

**STATE OF VERMONT
PUBLIC SERVICE BOARD**

Amended Petition of Deerfield Wind, LLC for a certificate)
of public good authorizing it to construct and operate 17 turbine,)
34 to 35.7 MW wind generation facility, and associated transmission)
and interconnection facilities, on approximately 80 acres in the)
Green Mountain National Forest, located in Searsburg and)
Readsboro, Vermont, with 7 turbines to be placed on the east side) Docket No. 7250
of Route 8 on the same ridgeline as the existing GMP Searsburg)
wind facility (Eastern Project Area), and 10 turbines along the)
ridgeline to the west of Route 8 in the northwesterly orientation)
(Western Project Area))

**PREFILED REBUTTAL TESTIMONY OF
LES POLISKY**

ON BEHALF OF DEERFIELD WIND, LLC

July 3, 2008

Summary:

Mr. Polisky's rebuttal testimony responds to the direct testimony of Clifford Duncan concerning the potential for the Deerfield Wind Project to interfere with television broadcast signals. He concludes that the Deerfield Wind Project will not cause material interference or have an adverse effect on cable operations for Duncan Cable TV.

1 **Q. Please state your name, position and business address.**

2 Response: Les Polisky. I am a Senior Principal Engineer with the Comsearch
3 Division of the Comscope Company. I am located at 19700 Janelia Farm Blvd,
4 Ashburn, Virginia 20147.

5
6 **Q. Please summarize your educational background and work experience.**

7 Response: I have over 40 years of experience in the field of electromagnetic
8 interference and the evaluation of radiation hazards. I initially joined Comsearch in
9 1980 after serving in the U.S. Air Force as a RADAR Maintenance Officer and
10 spending 17 years with the Atlantic Research Corporation. I pioneered the
11 electromagnetic interference measurement, radiation safety, and wind energy service
12 programs at Comsearch and I am the lead instructor in the radiation hazard training
13 course. I publish frequently on the subjects of electromagnetic interference, radiation
14 hazard issues and wind energy facility issues with regard to telecommunication
15 operations. I have been heavily involved in all aspects of Comsearch
16 telecommunication project work.

17 I hold a BSEE from the Illinois Institute of Technology and an MSEE from
18 George Washington University. See attached resume, *Exhibit DFLD-LP-1*.

19
20 **Q. Have you previously testified in this proceeding?**

1 Response: No.

2

3 **Q. What is the purpose of your testimony?**

4 Response: My testimony responds to the direct testimony of Clifford Duncan
5 concerning the potential for the Deerfield Wind Project to interfere with television
6 broadcast signals. I conclude that the Deerfield Wind Project will not cause material
7 interference or have an adverse effect on cable operations for Duncan Cable TV.

8

9 **Q. Please describe your general approach in reviewing the Deerfield Wind**
10 **Project's potential interference with broadcast television signals, in response to the**
11 **concerns expressed by Mr. Duncan for Duncan Cable TV.**

12 Response: Comsearch was commissioned by Deerfield Wind, LLC to evaluate the
13 claims made by Mr. Duncan with respect to Duncan Cable TV's operations when
14 the Deerfield Wind turbines are installed. We provided a Technical Memorandum,
15 dated January 22, 2008, which examined each of the issues raised by Mr. Duncan.
16 See *Exhibit DFLD-LP-2*. Our evaluation was based on sound engineering
17 principals and widely accepted calculation procedures for the determination of
18 interference conditions. Evaluations such as the one performed for Deerfield Wind
19 have been confirmed by field work Comsearch has performed all over the United
20 States.

1

2 **Q. Mr. Duncan suggests that the Project's turbines have the potential to generate**
3 **electro-static, electro-mechanical, electro-magnetic, or radio frequency interference**
4 **that could cause "severe degradation or complete loss" of television signals (Duncan**
5 **pft for Duncan Cable at 1). How do you respond to this claim?**

6 Response: The assertion that the Project's wind turbines have the potential to cause
7 electro-static, electro-mechanical, electro-magnetic or radio frequency interference
8 that could cause severe degradation or complete loss of television signals is an
9 extreme overstatement of the conditions that may occur. Each condition brought up
10 by Mr. Duncan is addressed below:

11 **▪ Electro-static interference** conditions are only created by extremely high
12 voltages, normally greater than 100, 000 Volts, that are in close proximity (within
13 less than 1000 feet) to devices that may be affected. The wind turbine generators
14 produce voltages that are less than 1000 Volts. At Deerfield, the transformer in
15 the nacelle will convert the voltage to 34,500 Volts. This power is conducted via
16 the collector system to the power distribution sub-station. Since the distance to
17 the Duncan Cable TV facility is over eight miles, electro-static interference will
18 not be an issue to the systems operating at the facility. Homes in the area will
19 not be affected because they are a great distance from the turbines (over 1/2 mile
20 away), and the wind turbine-generated power is conducted on wires encased in

1 the metallic tower, which provides shielding for the wires connected to the
2 distribution system that reduces the potential for electro-static interference.

- 3 ■ **Electro-mechanical interference** conditions are created if the wind turbine
4 obstructs the broadcast signal. This can occur if the turbines are in the path
5 between the TV broadcast antenna and the reception point. Potential TV
6 distortion is due to the variations in signal strength and reflections of TV signals
7 caused by the motion of the wind turbine blades. This effect has been measured
8 by Comsearch and has been found to have a maximum attenuation effect of 2.5
9 dB. Any reduction in TV signal therefore depends on the relative location of the
10 wind turbines with respect to the path between the TV Station and the reception
11 point. Since all stations are not located at the same point, this effect may occur
12 for individual stations but will not affect the reception of the majority of TV
13 stations available in the area. Also, the degradation caused by wind turbines
14 mainly affects analog modulated signals. The effects on digital TV signals are
15 much less noticeable. In February 2009, all off-air TV broadcast signals will be
16 digitally modulated as required by United States Congressional mandate.

- 17 ■ **Electromagnetic and radio frequency interference** conditions are the same
18 thing, although Mr. Duncan listed them as separate issues. All wind turbine
19 generators must meet the FCC regulations which specify the limits for
20 interference emissions from electrical devices. Wind turbine generators are

1 classified by the FCC as unintentional RF radiators and must meet the criteria of
2 Paragraph 15.109 of part 15 of the FCC Rules. The emission limits are stated at
3 a distance of 3 meters or approximately 10 feet and are shown in the following
4 table.

5 **FCC Radiated Emission Limits at 3 Meters**

6 <u>Frequency of Emission (MHz)</u>	7 <u>Field Strength</u> 8 <u>(microVolts/meter)</u>
9 30 – 88	100
11 88 – 216	150
12 216 – 960	200
13 > 960	500

14 Since the Project wind turbines must meet these requirements or they could
15 not be installed in the U.S., no electromagnetic or radio frequency interference
16 should be generated that would affect residences or the Duncan Cable TV service.
17 Even if the emissions reach the FCC rule limits, the emissions levels at the Duncan
18 Cable Headend earth station antennas more than eight miles away would be many
19 orders of magnitude below the sensitivity of the earth station receivers. Calculations
20 of the interference levels made at the Duncan Cable facility based on the emissions
21 from all of the wind turbines in the January 22, 2008 Technical Memorandum,
Exhibit DFLD-LP-2, showed that no interference conditions would occur.

1 **Q. Mr. Duncan claims that PPM's Lowville wind facility caused television**
2 **reception problems for more than 200 neighboring residences, and seems to suggest**
3 **that this is relevant information that the Board should consider with respect to**
4 **potential impacts of the Deerfield Wind Project. (Duncan pft for Duncan Cable at 2-**
5 **4). How do you respond to these claims?**

6 Response: The potential for interference from the Deerfield Project could not be
7 determined based on information from the Lowville wind facility. Interference is
8 extremely sensitive to the location of the wind turbines with respect to the path
9 between the particular TV stations and the reception point, the signal strength, and
10 the strength of the receiving antenna. The Lowville Project differs significantly from
11 the Deerfield Project in both scale and geography. The Lowville project is
12 comprised of 195 turbines spread out over 12 miles compared to the 15 turbines
13 proposed for the Deerfield site. The Lowville turbines are located in an area of
14 rolling terrain while the Deerfield project will sit atop a ridge.

15 While Mr. Duncan professes skepticism about the reliability of "laboratory
16 predictions" and "laboratory models," this is simply the most effective method
17 available for analyzing potential interference in this instance. It should also be noted
18 that the data from Lowville show that there was on average one complaint recorded
19 for every wind turbine installed. This is a relatively low number of complaints
20 compared to the scale of the project.

1 It is my understanding that TV problems experienced as a result of the
2 Lowville project have been identified and are being addressed by the owners of the
3 Lowville project. To my knowledge, the mitigation at Lowville has involved the
4 following actions: (i) adjusting existing receiving antennas; and/or (ii) upgrading
5 existing antennas and/or the cable connecting the antenna to the television.
6

7 **Q. Mr. Duncan testifies that the proposed turbines would be situated in line**
8 **between Duncan Cable's reception site on Mt. Olga and the off-air signals they**
9 **receive from the direction of Albany, NY. Furthermore, he argues that the poor**
10 **quality of the digital signal Duncan Cable is currently designated to receive from**
11 **Boston may result in an eventual switch to receiving the signals from the direction of**
12 **Albany, making the interference from the Project an even more significant problem**
13 **(Duncan pft for Duncan Cable at 2). How do you respond to this claim?**

14 Response: The signals available from the Albany, NY area will still be available to
15 Duncan Cable TV following installation of the wind turbines. The Comsearch
16 Technical Memorandum of January 22, 2008 (which I understand was provided to
17 Duncan Cable TV in discovery) dealt with this issue and stated:

18 The wind turbines will not cause interference to the off-air TV reception at
19 the Duncan Cable Headend. The calculations show that the interference
20 levels are well below the sensitivity and operational levels of the off-air TV
21 receivers. There will be physical attenuation of off-air TV signals in one 18.5°
22 sector from relative azimuths of 262.5° - 281°. The TV signal attenuation is
23 estimated to be no greater than 2.5 dB in this sector which will have no

1 measureable affect on the quality of the TV signal that will be received at the
2 headend TV receiver and will be available as video for distribution on the
3 cable network system.

4
5 See *Exhibit DFLD-LP-2*. Mr. Duncan has not raised any new information which
6 would suggest that my earlier conclusions were unfounded, overstated, or otherwise
7 in error.

8
9 **Q. Mr. Duncan states that the Project may also interfere with the reception of**
10 **signals from satellites low on the western horizon (Duncan pft for Duncan Cable at**
11 **3). How do you respond to this claim?**

12 Response: Comsearch ran an Azimuth–Elevation Report for the earth station
13 antennas at the Duncan Cable TV facility. *See Exhibit DFLD-LP-3*. The
14 Azimuth–Elevation Report identifies the satellites that can be communicated with
15 from any point on earth and gives the azimuth and elevation angle for the earth
16 station antenna. From the report, it can be seen that the wind turbines do not
17 prevent the earth stations from reaching any satellites in a westerly direction. The
18 wind turbines are located in azimuth relative to the Duncan site from 262.5 - 281°.
19 The minimum elevation angle for an earth station antenna is 5°. The maximum
20 azimuth that can be reached from the Duncan site for an elevation angle of 5° is
21 257.7°. Beyond that azimuth angle the earth station elevation angle falls below 5°.
22 Also, AMC 8 is the furthest westerly satellite to be communicated with and it is at an

1 azimuth 253.3°. In my professional opinion, there is no basis for Mr. Duncan's
2 concern that he will be limited by the wind turbines to the satellites on the western
3 horizon.

4

5 **Q. Mr. Duncan criticizes the Comsearch memos previously produced by**
6 **Deerfield, saying that they were not based on real-world examples but on laboratory**
7 **predictions that are often wrong (Duncan pft for Duncan Cable at 3-5). How do you**
8 **respond to this claim?**

9 Response: The Comsearch report produced for Deerfield was based on well-
10 accepted engineering calculations and field measurements that were made
11 throughout the United States at various facilities including wind turbine, earth station
12 and cable headend facilities. The measurements made in the United States were
13 made for various wind developers including PPM/Iberdrola, Invenergy, Horizon,
14 WE and Clipper. They have been made in Oklahoma, Kansas, New York, Michigan,
15 Iowa, Minnesota, Wisconsin and Illinois. In all cases, the empirical data collected
16 confirmed the engineering calculations and procedures used by Comsearch in
17 analyzing potential interference conditions in the vicinity of wind facilities. These
18 methods are widely accepted in the telecommunication industry.

19

20 **Q. Mr. Duncan has suggested that Deerfield Wind should be required to conduct**

1 a full independent field study of the Lowville project and a second location featuring
2 topography similar to that at the Deerfield Project and send the results of the study
3 to all adjoining landowners (Duncan pft for Duncan Cable at 6). How do you
4 respond?

5 Response: In my professional opinion, a study of another site is not necessary to
6 reach an understanding of the potential impacts that may result from the Deerfield
7 Wind Project. As I have discussed in this testimony, Comsearch has already
8 extensively evaluated the issues of potential interference raised by Duncan Cable TV,
9 using methods that are widely accepted in the telecommunications industry.
10 Comsearch's analysis shows that there will be no interference to the cable operations
11 at the Duncan Cable Headend facility, and no significant interference to antenna
12 reception at residences. A study such as Mr. Duncan proposes would be costly and
13 time-consuming. Moreover, the results would not be applicable to the Deerfield
14 Wind site due to the site-specific variables that affect interference, which I have
15 discussed in this testimony.

16

17 **Q. In sum, do you believe that the Deerfield Wind Project will materially**
18 **interfere with the operations of Duncan Cable TV or create a risk of financial harm?**
19 **Please explain.**

20 Response: The Deerfield Wind Project will not materially interfere with the

1 operations of Duncan Cable TV. The issues of potential interference from the
2 Deerfield Wind facility raised by Duncan Cable TV have been evaluated extensively.
3 The calculations show that there will be no interference to the cable operations at the
4 Duncan Cable Headend facility. The satellite reception at C- and Ku- Band will be
5 unaffected by the presence of the turbines. The electromagnetic emissions from the
6 wind turbines is limited by FCC Regulations and even if the emissions were at the
7 FCC rule limits their emission levels at the Duncan Cable Headend earth station
8 antennas would be many orders of magnitude below the sensitivity of the earth
9 station receivers. There is also no possibility that the wind turbines will physically
10 obstruct the earth station antennas' ability to have a clear view of the Geo-Stationary
11 satellite arc.

12 The wind turbines will not cause interference to the off-air TV reception at
13 the Duncan Cable Headend. The calculations show that the interference levels are
14 well below the sensitivity and operational levels of the off-air TV receivers. There
15 will be physical attenuation of off-air TV signals only in one 18.5° sector from
16 relative azimuths of 262.5° - 281°. The TV signal attenuation is estimated to be no
17 greater than 2.5 dB in this sector, which will have no measurable effect on the quality
18 of the TV signal that will be received at the headend TV receiver and will be
19 available as video for distribution on the cable network system.

20 The analysis and calculations in the January 22, 2008 Technical

1 Memorandum, *Exhibit DFLD-LP-2*, have shown that the Duncan Cable Headend
2 will not be adversely affected by the presence of the Deerfield Wind Energy facility
3 with regard to electromagnetic (radio-frequency), electro-mechanical (obstruction)
4 and/or electro-static interference. Electro-static interference applies to systems that
5 are in close proximity and is not an issue with regard to a Cable Headend facility that
6 is located 8+ miles from the electrical generation equipment of the wind energy
7 facility.

8

9 **Q. Does this conclude your testimony at this time?**

10 Response: Yes it does.