise exposure (Raymond, 1991). Immunoglubulins are linked to the body's ability to withstand infectious diseases and Raymond calls for further study on the effects of noise on the immune function.

In their study (Bronzaft, Ahern, McGinn, O'Connor, & Savino, 1998), the residents who complained that aircraft noises disturbed them also perceived themselves to be in poorer health. Similarly Hiramatsu, et al. (1997) reported that citizens living near an air base perceived their health to be poorer. It has been well documented that a patient's perception of health in general, as well as personal evaluations of current health states, health outlooks, and susceptibility to illness, is a valid indicator that has proven useful in detecting health outcomes (Davies & Ware, 1991; Ware, 1986; Ware,1990).

At the very least, the data linking noise and illness, suggest a connection between noise impacts on human health, calling for caution in exposing individuals to repeated noise sources. Dr. William H. Stewart, the former Surgeon General of the United States, in his keynote address to a 1969 Conference on Noise as a Public Health Hazard stated: "Must we wait until we prove very link in the chain of causation?...In protecting health absolute proof comes late. To wait for it is to invite disaster or to prolong suffering unnecessarily." (U. S. Environmental Protection Agency, 1978) The former United States Surgeon General over forty years ago warned about the dangers of noise even before the growing body of literature reported today supported the link between noise and adverse health impacts.

12. Are there also impacts from noise on an individual's quality of life?

Yes. In addition to documented physiological health impacts, noise may dramatically affect an individual's quality of life. Individuals living near a constant noise source may not yet have measurable physiological symptoms but their quality of life may be substantially diminished. In comparing two groups of residents, one living within a flight pattern and one residing in a nonflight area, Bronzaft et al. (1998) found

that higher percentages of people exposed to the aircraft noise indicated that they could not open their windows, talk on the telephone, converse with others in their homes, or listen to their radios and televisions, or sleep well. The quality of life of these individuals was significantly diminished, a finding which is corroborated by the Evans, Hygge and Bullinger (1995) study regarding children living near an airport.

The subjects of Bronzaft, et al. investigation may not *yet* manifest serious physical illnesses but they are definitely not living the "good life" as they cope with aircraft noise daily. This finding can be generalized to individuals who are living with other noise sources that are continuously intruding upon their lives.

The World Health Organization defines health as a decent quality of life. Thus, a diminished quality of life implies a poorer state of health.

13. Is there a relationship between noise exposure and sleep difficulty? If so, please explain.

Yes. The Bronzaft et al. study (1998) noted that people living in the flight pattern community, identified as being bothered by the noise, reported themselves to have sleep difficulty. While night flights are of special concern in the area of sleep deprivation, the young, the old and the infirm often tend to sleep during the day, and thus day flights may prove intrusive to these individuals. Sleep difficulty as experienced by the subjects in the Bronzaft, et al. study may have long-term health consequences. Furthermore, sleep loss may impair task performance the next day, rendering individuals less productive the workplace (Pollak, 1991). Dr. Pollak also cautions about a secondary effect for people living near intrusive noises. Their inability to sleep may cause them to turn to tranquilizers and other drugs and these drugs in turn may have harmful health implications.

The European Court of Human Rights (2001) went beyond statistics and listened to the personal testimony of individuals who had to live with noise, in this case aircraft noise, in the middle of the night. In ruling that flights to and from Heathrow Airport in London between 11 p.m. and 6 a.m. infringed on the rights of residents to a good night's sleep, the European Court of Human Rights was speaking to the rights of all individuals to a good night's sleep. Similarly other courts are paying attention to the personal testimony of individuals who are affected by nighttime noise. In Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners (2001), the court heard over 1,000 Berkeley residents describe how jet overflights disrupted their sleep. Thus, in addition to the research data on noise and sleep that have been included in court cases, we now have personal accounts that are being listened to by judges. While these studies focused on the effects of noise on night time sleep, as it was noted above, individuals also have the right to rest or sleep during the late afternoon or evening hours.

14. Is there a relationship between noise exposure and mental health, anger, and aggressiveness? If so, please explain.

The media is replete with stories of individuals saying that they cannot take the aircraft noise or the neighbor's loud music any longer. Their expressed anguish and unhappiness should not be overlooked, remembering that Hiramatsu, et al. (1997) suggest that the psychological disorders identified in their survey of residents living around Kadena Air Base are due to noise exposure. In a Bronzaft, et al. paper (2000), individuals identified six emotional responses to noise with annoyance ranking first and anger second. Logging on to websites such as http://www.noiseoff.org)www.noboomers.com will yield stories of individuals angered by

noise and newspaper accounts of individuals displaying acts of aggression when confronted with noise. Nearly three years ago in Cleveland, a firefighter disturbed by noise from a next door neighbor, over a period of time, expressed his anger and disgust on the Fourth of July after listening to loud firecrackers coming from his neighbor's home by shooting and killing three of his neighbors. Undoubtedly, noise elicits strong emotional feelings and such feelings in the long run can create psychological problems including aggressive acts. The growing opposition by community groups to increased air traffic and airport expansion may foretell a time when community groups express more hostile behavior in their encounters with airport representatives.

15. Does noise exposure have an impact on family interactions? If so, please explain.

Yes. In a book I wrote entitled Top of the Class (1996), I looked at the lives of high academic achievers, individuals who graduated Phi Beta Kappa from their colleges. I was interested in how these academic achievers fared in the years following their graduation as well as learning about their childhoods. Looking at the home in which they were reared, I found that their parents provided them with the requisite quiet needed for reading studying and doing homework. Also their parents tended not to discipline them with screams and shouts but with stern looks and softer words. The high academic achievers recalled that they frequently conversed with parents at meal times and were able to tell them about what happened to them at school, while at play, or visiting friends. These academic achievers appeared to have had good parent/child interactions as well and such interactions contributed to their success at school and to their success after graduation.

Of course, good parent/child interactions are facilitated by parents who are less anxious or bothered. A household where a parent may be disturbed by an ongoing problem can put greater stress on the relationship between the parents and their children. The stress of parents cannot be ignored when we examine impacts on children. The literature is replete with studies confirming this statement. In fact, our novels often focus on faulty parent/child relationships, pointing to the problems of one or both parents as contributing to the problems evinced by their children.

16. How does the body of literature and studies with which you are familiar relate to the issue of noise from wind turbines in the present case?

Looking at the wide body of literature on the effects of noise on mental and physical well-being, one has to conclude as the World Health Organization did in its 1999 document on Community Noise (Berglund, et al., 1999): "The growth in noise is unsustainable because it involves direct, as well as cumulative, adverse health effects."

Studies on community noise are conducted on populations located near noisy sources such as airports, railroads and highways. In order to get valid and reliable information on the relationship between noise and health, it is necessary to collect data on large populations. However, the results elicited by this research can be generalized to individuals who are living with other types of noises that are similarly bothersome and disruptive, noise from nearby motocross raceways. Thus, it is appropriate to apply the findings of the research on noise to the case at hand, namely the noises emanating from wind turbines. It should be pointed out that we commonly generalize findings of research on designated samples to the population as a whole, particularly in the area of medicine.

A question is frequently raised as to whether the individual bothered by noise is overly sensitive to noise. That is the wrong question to ask. Rather one should ask whether a reasonable person would be bothered by the noise. Would a reasonable person find the overhead planes upsetting, or would a reasonable person be bothered by a neighbor's loud stereo system, or are the residents living near wind turbines being reasonable in stating that the sounds from wind turbines are adversely affecting their lives? The body of literature on the effects of noise on people clearly addresses the "reasonable person" issue by noting that large numbers of people are disturbed by intrusive, uncontrollable and unpredictable noises and these noises adversely affect their mental and physical health.

17. Are Noise Meter Readings Always Necessary to Determine if a Noise is Unreasonable?

Must one rely on noise meter readings solely to answer the question as to whether certain noises would be deemed bothersome? No! From experience alone, one can determine whether certain sounds would be disruptive to ongoing activities or proceedings. For example, audiences in theaters are asked to turn off beepers, cell phones, and to open their candy wrappings before the play commences. In courtrooms, judges have similarly requested observers to turn off their beepers and cell phones and to refrain from whispering or speaking to each other. In the United District Court in New York City, cell phones are collected by the court before individuals are permitted to enter the courtroom. Judges are very aware that court proceedings require "quiet in the courtroom."

Similarly, homes require that noise not intrude upon the activities of the home, e.g. conversing with relatives and friends, reading or watching television, relaxing. Still

quieter times are expected when people are trying to fall asleep or are sleeping. Homeowners are entitled to spend time in their gardens and to relax in their backyards. The founders of our country treasured property rights and mad this clear when they wrote the United States Constitution. Noise intrusions would indeed rob owners of their property rights and these rights are protected under our Constitution.

18. Please summarize your opinions regarding wind turbine noise and health.

When Annette Zaner (1991) wrote her chapter on Sources of Noise, she stated the following: "The growth and utilization of noise-producing and noise-related technology in modern civilization are proceeding at such an accelerated rate that it is practically impossible to compile a catalogue of noise sources that will not quickly become out-dated."

Arinette Zaner was correct in predicting her chapter would be soon outdated -- wind turbines were not included in her chapter. However, in the soon to be published book Why Noise Matters, John Stewart has an entire section of a chapter devoted to examining the impacts of wind turbine noise on health. Mr. Stewart will rely heavily on the research linking low frequency noise and infrasound sound to generalize to the potential adverse impacts of wind turbines which are indeed characterized by low frequency sounds. As noted earlier, it is indeed perfectly appropriate to generalize from findings conducted on comparable sources. The World Health Organization (Berglund, 2000) summing up the effects of low-frequency noise concluded that while she advocated additional research in this area, on could still conclude that such noise can disturb sleep and rest. In a 2004 paper, Leventhall stated the following: "Regulatory authorities must accept that annoyance buy low frequency noise presents a real problem which is not addressed by the commonly used assessment methods."

Studies relating wind turbine noise to health are presently being conducted and we are awaiting the results to be published shortly in academic journals. However, we should also pay attention to the complaints of individuals who have been exposed to wind turbine noise. In her book Wind Turbine Syndrome (2009) , Nina Pierpont, a physician, interviewed a group of people who lived near wind turbines and found that they experienced a cluster of symptoms which she named Wind Turbine Syndrome. The people she interviewed complained of sleep disturbance, headache, nausea, dizziness, etc. She also notes that the people who were disturbed by the wind turbines did not dislike the wind turbines and further states that not all the people exposed to the wind turbine sounds will develop these symptoms. However, we all know that not everyone exposed to a virus, a particular bacterium, or secondhand smoke will fall ill. Yet, this does not stop us from seeking ways to reduce the potential harmful effects of these sources of ailments. Additionally, Laura Israel in her documentary film Windfall, which was released in 2010, reported that individuals in Meredith, New York, who were exposed to the sounds of wind turbines near their homes suffered from headaches and respiratory disturbances. Should these reports from individuals exposed to wind turbine noise be given weight as we collect data on the potential adverse impacts of wind turbine noise. Yes, indeed! In medical schools, medical student doctors are taught to listen to what patients tell them about how they feel and give weight to these statements. Psychotherapy owes a great debt to Sigmund Freud who listened attentively to his patients' concerns. Parents are similarly encouraged to listen to what their children say and this indeed will guide them in their parent-child relationships. In science, verbal reporting frequently precedes the "hard data" to support cause-effect links.

19. Have you reviewed and formulated opinions concerning the noise study submitted as Exhibit N to the Petition filed by Wind Prospect in this matter? If so, please discuss your opinions.

Yes I have.

Whereas acousticians are the individuals who can best estimate the potential sound levels generated by the proposed wind turbines in Prospect, Connecticut, I, as a psychologist, can address the impacts of these projected sound levels on nearby residents. It is not simply as an environmental psychologist that I can speak to these impacts but also as an individual who has worked in the area of noise impacts for over thirty-five years, having conducted landmark research on the effects of noise on children's learning and research on the effects of airport-related noise on quality of life as well as contributing chapters on noise impacts to eight books.

The VHB/Vanasse Hangen Brustlin Inc. Report has been challenged by Michael Bahtiarian who does not believe that report properly assessed the sound levels that the nearby residents will be exposed to. Calculating sound levels to be potentially softer by as little as three decibels is significant when it comes to the impacts on people; people can be bothered by sounds that are three decibels louder than the ambient. Thus, one must weigh the impacts on people in assessing the different sound levels projected by these two reports.

Mr. Bahtiarian noted that the VHB/Vanasse Hangen Brustlin Inc. Report ignored the potential impacts of the lower frequency sounds of the wind turbines. It is these lower frequency sounds that may adversely affect the health of people exposed to these wind turbines. I wish to underscore Mr. Bahtiarian's concern for the failure to project the impacts of these lower frequency sounds and call attention to the references

cited above on the relationship between low frequency and health effects. A proper report of potential impacts of noise must examine the low frequency sounds. I would also like to add that New York City's Noise Code allows for the measuring of low frequency sounds in determining impacts on complainants (www.nyc.dep).

On Page 10, the VHB Vanasse Hangen Brustlin Inc Report states that the sound levels projected by its analysis "...are below the daytime and nighttime noise criteria of 61 and 51 dBA respectively." Let us put aside the criticism of these noise criteria by Mr. Bahtiarian who asserts they should have been lower in this residential community and simply compare the projected levels with the levels residents are experiencing, according to this report, on Page 9. The existing daytime and nighttime levels are most certainly below the State's noise impact criteria and the report rightfully acknowledges this. It is these actual levels that must be considered in determining whether or not the residents will be impacted by the sounds of the wind turbines. It will be the increased sound levels, especially at night, brought about by the wind turbines that will disturb the residents. I have been asked to consider whether a near doubling of nighttime noise will prove intrusive and the answer is "yes." Intrusive could mean sleep disturbance and sleep is essential to good health.

Whenever a community considers an installation project that might generate sounds that could disturb the residents, it should be obligated to commission reports that can provide the best assessment of incoming sounds. In the case on hand, wind turbine noise, I would also add that reports should be called for that summarize the growing body of literature on the relationship between wind turbine noise and health.

Finally, I ask that Dr. Stewart's quote cited above be properly weighted:

"Must we wait until we prove very link in the chain of causation?...

In protecting health absolute proof comes late. To wait for it is to invite disaster or to prolong suffering unnecessarily."

(U. S. Environmental Protection Agency, 1978)

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