

VERMONT ENVIRONMENTAL BOARD
10 V.S.A. §§ 6001-6092

Re: Burlington Broadcasters, Inc., d/b/a WIZN; Land Use Permit
Charlotte Volunteer Fire & Rescue; Application #4C1004R-EB
& John Lane

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER

I. INTRODUCTION

This appeal concerns whether radiofrequency radiation (RFR) from a radio broadcast tower on the northwest side of Pease Mountain in Charlotte, Vermont causes undue health effects. Technically, the criteria on appeal are Criteria 1(air), 6(educational services), 8(aesthetics and historic sites), 9K(adjacent public lands), and 10(town and regional plan), but the issue has been limited by agreement and order to the adverse health effects, if any, of RFR. See, Memorandum of Decision Regarding Stipulation (Jan. 22, 2004). While the evidence in this case raises several concerns about the possible adverse health effects associated with RFR, the Board is persuaded by a preponderance of the evidence that RFR from the Project will cause no such adverse effect.

II. PROCEDURAL HISTORY

On June 4, 1999 the District 4 Environmental Commission (Commission) issued Land Use Permit (LUP) #4C1004R (Permit) and supporting Findings of Fact, Conclusions of Law, and Order (Reconsidered Decision) to Burlington Broadcasters, Inc. d/b/a WIZN (BBI), Charlotte Volunteer Fire and Rescue Services, Inc. (CVFRS), and John Lane (collectively, Permittees). The Permit authorizes a previously constructed 199-foot communication and broadcast tower and an equipment building (Project). The Project is located on 17 acres of land on the northwest side of Pease Mountain, off Church Road in Charlotte, Vermont. The tower currently contains broadcast antennae used by WIZN and CVFRS, as well as four antennae presently used and maintained by Verizon (formerly NYNEX Mobile Limited Partnership). Verizon's use of the tower is authorized under Land Use Permit #4C0901.

On July 2, 1999, Mary Beth Freeman, Graeme Freeman, Elaine Ittleman, Dr. Frank Ittleman (Freeman et al.) and Citizens for Appropriate Siting of Telecommunications Facilities (CCAPTF) (Freeman et al. and CCAPTF hereinafter collectively referred to as Appellants) filed an appeal with the Vermont Environmental Board (Board) from the Permit and the Reconsidered Decision alleging that the Commission erred in its conclusions concerning 10 V.S.A. Sections 6086(a)(1), (9)(K), (10) and with respect to its rulings on party status. Appellants' July 2, 1999 appeal incorporates by reference their previously filed appeal dated July 6, 1998 of the Commission's initial decision dated June 5, 1998 (1998 Decision). On July 14, 1999, Verizon filed a cross-appeal pertaining to the Project, wherein it contests the Commission's denial of Verizon's party status in the

#4C1004R proceeding. Verizon's cross-appeal supersedes a Notice of Appeal filed on July 6, 1998 relative to the Commission's 1998 Decision.

The issuance of the Permit by the Commission vested jurisdiction with the Board to hear several other appeals that were filed in June and July of 1998 (Other 1998 Appeals). The Other 1998 Appeals were held in abeyance pending the Commission's proceedings on Motions to Alter and Reconsider the Commission's Decision. The Other 1998 Appeals include an appeal filed by Charlotte Congregational Church (CCC), an appeal filed by BBI, and an appeal filed by the Charlotte Central School Board (CCSB). Also pending on the Board's Docket are Declaratory Rulings #322 and #323, each of which appeals Jurisdictional Opinion # 4-116, dated March 29, 1996, which pertains to the Project.

As a result of the issuance of the Permit on June 4, 1999, BBI's appeal of the Commission's June 5, 1998 Decision became moot. Verizon affirmatively superseded its July 6, 1998 appeal with its appeal of Land Use Permit #4C1004R filed on July 14, 1999 and so its July 6, 1998 appeal is also moot. Both of the appeals referenced in this paragraph have been dismissed.

Also as a consequence of the Commission's issuance of the 1998 Decision and Land Use Permit #4C1004R, the appeals filed by CCSB and CCC on July 13, 1998 and July 10, 1998, respectively, are moot.

Freeman et al. consolidated the claims set forth in their 1998 Appeals with those being pursued in their Notice of Appeal dated July 2, 1999, and have accordingly preserved any arguments raised in the former appeal to the extent now applicable.

There was also a revocation proceeding relative to a Permit #4C0901 issued to Steve Korwan d/b/a Contel Cellular, to which Verizon is a successor in interest. The Board dismissed the revocation petition on August 7, 2000.

On April 10, 2003, Chair Moulton Powden convened a prehearing conference. At the prehearing conference, the parties agreed that the two declaratory rulings should remain continued awaiting resolution of this appeal. During the prehearing conference, Chair Moulton Powden made verbal party status rulings and also established additional party status issues to be decided as preliminary issues following filings by the parties and potential parties, all of which are set forth in the Prehearing Conference Report and Order issued on April 18, 2003 (PCRO). Among other things, the PCRO also identified two sets of preliminary issues, the Group 1 Preliminary Issues, and the Group 2 Preliminary Issues.

On April 17, 2003, BBI filed Motions to Dismiss Mary Beth Freeman, CCAPTF, and CCC. On the same date, Appellants filed a Motion to Recuse Board Member Christopher Roy, Esq.

On April 25, 2003, Verizon filed an objection to the merits hearing date. On April 29, 2003, Appellants, Verizon and CCC filed petitions for party status. The Board deliberated on these motions and petitions on May 21, 2003 and issued a Memorandum of Decision on them on June 6, 2003.

On June 18, 2003, the Charlotte School Board filed a letter seeking to enter a late appearance. BBI objected to this request on June 27, 2003.

Briefs on the Group 1 Preliminary Issues were filed in early July. The Board deliberated on July 16, 2003. On August 8, 2003, the Board issued a Memorandum of Decision on the Group 1 Preliminary Issues and the late appearance by the Charlotte School Board. The Chair issued a Preliminary Ruling on the same date, ruling that certain filings were unauthorized and would not be considered by the Board.

On September 8, 2003, BBI filed a Motion to Alter the August 8, 2003 Memorandum of Decision. The Motion contained a request that the Board undertake rulemaking. Reply briefs were filed by Appellants and by the Charlotte Congregational Church. The Board deliberated on the Motion to Alter and discussed the request for rulemaking on September 17, 2003.

On September 26, 2003, the Board issued a Memorandum of Decision denying the Motion to Alter, and a Memorandum to Parties denying the request for rulemaking.

The Group 2 Preliminary Issues were briefed in September and the Board deliberated on them on October 15, 2003. A Memorandum of Decision on Group 2 Preliminary Issues was issued on November 25, 2003.

On November 26, 2003, the parties submitted a stipulated schedule for filings and hearing date. The Chair ruled on this joint motion on December 1, 2003. On December 16, 2003 the Chair issued a Scheduling Order modifying the December 1 Order.

On January 2, 2004, the parties submitted a stipulation limiting the issues on appeal. On January 6, 2004, the Chair issued a Chair's Order Regarding

Stipulation. Also on January 6, 2004, the Chair issued an Order regarding the Motion to Recuse, denying the motion to recuse Board member Christopher Roy.

After deliberating on objections to the Chair's Order Regarding Stipulation on January 21, 2004, the Board issued a Memorandum of Decision Regarding Stipulation on January 22, 2004.

BBI filed a Motion to Extend certain filing deadlines on January 29, 2004. The Chair's Order on Motion to Extend was issued on February 5, 2004.

On March 29, 2004, BBI filed a motion requesting that the Board engage independent experts. Evidentiary objections were filed by BBI and Appellants. Replies to evidentiary objections were also filed.

On April 8, 2004 a second prehearing conference was held at which the Chair ruled on the evidentiary objections and took BBI's motion concerning independent experts under advisement.

A site visit and public hearing were held on April 14, 2004. The hearing was reconvened on April 15, 2004 and again on May 12, 2004. The Board deliberated on May 19, 2004, June 23, 2004, September 15, 2004 and on October 27, 2004. Based upon a thorough review of the record, related argument, and the parties' proposed findings of fact and conclusions of law, the Board declared the record complete and adjourned.

III. ISSUES

The issues on appeal are:

1. Whether, pursuant to 10 V.S.A. § 6086(a)(1), the Project will result in undue air pollution.
2. Whether, pursuant to 10 V.S.A. § 6086(a)(6), the Project will cause an unreasonable burden on the ability of a municipality to provide educational facilities.
3. Whether, pursuant to 10 V.S.A. § 6086(a)(8), the Project will "have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites or rare and irreplaceable natural areas."
4. Whether, pursuant to 10 V.S.A. § 6086(a)(9)(K), the Project will

materially jeopardize or interfere with the public's use or enjoyment of certain lands adjacent to the project owned or controlled by the University of Vermont.

5. Whether, pursuant to 10 V.S.A. § 6086(a)(10), the Project is in conformance with the applicable Town and Regional Plans.

Each party with party status on a criterion on appeal was required to limit its presentation of evidence under such criterion to the alleged health and safety effects of radio-frequency radiation (RFR). The Board has not addressed whether such health or safety effects could constitute a violation of any criterion on appeal other than Criterion 1(air).

IV. FINDINGS OF FACT

To the extent that any proposed findings of fact are included herein, they are granted; otherwise, they are denied. *See Secretary, Agency of Natural Resources v. Upper Valley Regional Landfill Corp.*, 167 Vt. 228, 241-242 (1997); *Petition of Village of Hardwick Electric Department*, 143 Vt. 437, 445 (1983). Topic headings are only for organizational purposes. Facts stated and terms defined in the procedural summary are incorporated herein.

General

1. The Project is located on a 17-acre tract of land on the northwest side of Pease Mountain, immediately east of Route 7 and south of Church Hill Road, in Charlotte, Vermont, and consists of a 199-foot-high radio tower, with associated antennas and facilities, owned by Charlotte Volunteer Fire and Rescue Services (CVFRS).
2. The 17-acre tract of land is owned by John Lane and Linda Lane, and a portion of the tract is leased to BBI, and subleased to CVFRS, for operation of the tower.
3. The Project was constructed in 1987.
4. The Project was originally owned by Radio Vergennes, Inc., d/b/a WIZN, which transferred ownership to CVFRS in November 1987. In June 1988, Radio Vergennes, Inc., sold its assets to Burlington Broadcasters, Inc., d/b/a WIZN (BBI).
5. CVFRS and Radio Vergennes, Inc. began transmitting from the tower in April 1987.

6. In 1991, CVFRS leased space on the tower to a cellular telephone service company now known as Verizon Wireless. Use of the tower by Verizon Wireless is authorized by Land Use Permit #4C0901, issued December 5, 1991.
7. CVFRS uses the tower to receive and transmit signals for fire and rescue calls and other emergencies. WIZN has antennas on the tower to broadcast an FM radio signal at a frequency of 106.7 megahertz (MHz).
8. The Charlotte Congregational Church (CCC) is located across Church Hill Road from the Project, approximately 1,450 feet to the north.

Radiofrequency Radiation (RFR)

9. An electric field is measured by the force it exerts on a charged particle; a measure of the magnetic field is the force it exerts on a moving charged particle. Electric field strength is measured in volts per meter (V/m), and magnetic field strength is measured in amperes per meter (A/m). Electromagnetic field strength is also expressed in terms of power density, which is measured by the power per unit of area normal to the direction of propagation, usually expressed in units of watts per square meter (W/m^2) or milliwatts per square centimeter (mW/cm^2).
10. Magnetic field strength can also be measured in terms of magnetic flux density, in units of milligauss (mG) or microtesla (μT). One microtesla is equal to one millionth of a tesla.
11. The electromagnetic spectrum is a continuum of properties of electromagnetic waves, in order of wavelength (frequency), which is measured in hertz (Hz). The electromagnetic spectrum can be depicted graphically. At the lowest end of the spectrum are extremely low frequency fields, at or below 30 Hz. At the highest end of the spectrum are infrared radiation and visible light, with frequencies from 300,000 megahertz (MHz) to 750,000,000 MHz. One MHz is equal to one million Hz.
12. The range of radiofrequency is between 3 kilohertz (kHz) and 300 gigahertz (Ghz), between audiofrequencies and the infrared region. This includes the ultrahigh frequency (UHF) band, ranging from 30-300 MHz. One kilohertz equals one thousand hertz, and one gigahertz equals one thousand million hertz.
13. An FM, or frequency modulation, radio broadcast signal involves a radiofrequency carrier wave with small variations in frequency around the carrier frequency.

14. Electromagnetic waves result from the propagation of electromagnetic energy through space.
15. Electromagnetic waves include both electric and magnetic waves. Radiofrequency radiation means the propagation of electromagnetic waves in the radiofrequency range.
16. Electromagnetic waves in the RFR range are non-ionizing radiation.
17. When an electromagnetic wave interacts with the human body, part of the energy is reflected and part is absorbed. The amount of energy absorbed depends on the frequency, the size of the body, the orientation of the body with respect to the direction of the incident field, the presence of nearby reflecting surfaces, and other factors.
18. The specific absorption rate (SAR) is a measure of the rate at which a body absorbs energy in an electromagnetic field, and is usually expressed in units of watts per kilogram (W/kg).
19. Electromagnetic energy disperses over an ever-increasing area as it radiates from a source. Generally, when the distance from the source doubles, the area covered by the radiation increases by a factor of four, and the power density in any particular spot decreases by a factor of four.

FCC Guidelines and Compliance

20. In 1996, the Federal Communications Commission (FCC) adopted safety guidelines to regulate human exposure to RFR (FCC Guidelines). The FCC Guidelines are based on the recommendations of National Council on Radiation Protection and Measurements (NCRP) Scientific Committee 53 (NCRP Report No. 86) and the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee 28 (IEEE C95.1-1991).
21. The FCC has acknowledged that it is not a health agency, and that it defers to the comments of the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the National Institute for Occupational Safety and Health, and the Occupational Safety and Health Administration. Each of these agencies has endorsed the FCC Guidelines, as well as numerous non-governmental organizations such as the International Commission on Non-ionizing Radiation Protection (ICNIRP) and IEEE.
22. The FCC Guidelines establish Maximum Permissible Exposure (MPE) limits, which “are derived from exposure criteria quantified in terms of SAR.” Exhibit B-3 at 8.

23. The established threshold SAR is 4 W/kg. This value represents the whole-body average rate of exposure which was found to disrupt learned behavior in laboratory animals. Specifically, this standard is based on research that shows a decrease in the ability of food-deprived laboratory animals to seek food.
24. To account for any uncertainties in the data and increase confidence that adverse effects will not occur, the FCC reduced the established threshold SAR in the IEEE standard (4 W/kg) by a factor of 10 to provide an additional margin of safety for exposures in controlled environments such as occupational exposure inside fenced antenna sites. In other words, the FCC Guidelines for controlled environments cap exposure to RFR at 10% of the established threshold SAR.
25. In addition to the safety factor of 10, a further safety factor of 5, i.e., 2% of the established threshold SAR, was applied for an added margin of safety for exposures in uncontrolled environments, where exposure to the general public could occur. Thus, the FCC Guidelines for public, uncontrolled environments cap exposure to RFR to 2% of the established threshold SAR.
26. The MPE limits are defined by the FCC as “the rms [root-mean-square] and peak electric and magnetic field strength, their squares, or the plane-wave equivalent power densities associated with these fields to which a person may be exposed without harmful effect and with an acceptable safety factor.”
27. MPE limits are expressed in terms of electric field strength, magnetic field strength, power density, and averaging time.
28. The literature cutoff date for the IEEE Std C95.1-1991 (which was reaffirmed in 1997 and republished with a supplement in 1999) was 1986.
29. The IEEE standards, on which the FCC Guidelines are based, are subject to review or reaffirmation every five years. The American National Standards Institute (ANSI) board reaffirmed the 1991 ANSI standards in 1997. The members of the IEEE who voted on the reaffirmation participated in an ongoing literature evaluation. A literature surveillance group reviews all of the pertinent literature and places it in the IEEE database. The 1997 reaffirmation of the 1991 standards was based on scientific literature from 1985 until the time in 1997 when ANSI voted to reaffirm the standard. The IEEE standard was republished with a supplement on issues beyond the scope of this appeal in 1999.
30. The FCC Guidelines protect against health hazards from the thermal effects of RFR. They do not directly address nonthermal health hazards, if any.

31. The FCC Guidelines limit exposure for the general population to RFR between 30-300 MHz to an electric field strength of 27.5 V/m, a magnetic field strength of 0.073 A/m, and a power density of 0.2 mW/cm², averaged over a 30-minute period.
32. The parties' consultants took RFR readings in the area around the Project.
33. BBI's consultant, Donald Haes, has a B.S. in Health Physics, and a M.S. in Radiological Sciences and Protection, from the University of Lowell, and a Ph.D. in radiation protection from Hamilton University.
34. Appellants' consultant, Raymond Kasevich, has a B.S. in electrical engineering from the University of Hartford, a M.S. in electrical engineering from Yale University, and has taken courses toward a Ph.D. in electrical engineering at the University of Michigan, in addition to other coursework. He has also taught electrical engineering at the University of Massachusetts, Northeastern University and University of Hartford.
35. Mr. Kasevich, took numerous RFR readings around the Project site. Most of these readings were within the FCC Guidelines. Five readings were above the standard set in the FCC Guidelines, namely, the readings taken at the Charlotte Congregational Church mailbox (Kasevich location 3, Haes F3), ten steps west of location 3 (Kasevich location 4, Haes F4), fifty steps west of the Charlotte Congregational Church mailbox (Kasevich location 8, Haes G8), eighty steps west of the Charlotte Congregational Church mailbox (Kasevich location 11, Haes E 11), and 150 steps west of the Charlotte Congregational Church mailbox (Kasevich location 18, Haes E18). Mr. Kasevich took each of these readings in close proximity to, well within 20 cm of, a metal window frame or other conducting object.
36. The FCC guidance document for determining compliance with the FCC Guidelines, OET-65, cautions "that 20 cm should be the minimum separation distance where reliable field measurements to determine adherence to MPE's can be made." OET-65 at 46. The FCC guidance document, OET-65, cites the ANSI/IEEE 1992 standard, which also specifies 20 cm as a minimum separation distance for such measurements. *Id.* at 49.
37. The United States Air Force also has guidelines on how to take RFR readings, but those guidelines allow readings to be taken within 20 cm of metal or other conducting objects.
38. When the probe of an RF meter comes very close to, or touches a metal or other conducting object that is immersed in an RF field, RF readings can be high

- because currents are coupled with, and/or reradiated by, the conducting object. There can also be instances in which currents are coupled into the antenna that is inside the meter and into other parts of the instrument, although there is no indication that that is what happened in this case.
39. Metal, such as that which can be used as siding or roofing on homes and other buildings, can also reflect RFR away from occupants inside the building.
 40. Electromagnetic radiation, including RFR, can come from a variety of sources in and around any given home, including microwave ovens, and cordless and wireless electronic appliances, such as cell phones. Overlapping electromagnetic fields can act on each other to increase or decrease net field strength.
 41. BBI's expert, Donald Haes, also took numerous readings around the Project site, including each site tested by Mr. Kasevich that was accessible on the testing date. Mr. Kasevich accompanied Mr. Haes to each testing location and showed him where he obtained the measurements.
 42. Mr. Haes took RF readings at each of the above locations where Mr. Kasevich tested, except that Mr. Haes did not test within 20 cm of conducting objects. Mr. Haes' readings at the five locations where Mr. Kasevich found RF levels in excess of the FCC Guidelines, were much lower than Mr. Kasevich's, and were well within the FCC Guidelines.
 43. The readings taken in close proximity to conducting objects were taken in places not likely to provide long-term human exposure, such as right up against a window frame.
 44. With respect to the readings taken in accordance with the FCC's guidance on gauging compliance with the FCC Guidelines, the highest readings occurred at the guy wires and the fences around the tower. The highest reading was under 26% of the MPE. All three sets of guy wires are completely enclosed by wooden fences.
 45. Over 95% of the readings were under 10% of the MPE limits set by the FCC Guidelines. All of the readings taken in accordance with FCC-approved procedure were within the FCC Guidelines.
 46. Of the 26 readings at the Church and Church parking lot, most were less than 2% of the MPE limits.
 47. The topography of the Project's surroundings, in particular, its location on the side of Pease Mountain facing another mountain, causes distribution of RFR

from the Project to be uneven. In addition, RFR can be reradiated from conducting objects like metal window frames, resulting in even greater variation in RFR levels in the Project vicinity.

48. Raising the height of the tower could decrease RFR levels in the vicinity of the Project.

49. The Project complies with the FCC Guidelines.

Nonthermal Health Effects

50. Electromagnetic radiation in the microwave and radiofrequency ranges causes chromosome aberrations and deoxyribonucleic acid (DNA) strand breakage.

51. The DNA molecule in a cell nucleus is a long, tightly coiled, double helix. The two strands of the helix are connected by four interacting chemicals called bases. The sequence of the bases along the DNA is in a code used to make the proteins essential for life. Each protein is encoded in a separate segment called a gene, and specific genes are activated by specific chemicals in regions of the gene called promoters.

52. After DNA is activated in the promoter region of the gene, proteins are synthesized in two steps, transcription -- making a copy of the DNA code of the gene in the form of a messenger RNA (mRNA) -- and translation -- using the mRNA to synthesize protein.

53. An accumulation of changes, or mutations, in the DNA is associated with the development of cancer. Cancers are believed to arise from a multi-step process: initiation (damage to the DNA in at least two places), promotion (effect on cellular processes that causes loss of control of those processes), and progression (tumor growth). Cancer mechanisms are not well understood and different mechanisms may be operating in each specific tissue.

54. A genotoxic carcinogen has no safe threshold because it damages DNA cell by cell, producing mistakes in DNA repair, leading to increased death and neoplastic transformation of cells.

55. Some studies show elevated rates of adult and childhood cancer among persons living near radio towers or microwave towers. The childhood cancers in these studies include leukemia, brain cancer, Hodgkin's lymphoma and non-Hodgkin's lymphoma.

56. The increased risk of cancer in these studies occurred with RFR exposure levels much lower than those allowed under the FCC Guidelines.

57. FM radio transmitters have been in operation in various places around the country since at least the 1930's, and there is no epidemiologic data that proves that RFR causes cancer or other nonthermal health problems.
58. There are inherent difficulties in obtaining good scientific data on nonthermal health effects or the lack thereof. For instance, people tend to move to new homes several times over their lifetimes, so any long-term effects of childhood exposure are difficult to gauge. Also, the private sector has little incentive to fund this type of research.
59. When the human body is exposed to RFR, even at very low field strengths under a milligauss, the body manufactures stress proteins. This is initiated by the stimulation of DNA to produce messenger RNA, which then makes the stress protein. The same proteins are manufactured by the body when exposed to heat. This is why these proteins are also referred to as "heat shock proteins."
60. Stress protein synthesis occurs at a very low SAR level, approximately 10^{-12} W/kg.
61. Induction of stress proteins can have positive effects. For instance, giving a patient a hot bath immediately prior to heart surgery can increase the positive outcome of that surgery. Stress proteins can help the body prepare for and withstand a traumatic event like heart surgery. Pre-stressing the body like this can help the body develop mechanisms to withstand an additional stress in the immediate future. This is called cytoprotection.
62. If the stimulus for stress protein synthesis is maintained for a period of time, the body has a negative feedback mechanism that shuts off production of stress proteins. The positive, cytoprotective effect wears off with continued stress.
63. However, while the same stress proteins are produced whether exposure is to a thermal stimulus or nonthermal stimulus, two different segments of DNA and different biochemical pathways are involved in the two responses, and cells have a greater sensitivity to nonthermal effects in this regard.
64. It is possible that stress protein synthesis is stimulated by the interaction of electromagnetic energy with electrons in human DNA, but there is no persuasive proof that this is the mechanism for stress protein synthesis caused by exposure to RFR.
65. Much of the research on the stress response has involved electromagnetic radiation in the extremely low frequency (ELF) range (3-300 Hz), but there are studies which show stress protein synthesis resulting from exposure to

- electromagnetic radiation in the RFR range. The cellular response and pathways activated by RFR are the same as those activated by ELF radiation.
66. The energy of the electromagnetic radiation is not the key to nonthermal stress protein synthesis. A cellular stress response can be caused by electromagnetic fields of different energy levels in different frequencies. If the cellular stress response were proved to cause cancer, energy-based exposure limits would not be effective safeguards. It appears that the cellular process is not being stimulated by energy input but by some other property of the electromagnetic radiation.
67. Electromagnetic fields have been shown to cause other biological effects, such as increased chromosome aberrations and micronuclei (cell fragments indicative of cell damage) in human blood lymphocytes, changes in cell proliferation, and single and double DNA strand breaks, at exposure rates well below the limits in the current FCC Guidelines.
68. In December 1996, the Vermont Department of Public Service (DPS) published Technical Report No. 38, a report to the General Assembly Pursuant to Act 182 of the 1995 Session, entitled *Radiofrequency Radiation: Health Effects and Interference, Status of Current Research and Regulation*.
69. In this report, the DPS concluded that the exposure limits in the FCC Guidelines were “the best to use” based on what was known at that time, and that state, regional and local decisionmakers need to be ready to take appropriate action to maintain public health and safety in the event that the consensus on health effects shifts.
70. There is no evidence that the Vermont legislature has requested that the DPS update its 1996 report.
71. While it appears that electromagnetic fields, including those in the RFR range, do have an effect on cell function, a causal link between RFR and cancer, or any other nonthermal health problem, has not been persuasively established. In short, there is no persuasive evidence that RFR can cause cancer or any other adverse nonthermal health effect.

V. CONCLUSIONS OF LAW

A. Burden of Proof

In this case, BBI bears the burden of proving by a preponderance of the evidence that RFR from the Project will not cause adverse health effects. “[S]ince the standard of proof in Act 250 proceedings is a preponderance of the evidence, the conclusion need only be more likely than not rather than absolute.” *Re: Washington Electric Cooperative, Inc., # 5W1036-EB*, Findings of Fact, Conclusions of Law and Order at 8-10 (Dec. 19, 1990)(citing *In re Muzzy*, 141 Vt. 463, 472-73 (1982) and quoted in *In re: St. Albans Group and Wal*Mart Stores, Inc., #6F0471-EB*, Findings of Fact, Conclusions of Law and Order at 23 (Altered) (June 27, 1995)(citations omitted), *aff’d, In re St. Albans Group and Wal*Mart Stores, Inc., 167 Vt. 75 (1997)*); see also *In re Trudy J. Smith*, 169 Vt. 162, 168 (Apr. 9, 1999)(citing *Muzzy*, 141 Vt. at 472-73).

The Vermont Supreme Court has held that the allocation of the burden of proof to one party simply relieves the other party of the "risk of non-persuasion," which means that if there is not enough evidence on the issue, or if the evidence is indecisive, the issue is decided against the party with the burden of proof. *In re Denio*, 158 Vt. 230, 237 (Apr. 3, 1992)(citing *In re Quechee Lakes Corp.*, 154 Vt. 543, 553 (1990); 4 J. Stein, G. Mitchell, B. Mezines, Administrative Law § 24.01, at 24--5 to 24--8 (1991)).

B. Health Effects of RFR

This is a difficult issue given the present state of the scientific research and evidence in this case on health problems that some experts contend are caused by RFR. On the current record, however, the Board must conclude that BBI has met its burden of proving that RFR from the Project will not adversely affect the health of individuals living in its vicinity.

In a prior Memorandum of Decision in this case, the Board held that RFR can be air pollution under Criterion 1(air), based on the Board’s noise precedent. (Memorandum of Decision on Motion to Alter, at 1-3 (Sept. 26, 2003)(citing *In re Barre Granite Quarries, LLC, #7C1079 (Revised)-EB*, Findings of Fact, Conclusions of Law, and Order at 70-71 (Dec. 8, 2000)(citing *Re: Bull’s Eye Sporting Center, #5W0743-2-EB*, Findings of Fact, Conclusions of Law, and Order at 14 (Feb. 27, 1997); *Talon Hill Gun Club and John Swinington, #9A0192-2-EB*, Findings of Fact, Conclusions of Law, and Order at 8 (June 7, 1995); *Black River Valley Rod & Gun Club, Inc., #2S1019-EB(Altered)*, Findings of Fact, Conclusions of Law, and Order at 18 (Jun. 12, 1997); *Re: James E. Hand and John R. Hand, d/b/a Hand Motors and East Dorset Partnership, #8B0444-6-EB (Revised)*, Findings of Fact, Conclusions of Law, and Order at 22 (Aug. 19, 1996)); see also, *In re R.E. Tucker, Inc.*, 149 Vt. 551, 556-557 (1988).) After the Board’s September 26, 2003 Memorandum of Decision, the parties agreed to limit the issues on appeal to whether there were any adverse health effects from the Project’s RFR. It is clear

that, having proved that there will be no adverse health effects from RFR, BBI has proven compliance with Criterion 1(air) and leaves no reason to find noncompliance with any other criterion on appeal. Even if BBI had failed to meet its burden of proving no health risk, there is no evidence that the Project would violate any of the other criteria on appeal. Put another way, the facts of this case do not indicate that RFR-related health issues would implicate Criteria 6(educational services), 8(aesthetics and historic sites), 9(K)(public lands) or 10 (town and regional plan).

The Project complies with the FCC Guidelines, which protect against thermal health effects of RFR with a wide margin of safety.

The Board agrees with much of the scientific community that more research is needed in the area of nonthermal health effects. At this time there simply is no persuasive and comprehensive evidence that RFR causes any nonthermal health effect. The state of the scientific information on any link between RFR and nonthermal health effects is likely to continue to evolve. This is an important issue and one that would benefit from further examination by state agencies with expertise in the areas of radiation and health, such as the Department of Public Service and Department of Health. However, the Board must decide this case based on the present evidentiary record. On that record, the Board is persuaded that RFR from this Project will cause no adverse health effects.

Act 250 generally prohibits the Board from putting time limits on land use permits. 10 V.S.A. § 6090(b)(1)(general rule that permit shall be for an indefinite period, as long as there is compliance with the terms of the permit, and excepting certain types of projects such as extraction of earth resources). The permit in this case is expressly conditioned on timely renewal of BBI's FCC license, which in turn requires an assessment of compliance with the FCC Guidelines. Should BBI fail to maintain compliance with the FCC Guidelines, or should persuasive evidence of adverse nonthermal health effects emerge, such a change in circumstances could furnish grounds for modification or revocation of the permit.

The issues on appeal were limited by agreement of the parties to any noncompliance with the criteria on appeal based on health effects of RFR from the Project. BBI has proved by a preponderance of the evidence that RFR from the Project will cause no adverse health effects. Therefore, the Project complies with all criteria on appeal.

VI. ORDER

1. The Project complies with 10 V.S.A. § 6086(a)(1)(Criterion 1(air)).
2. The Project complies with 10 V.S.A. § 6086(a)(6)(Criterion 6).
3. The Project complies with 10 V.S.A. § 6086(a)(8)(Criterion 8(aesthetics and historic sites)).
4. The Project complies with 10 V.S.A. § 6086(a)(9)(K)(Criterion 9(K)).
5. The Project complies with 10 V.S.A. § 6086(a)(10)(Criterion 10).
6. Land Use Permit #4C1004R-EB is hereby issued.
7. BBI's Motion for the Board to call an independent witness DISMISSED as moot.

DATED at Montpelier, Vermont this 29th day of October, 2004.

ENVIRONMENTAL BOARD

 /s/Patricia Moulton Powden
Patricia Moulton Powden, Chair
Jill Broderick*
William Martinez
Patricia Nowak**
Alice Olenick
Richard C. Pembroke, Sr.***
A. Gregory Rainville
Jean Richardson
Christopher D. Roy

* Board Alternate member Jill Broderick was unable to attend the April 15, 2004 hearing date, and the Board's deliberations on September 15, 2004, but listened to the audio record and joins in the permit and decision.

** Board member Patricia Nowak was unable to attend the Board's deliberations on September 15, 2004, but joins in the permit and decision.

*** Board member Richard C. Pembroke, Sr. was unable to attend the May 12, 2004 hearing date, but listened to the audio record and joins in the permit and decision.