STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 6911

Petition of EMDC, LLC d/b/a East Haven Windfarm)
for a Certificate of Public Good pursuant to)
30 V.S.A. sections 231 and 248, authorizing it to construct)
a 6 MW wind electric generation facility, and)
associated transmission and interconnection facilities,)
in East Haven, Vermont, and operate the same.)

PREFILED REBUTTAL TESTIMONY OF PAUL KERLINGER

ON BEHALF OF EAST HAVEN WINDFARM

February 11, 2005

Summary:

Paul Kerlinger responds to the testimony of ANR witnesses Austin and Kelly concerning DeTect's East Mountain radar study of birds. Dr. Kerlinger also addresses issues raised by ANR witnesses Austin, Rimmer and Marshall concerning the timing of construction relative to impacts to birds.

Q. Please state your name and occupation

A. My name is Paul Kerlinger. I am a consulting biologist and principal in the firm of Curry & Kerlinger, L.L.C.

Q. Have you previously filed testimony in this matter?

A. Yes, I have filed direct testimony and associated exhibits.

Q. What is the purpose of your rebuttal testimony?

A. I respond to the testimony of ANR witnesses Austin and Kelly concerning DeTect's East Mountain radar study of birds. I also address issues raised by ANR witnesses Austin, Rimmer and Marshall concerning the timing of construction relative to impacts to birds.

Q. Statements by Kelly and Austin in various places in their testimony and discovery suggest that further preconstruction radar studies of migration are needed to evaluate risk to migrants at the EHWF site. Do you agree with them? How do Kelly's findings regarding migration at the EHWF compare to other migration studies in eastern North America?

A. I disagree for various reasons. I do not agree that further preconstruction radar studies are necessary for the reasons stated in my direct testimony and in my reports. My rationale is that I have great difficulty understanding or validating the results of the DeTect radar study. Most importantly, the methodology used for the radar study at the EHWF site and results from that study differ from almost all other modern radar studies of migration that were performed over the past five years at wind projects in the United States with

marine surveillance radar. The DeTect radar report has yet to be thoroughly reviewed by experts and it relies on methodologies that, apparently, have never been used previously. Based on these issues, specific comments on the radar study are as follows:

The use of only vertical radar and electronic analysis of parts of the radar output is problematic. Exhibit EHWF-PK-Reb2 lists radar studies at prospective wind power sites in the eastern United States conducted since 2000. In all of those studies, both vertical and horizontal surveillance modes were used to study migration. In addition, there are about 4 more radar studies from the western United States in the past 5 years that have also relied on both vertical and horizontal radars. In fact, Dr. Sidney A. Gauthreaux discussed the use and importance of vertical and horizontal radar at the U. S. Fish and Wildlife Service October 2003 Region 5 wind power workshop (personal communication, February 2005). Gauthreaux and Belser (2003) describes the use of vertical and horizontal radar for assessing the migration of birds at prospective wind power sites. I myself have published papers using vertical and horizontal radars (Kerlinger 1989) to study migration. It is unlikely that the U. S. Fish and Wildlife Service, in light of their guidance and recommendations document for studying wind power facilities, would recognize the use of vertical radar as being adequate.

While Mr. Kelly (page 4 of the DeTect report) cites the methodology used by Harmata, et al. 2000, he does not use the same methods as Harmata. Harmata et al. used two radars at Norris Hill, vertical for measuring altitude and horizontal for measuring numbers of birds passing through the area (passage rate) and flight direction. Likewise, Mr. Austin on page 5 of his testimony, cites radar studies by Cooper (2004a, 2004b, 2004c, 2005) all of which used radar in both vertical and horizontal modes. The reason researchers have

relied on two radars is that horizontal radar is used to determine flight speed, traffic (or passage) rates, and direction of migration and vertical radar is used to determine altitude. In no other wind project-related study that I know of has a vertical radar been used in the way Kelly used it.

The migration traffic rate of 1,700+ targets per km per hour for night migration is about 5 to 10 times the rates determined by experts using horizontal radar mode, as opposed to the vertical radar mode used by Kelly. The results of radar studies from West Virginia, Maryland, Pennsylvania, New York, and Vermont are summarized in Exhibit EHWF-PK-Reb2. It is enigmatic that migration traffic rates for night migrants near the Canadian border are 6+ times higher than migration traffic rates in Appalachia, which many experts believe to have higher migration rates because Appalachia is further south. This means that the source area for migrants is larger than for sites in northern New England. The traffic rates reported by DeTect are greater than those reported from all sites north of South Carolina and the Gulf Coast states, where migrants converge from all of eastern and Midwestern North America.

The DeTect report did not adequately screen out slow flying targets that could have been insects or other reflective material (precipitation). The insect problem has been thoroughly examined by other radar researchers and researchers using other types of radars. This problem is not unique to marine surveillance radar. In fact, Mr. Kelly himself has screened out potential insects using flight speed rather than size when using horizontal mode radar. The study Mr. Kelly conducted for GeoMarine at the Cape Winds wind power project in Nantucket Sound screened out slow moving targets that were likely insects. Other researchers that have screened out insects by eliminating slow moving

targets include Cooper (2004a, 2004b, 2004c, 2005), Roy et al. (2005a, 2005b, 2005c), Diehl et al. (2003), Williams (et al. 2001), and Larkin (1991; Sensitivity of NEXRAD). All of these researchers used horizontal type radars and screened out slow flying targets so that they would be left with measuring only birds (and potentially bats). Mr. Kelly states that the cold weather in fall at the site precludes the possibility of insects such as moths being present, but the literature reveals that moths are active until late in October. Moth migration can occur into early November and certainly occurs at latitudes as far north as Sault Ste. Marie in northern Michigan in cooler months. We simply do not know what the targets were that DeTect tracked because they did not use accepted practices for screening out non-avian or bat targets.

The statement on page 15 of the DeTect report regarding screening out bats from birds by virtue of size is not well founded. Migratory bats such as hoary, red, and other bats are the same size or larger than the most common migrants such as warblers, vireos, kinglets, and other small birds, so they cannot be screened out by virtue of size. Furthermore, insects such as moths can be observed easily on radar and vertical radars are commonly used by entomologists to track moth migration. There are dozens of references in the entomology journals that document vertical use of radar to track insect migration.

Information in the DeTect report on direction of migration is lacking. All other radar studies include some measurement of the direction of migration. Such information is integral for understanding migration at a site. A radar study that does not report direction of migration is deficient. This is why Mr. Austin's testimony about "montane channeling effects" (page 19-20), as well as references to direction of flight along chains of mountains (page 20) is difficult to understand. The DeTect study does not offer

any information on this aspect of migration. It should be noted that the mountains referred to by Mr. Austin do not "extend in a northwest to Southeast orientation." Review of a topographical map does not show this to be the case. The mountains are not linearly aligned, but are a jumble with little to no orientation.

Q. Do the results shown by the DeTect report (page 28) demonstrate that birds rise up and over the ridge and does this statement differ from statements made in Austin's direct testimony (page 20)?

A. Because the radar DeTect was using is not capable of showing direction of migrants, it is difficult to understand how the report can conclude that the birds were rising up and over the ridge. To conclude that birds were climbing over the mountain without knowing their direction of their flight is questionable for two reasons. First, radar in the vertical mode measures only absolute altitude, not changes in altitude, so the DeTect radar system could not have measured birds changing altitude. Second, at night birds cannot be seen visually, so this cannot have been observed by naked eye. To the extent that Mr. Kelly visually observed this behavior during the day, that assessment is inconsistent with Mr. Austin's testimony that birds are following a ridgeline or are experiencing "montane channeling." The two statements are contradictory.

Q. Mr. Kelly claims (p. 18) that you "suggested that the area would not be used as a stop over location." He appears to believe otherwise. How do you respond?

A. Mr. Kelly and Mr. Austin both, in several instances, misrepresent what I reported in the Phase I Avian Risk Assessment or report what I said out of context. For example, in

response to Mr. Kelly, my report actually stated, "East Mountain is unlikely to be a concentration site or an important stopover area for any type of migrant." (page 2, Avian Risk Assessment). "Based on the topography and habitat it is likely that nocturnal songbird migration is spread across the state.... The habitat in northeastern Vermont, including the Project site, is mostly forest so migrating songbirds have a vast area in which to stopover, with few locations acting as magnets for large concentrations of these birds." (page 12 Avian Risk Assessment). The DeTect report does not offer any data to contradict my conclusion that the site is unlikely to serve as an important stopover point.

To further substantiate my claim that the top of East Mountain is not a significant migration stopover site and that large numbers of birds do not stopover there, I cite the peer reviewed and published work of Chris Rimmer of VINS. VINS studied stopover ecology of night migrating birds on Mount Mansfield at an elevation of about 3,800 feet ASL (Rimmer, C.C. and K.P. McFarland. 2000). They found, that relatively few birds stopover in such habitats and concluded that "that high elevation, montane spruce-fir forests are not good stopover habitats for night migrating songbirds."

With respect to waterfowl, DeTect states that waterfowl fly by East Mountain and do so at low altitudes, yet they present no quantitative data on the numbers, dates, altitude, or flight direction of any waterfowl during their study. I point these discrepancies out because Mr. Kelly's testimony could be read to inflate the importance of this site as a migratory stopover or as an important migratory pathway for waterfowl.

Q. **Mr. Kelly concludes that black turbine rotors present greater risk to night migrating birds. Is there evidence that black rotors are riskier than rotors of lighter colors?**

A. The statement by Kelly on page 14 of his testimony that black turbine rotors will reduce birds' ability to avoid them is unsubstantiated. To date, there is no evidence that black rotors are riskier than rotors that are painted white or light gray. It is important to note that the turbines at Searsburg have black rotors, yet in seven years of operation only a single bird fatality has been reported from that site. Some turbines in Minnesota at Buffalo Ridge also have black rotors and at that site the fatality rates of night migrating birds have not been large or biologically significant.

Q. Do you agree with Mr. Austin's (page 30) and Mr. Kelly's (page 19) statements that post-construction fatality studies would not result in accurate determination of fatality rates?

A. No, I disagree with their statements. I originally suggested a dog because dogs are used to point to birds for hunters, identify drug smugglers, find lost hikers, etc., all under difficult conditions. Since my earlier testimony dogs have been used successfully in various types of vegetation, including thick brush, to search for carcasses of birds and bats under and near wind turbines. This work was done by Dr. Ed Arnett from Bat Conservation International and head of the Bat Wind Energy Collaborative formed by U.S. Fish and Wildlife and Bat Conservation International to examine the bat issue at wind turbines. In a recent conversation with Dr. Arnett and during a presentation at the National Wind Coordinating Committee meeting in November 2004 in Virginia, he stated that dogs would work in areas where there is thick vegetation, including spruce and fir. About the latter habitat, he suggested that the dogs should be pointers rather than the larger retrievers he uses. Pointers are more gracile and are more adept at going under vegetation and pointing

to birds and bats that are several feet away. Arnett used dogs at sites in Pennsylvania and West Virginia and found that dogs found four times as many carcasses as humans.

It is also important to note that Mr. Austin and Mr. Kelly acknowledged the importance of conducting tests to determine the carcass removal (scavenging) and observer efficiency rates when doing fatality studies at wind turbines. Both are now routine for post-construction fatality studies at wind power facilities and the methods have been used at more than 15 different sites around the United States. They also note that carcasses "will be scavenged by ravens and mammals before they are found by three-day searches." (Kelly testimony page 19). The mean carcass removal time for small carcasses at most wind power facilities is in excess of 3 days and is often 4-7 days (including the Searsburg study). Even with these rates, sampling of 5-7 days is adequate as borne out by statistical analysis.

ANR's expert witness, Dr. Rimmer, has reported that after searching 4 communication towers (3 guyed, 1 unguyed – 1 or 2 of which were owned by the state of Vermont) up to about 300 feet in height during a fall migration season (searches done on 51 days), only 2 dead birds were found, including only 1 migrant. Rimmer and a team from the Vermont Institute of Natural Science concluded that "evidence for significant numbers of migrants in the night skies was not reflected by our tower survey data" and that "we rarely observed evidence of potential scavengers in the vicinity of the 4 towers, and we doubt that such scavenging occurred." The habitat and elevation of the site investigated by Dr. Rimmer and that of East Mountain site are similar, further suggesting that the risk to migrating birds and the ability to conduct post-construction mortality studies are not as problematic as suggested by other ANR witnesses.

Q. Do you agree with Mr. Kelly and KCG witness Mr. Willy that large numbers of Canada Geese migrate close to the summit of East Mountain? Are Canada Geese likely to be at risk of colliding with wind turbines at EHWF?

A. I am not sure how to interpret the statements by Mr. Kelly and Mr. Willy regarding Canada Geese migration at EHWF. First, no data or records of observations were provided that allow me to make a conclusion. I do find it odd that there was no quantification of numbers or flight behavior of these birds. When I concluded that the site was not likely to be a waterfowl stopover site, I based that on the fact that northeastern Vermont is not in any of the migration corridors known to waterfowl biologists. Also, the habitat at that site is devoid of open water such as lakes and rivers where waterfowl make stopovers. Bellrose (1976) provides a map of well-used migration corridors for the different races of Canada Goose and northeastern Vermont is outside of those corridors. It is probable that some Canada Geese fly over the site because they fly over most areas of the northeast during migration.

With respect to colliding with wind turbines, it is unlikely that Canada Geese will collide with the turbines at EHWF for two reasons. First, the numbers that likely fly over the mountain are small and second, Canada Geese, like most other waterfowl, rarely collide with tall structures. A recent study completed by the Iowa Department of Natural Resources and Iowa State University (Koford et al. 2004) reported that a 90 turbine wind farm in Iowa located within 1 mile of three wildlife management areas experienced not a single waterfowl casualty in the first two years of operation. Despite 2.5 million duck and goose use days at these wildlife management areas and movements into and out of the com

fields surrounding the management areas, no fatalities resulted. Waterfowl do not seem to be susceptible to colliding with turbines or other tall structures.

Q. Have Mr. Austin and Mr. Kelly properly characterized risk to night migrants?

A. Mr. Austin and Mr. Kelly often refer to risk, potential risk, and collisions risk in their testimony without defining what they mean. This amounts to a straw-man argument. Without providing a definition of "risk" or qualifier of risk in terms of magnitude or biological significance of risk, these statements are meaningless. Potential risk can be small, large, insignificant or significant from a biological perspective. It is important to note that they have never suggested that the risk to birds at EHWF is high or biologically significant. In fact, Mr. Austin in his discovery responses has declined to state what he considers to be biologically-significant numbers of fatalities. In my avian risk assessment I acknowledge that there is risk at the EHWF, but I qualified that risk as being not biologically significant. In other words, small numbers of birds are likely to be killed, but the numbers are not likely to result in biologically-significant impacts to the species involved.

To date, migrants have never been shown to be killed at rates that are biologically significant at any wind plant. A post-construction fatality study at EHWF is the best way to bear that out.

To address the issue of biological significance of fatality rates among migrants (and other birds), I have assembled a summary of fatality rates at wind projects throughout the U.S. See Exhibit EHWF-PK-Reb1. This summary includes the fatality rates from the Buffalo Ridge project in Minnesota, which Mr. Austin has described as "one of the largest rates of avian collision fatalities in the country." As the table indicates, the Buffalo Ridge

fatality rates are about average for the country and the numbers are certainly not biologically significant. If such rates were applied to the EHWF, the number of fatalities would be on the order of 8 to 16 birds per year in total, which cannot be construed as significant. So, while it is obvious that "risk" has been demonstrated at all modern wind power projects, application of even the highest fatality rates or multiples of those rates to the EHWF turbines would not amount to biologically-significant impacts.

Q. Mr. Austin (p. 16) states that your Searsburg report "advocates for monitoring and research in northeastern United States to better understand the impact of wind turbines on migrating birds." Do you still agree with that statement?

A. That statement was written in 1997 or 1998 and finally published in 2002. At the time it was written there were no other post-construction studies of wind turbines east of California, at least completed studies. There were also no other utility scale turbine facilities east of California other than in Texas, Wyoming, and part of the Buffalo Ridge turbine facility. Today, we have turbine facilities and post-construction fatality studies from many states including studies from Minnesota, Iowa, West Virginia, Tennessee, New York, and Pennsylvania. For the most part, the same types of birds and many of the same species migrate over all these areas. For night migrants, the species composition is very similar, although at turbines in the Midwest, many more migrating waterfowl are present. The fatality rates at all of these Midwestern and eastern sites, not to mention new sites in the western United States are small and not biologically significant. As stated above, I do believe that post-construction fatality monitoring is important and should be done at the EHWF.

Q. Do you feel that post-construction studies, including radar, acoustical, and fatality monitoring, as stated by Mr. Austin, are necessary to evaluate the impact of the project?

A. Although radar, acoustical and other studies are not necessary, I do believe that fatality monitoring is crucial. Radar, acoustical and other studies referred to by Mr. Austin really aren't used to determine the impact of a project. I do not know of any radar or acoustical studies done after construction that have revealed anything about fatalities of birds at a site. Only robust estimates of actual numbers of fatalities along with the species composition of the birds (and bats) killed can determine the significance of impacts at a site like the EHWF. It should also be pointed out that radar studies have never been shown to precisely predict numbers of fatalities at a wind power facility, nor have they been shown to determine whether impacts are likely to be biologically significant an a wind power facility - whether conducted pre- or post-construction.

Q. Mr. Willy (page 5) states that the construction process is likely to drive hares, squirrels and other prey species away from the project site. Do you agree with his assessment?

A. I agree in part with Mr. Willy's testimony. I do think that the heavy construction equipment and construction work will drive some hares, squirrels and other prey species off-site. However, they are not likely to be driven far away nor will they be driven away permanently. In my experiences at wind turbine sites, small mammals such as ground squirrels and cottontail rabbits habituate readily to the presence of infrastructure like turbines, lay-down areas, etc. It is interesting that lay-down areas at some wind power

facilities provide refuge for rabbits and squirrels and squirrels burrow more frequently around turbines bases. It is highly likely that these animals will recolonize the areas beneath the turbines in the first or second year following construction.

Q. Mr. Willy states (page 6) that the top of East Mountain is important woodcock stopover habitat. Do you agree with that statement?

A. I do not. In addition to my professional experiences, I observe woodcock year-round near my home in Cape May and they forage occasionally at night on my lawn. I have captured them frequently in mist-nets while banding owls during the fall migration season. To my knowledge, woodcock primarily use lowlands because there is more forage available there. This is in agreement with Mr. Willy's statement that woodcock use "alder swamps" on East Mountain. I do not know of any alder swamps near the top of East Mountain. Mr. Willy did not provide numbers he had seen or other quantitative information, so I find it difficult to say more. I also find it difficult to understand Mr. Willy's comment that he watches them landing at dusk in light of the fact that this bird is a night migrant. He also does not state where he saw them other than "in the immediate area of East Mountain" which encompasses tens of square miles around the wind power site. It would also make more sense if he said that the birds were coming in at or before dawn.

Q. On page 12-13 of his testimony Mr. Austin states that the "Transport of heavy equipment along radar road should be avoided during the potential breeding and nesting period for most birds that may be inclined to use these wetlands (April-June). Is this a reasonable request?

A. It is difficult to know what Mr. Austin's concerns are without a list of the species that may be involved. To my knowledge the species that are likely to be present at the wetland in question are relatively common species of forests in the Northeast. During our breeding bird surveys, our field person made incidental observations in that area and did not identify any listed species or species of concern. Heavy equipment will push birds away from the road, but this impact is likely to be very short term. These birds are likely to leave the immediate area as a large truck moves by, but will probably return shortly thereafter. Certainly, the birds that are present will return to normal activities following completion of the construction.

Q. Mr. Marshall and Mr. Rimmer have expressed concern with the temporary impacts associated with construction during the Bicknell's Thrush nesting season (May 15 to August 1), and have proposed a no construction window. How do you respond?

A. The construction activities, if done during the peak of nesting season for Bicknell's Thrush are likely to displace some nesting pairs of Bicknell's Thrush. Because construction activity will be limited to only one season, the impacts are likely to be ephemeral. In other words, Bicknell's Thrushes are likely to reoccupy the areas they avoided during the construction period. That only approximately 1 acre of habitat will be disturbed by actual clearing suggests that overall habitat impacts from the project will be minimal such that reoccupation of the area around the turbines would be likely in the year following construction. Dr, Rimmer in his testimony has agreed that long-term impacts from turbines and the minimal habitat impacts are not likely.

Because these potential impacts to Bicknell's Thrush during the nesting season cannot be avoided if construction is to proceed, mitigation would appear to be a viable means of compensating for reducing the suitability of habitat for a single season. A possible avenue for mitigation would be acquisition of rapidly disappearing forest habitat within Bicknell's Thrush wintering range. For example, purchase of acreage in the prime wintering area in the mountains of the Dominican Republic potentially would mitigate for the temporary loss of suitable habitat for one year at EHWF. Dr. Rimmer has stated that the habitat in the Dominican Republic is disappearing rapidly, suggesting that suitable wintering habitat may be a limiting factor for the long-term survival of Bicknell's Thrush. To be conservative and ensure that the benefits of long term winter habitat protection clearly outweigh the temporary loss of breeding/nesting habitat, the amount of conserved habitat should be some multiple of the acreage of temporarily-disturbed habitat at EHWF (i.e., 2:1, 3:1, etc.). In light of the fact that the displacement that may result from construction is likely to be ephemeral, this type of mitigation offers a good opportunity to more than compensate for potential losses.

If this mitigative compensation were attempted for the EHWF, allowing construction to proceed during the nesting season, I would suggest that construction disturbance commences before Bicknell's Thrushes attempt to nest. This would avoid interruption of nesting activities so that animals would not invest time and energy in attempting to nest. By taking this approach, thrushes might nest in the general area and not lose a nesting season. In other words, the few pairs of thrushes that might be displaced by the construction activity would have a chance to nest rather than possibly losing the

opportunity to nest successfully in that year. Input from Dr, Rimmer on the mitigation opportunities would be helpful.

Q. Does this conclude your rebuttal testimony at this time?

A. Yes it does.

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