

State of Vermont
Water Resources Board

In re: Appeal of Vermont
Natural Resources Council
Docket Nos. 92-02 and 92-05

Authority: 10 V.S.A. § 1024(a)
10 V.S.A. § 1099(a)

Findings of Fact, Conclusions of Law and Order

Introduction

I. Docket No. 92-02 (Dam Order appeal)

On February 11, 1991, Elwin R. and Janice L. Kingsbury and Snowridge, Inc. (SRI) filed an application with the Vermont Agency of Natural Resources, Department of Environmental Conservation (ANR) under the provisions of 10 V.S.A. Chapter 43 (Dams), for a permit to construct an impoundment ("dam") consisting of a water withdrawal facility and an off-stream storage pond (pond). The pond would be located adjacent to the Mad River in the Towns of Waitsfield and Warren, Vermont. Water would be diverted via the water withdrawal facility from the Mad River to the pond. The pond would act as a reservoir, primarily for snowmaking purposes. On January 8, 1992, after providing proper public notice, ANR issued an Order of Approval authorizing the project (hereinafter referred to as the "Dam Order").

On February 6, 1992, the Vermont Natural Resources Council (VNRC) and others¹ filled a Notice of Appeal with the Vermont Water Resources Board (Board). The appeal was filed under 10 V.S.A. § 1099(a). A prehearing conference was held on March 4, 1992. On April 10, 1992, the Board issued a Prehearing Conference Order and Preliminary Order. On April 20, 1992, VNRC filed an amended Notice of Appeal.

II. Docket No. 92-05 (401 Certification appeal)

On May 7, 1991, SRI applied for a Water Quality Certification from ANR under 10 V.S.A. § 1004 in connection with its application for a permit from the U.S. Army Corps of Engineers. See: P.L. 92-500, Section 401, codified at 33 U.S.C. § 1341; P.L. 92-500, Section 404, codified at 33 U.S.C. § 1344. On May 6, 1992, ANR issued a Water Quality Certification (401 Certification) finding generally that the operation of the proposed water withdrawal facility and pond when conducted according to certain conditions imposed by ANR, would not violate applicable Vermont water quality standards.

On May 20, 1992, VNRC properly filed a Notice of Appeal with the Board in accordance with 10 V.S.A. § 1024(a).

¹ The Mad Dog Chapter of Trout Unlimited, the Vermont Group of the Sierra Club and Peter F. Cammann.

III. Party Status

Under Board Procedural Rule 22, SRI, VNRC and ANR timely sought and obtained party status in both dockets. The Vermont chapter of the Sierra Club (Sierra Club) and the Vermont chapter of Trout Unlimited (Trout Unlimited) sought and obtained limited party status in the Dam Order appeal (Docket No. 92-02). Prehearing Conference Order and Preliminary Order, April 10, 1992. The Vermont Federation of Sportsmen Clubs (Sportsmen Clubs) sought and obtained limited party status in the 401 Certification appeal (Docket No. 92-05). Preliminary Order: Party Status, August 18, 1992. VNRC, Sierra Club, Trout Unlimited and the Sportsmen Clubs were represented by the same counsel and are collectively referred to in this decision as "VNRC." Winooski One Partnership ("Winooski One") sought party status under both dockets but obtained limited party status with respect to the 401 Certification appeal only (Docket No. 92-05). Preliminary Order: Party Status, August 18, 1992. Peter Richardson sought party status in both dockets and was denied such by the Board. Id. The Mad Dog Chapter of Trout Unlimited and Peter F. Cammann, appellants who appealed the Dam Order with VNRC, withdrew from the case prior to issuance of the party status order.

IV. Standard of Review

The Board conducted de novo hearings in these appeals. 10 V.S.A. § 1024(a); 10 V.S.A. § 1099(a).

V. Joint Hearings

On June 15, 1992, the Board issued an Order providing for joint evidentiary hearings (this proceeding). The two dockets were not consolidated.

The Board heard these appeals on September 30, October 1-3, October 6 and October 14, 1992. On October 14, 1992, the Board recessed the evidentiary hearings and provided an opportunity for the parties to submit proposed findings of fact and conclusions of law, as well as legal memoranda. SRI, VNRC and Winooski One filed proposed findings and conclusions of law on November 4, 1992, followed by reply memoranda on November 12, 1992.

IV. Deliberations

The Board began deliberations on these appeals upon receipt of the parties' filings.

On January 26, 1993, the Board received a letter from VNRC, objecting to the participation of Chair Rocheleau pending full disclosure by him of information concerning his firm's clients in order that appellants might evaluate the Chair's potential con-

conflicts of interest. On January 27, 1993, counsel for the Board sent to all parties an affidavit from Chair Rocheleau and a cover letter responding to VNRC's request. The parties were given an opportunity to file written responses with the Board until noon, February 1, 1993. ANR, SRI, VNRC and Winooski One all filed timely responses. On February 6, 1993, each Board member received formal notice of Chair Rocheleau's recusal from this proceeding.

The remaining Board members (the Board) continued deliberations without the participation of Chair Rocheleau. In light of the Chair's recusal, the Board deemed the parties' requests for further disclosures moot. The Board reviewed the record, and in particular all preliminary and evidentiary rulings made by Chair Rocheleau to determine whether or not to reconvene the hearing to rehear arguments of the parties on any procedural or substantive matters. The Board unanimously concluded that the hearing should not be reconvened and it unanimously voted to ratify all rulings made by its Chair. The Board then declared the record complete, and at its final deliberations on February 8, 1993, it voted to adopt this decision. Members Adler, Davies, DesMeules and Rachlin voted to approve the decision, and to issue it under the signature of each member.

Findings of Fact and Conclusions of Law

To the extent that any party's proposed findings of fact and conclusions of law are included below they are granted; otherwise, they are denied.² The evidence in this proceeding was voluminous, complex and often contradictory, requiring the Board to exercise its discretion in determining the weight that should be given any particular exhibit or bit of testimony. Considering the record as a whole and applicable Vermont law the Board makes the following Findings of Fact, and Conclusions of Law.

I. General Findings and Conclusions

A. Background

1. The Sugarbush ski resort consists of two separate alpine ski areas, Sugarbush South and Sugarbush North, that are not connected by ski terrain but are linked by car and shuttle

² VNRC's Motion Requesting Supplemental Testimony of Kathleen Fallon is hereby denied. The appellant's Motion Requesting the Board to Take Official Notice of Weather Data and Okemo Mountain, Inc., #2S0351-12A-EB, Findings of Fact, Conclusions of Law and Order (March 27, 1992) is hereby granted. However, since the March 27, 1992 decision was not the Environmental Board's final decision in this matter, official notice also is taken of Okemo Mountain, Inc. (Revised), #2S0351-12A-EB, Findings of Fact, Conclusions of Law and Order (July 23, 1992).

transport. One lift ticket allows skiing at both areas. The project under consideration in this proceeding relates to enhancing the availability of water for snowmaking at Sugarbush South only.

2. Sugarbush South currently has a snowmaking system that relies exclusively on water withdrawn from Clay Brook. Clay Brook drains much of the terrain at Sugarbush South and is a tributary of the Mad River. During a typical year between 48 and 60 million gallons of water is withdrawn from Clay Brook for this purpose allowing SRI to achieve coverage over approximately 80 acres or 32% of its existing 250 acres of ski terrain.
3. The proposed water withdrawal facility and pond will be connected via a pipeline transmission system to the existing on-mountain snowmaking system at Sugarbush South. Subsequently, SRI plans to apply for additional permits to refurbish, reconfigure and expand the existing snowmaking system at Sugarbush South. SRI also plans during those future permit proceedings to seek approval for improvements, primarily widening, to the existing Sugarbush South ski trail network adding approximately 100 acres to its existing 250 acres of ski terrain and expanding its snowmaking system accordingly.
4. All future trail improvements and expansion, will be in accordance with the approvals contained in the 1983 Record of Decision and Final Environmental Impact Study (the EIS) prepared by the United States Forests Service (from which SRI holds a Special Use Permit to occupy and use most of the skiing terrain located at Sugarbush South). The EIS also approves a "Master Plan" development strategy through which SRI could make improvements designed to generate additional skier traffic up to its designated comfortable carrying capacity.

B: The Project

5. The project subject to Board jurisdiction in this proceeding consists of the construction and operation of a water withdrawal facility and storage pond for the purpose of providing water for snowmaking at the Sugarbush ski resort and, to a lesser extent, municipal fire protection (the "project").
6. The project includes a 9.6 acre, 43.5 million gallon storage pond that will be located on a 176 acre parcel of land owned by the Kingsburys. This property straddles the Waitsfield-Warren town line, west of Route 100, and is adjacent to the Mad River. Water will be withdrawn from the river and transferred to the pond by gravity via two water withdrawal pipes.

7. The first or "low flow" pipe will be 24 inches in diameter and will include a continuously variable, computer controlled valve. This valve would control the amount of water being withdrawn from the Mad River when flows are between .5 and 1.0 cubic feet per second per square mile of watershed (csm) in accordance with the formula. Under this formula no withdrawal will occur when natural in-stream flows (in-stream flows) are .5 csm³ or less. The rate of withdrawal will be controlled or "stepped-down" so that it will gradually decrease from 3,000 gallons per minute (gpm), when in-stream flows exceed 1.0 csm, to zero gpm when flows are .5 csm or less.
8. The top of the concrete vertical riser for the low flow pipe will be set at an elevation corresponding to the minimum flow rate. Safety mechanisms, including a "fail closed" valve and alarms, will insure that no withdrawals can occur whenever in-stream flows are below the minimum flow rate. The maximum withdrawal capacity of the low flow pipe under the most advantageous flow conditions is 3,000 gpm.
9. The second or "high flow" pipe will be 48 inches in diameter, and will be connected to a ten foot diameter concrete riser at the edge of the river set at an elevation that will prevent any water from being withdrawn by this larger pipe until in-stream flows exceed 1.2 csm. When flows exceed that value, the rate of withdrawal via the high flow pipe will be limited only by the pipe's hydrologic capacity. Under the most advantageous conditions, sustained high flows above 1.2 csm, it would take approximately 12 hours to fill the entire 43.5 million gallon storage pond.
10. The low flow pipe will not be operated between March 15 or ice out, whichever ever later occurs, and November 1. During this period the high flow pipe will only be operated to refill the pond in anticipation of the next snowmaking season or, if necessary, to maintain its use as a reservoir for fire hydrants on the Sugarbush Access Road.
11. Both withdrawal pipes will operate by gravity and will be set into a recessed area in the riverbank adjacent to the pond. The pond would be created primarily by excavation with an embankment of two feet or less at the northerly end. SRI has obtained local and Act 250 permits for disposal of the fill and gravel that would be excavated.

³ This flow corresponds to the winter 702 flow established as being "biologically justified" in the Egg Mortality Analysis discussed below (see findings #84 through #99).

12. The pond will be connected to the existing snowmaking system at Sugarbush South via a 3.2 mile, 16 inch diameter underground pipeline which will be laid from a pump house adjacent to the pond, within a private easement to the Sugarbush Access Road, and then up that road to Sugarbush South.
13. The expanded snowmaking system envisioned for Sugarbush South will have a peak capacity of 5,000 gpm. The current snowmaking system at Sugarbush South has a capacity of 800 gpm.
14. The transmission pipeline will terminate at a 100,000 gallon holding tank at Sugarbush South. The first 75,000 gallons within the holding tank will be permanently committed to service nine fire hydrants which will be installed at SRI's expense along the Sugarbush Access Road, at points to be designated by the Town of Warren Fire Department. The expanded snowmaking system will then draw from the uncommitted 25,000 gallons in this tank.
15. In addition to the pond, construction at the project site will include a permanent base for the weir installed in the riverbed. The rest of the weir consists of removable vertical posts and "stop logs" that when installed will be equal in height to the elevation representing an in-stream flow of 1.2 csm. The vertical posts and stop logs will be in place only between November 1 and March 15 or ice out whichever later occurs (snowmaking season).
16. A heated Parshall flume will be constructed between the weir and the edge of the river bank adjacent to the pond. The flume will provide instantaneous measurements of in-stream flows during the snowmaking season to ensure that the required withdrawal rates and the step-down formula are adhered to. The flume will be located slightly downstream of the actual withdrawal point. The flow through the flume and the volume of water withdrawn will be measured separately. The in-stream flow will then be calculated instantaneously as the sum of these two measurements and will be used to determine the amount of water being diverted to the pond.
17. These data will be fed directly from the measuring devices in the flume to the computer controlling the low flow pipe valve, and will also be visible simultaneously on monitoring gauges to be installed at the pump house and in the main snowmaking control room at Sugarbush South. A permanent printed record of all daily flow measurements will be maintained. An audio and visual alarm system will be activated in both the pump house and the main control room if the low flow pipe valve should fail for any reason. If such a failure occurs, the valve is designed to fail into a closed or shut mode.

C. Board Jurisdiction

18. The Board's jurisdiction in this case is limited solely to the construction and operation of the storage pond and the associated water withdrawal facility on the Mad River.
19. Because the project involves the construction of an impoundment capable of storing more than 500,000 cubic feet of water, it is subject to the permitting requirements of 10 V.S.A. Chapter 43. See 10 V.S.A. § 1082(a). The project does not relate to the generation of electric energy for public use or as part of a public utility system, nor is it an "agricultural dam" as defined under 10 V.S.A. § 1083a. Consequently, jurisdiction of this project rests with the ANR initially and with this Board on appeal. 10 V.S.A. § 1081(a); 10 V.S.A. § 1099 (a).
20. In order to obtain a permit pursuant to 33 U.S.C. § 1344 from the Corps of Engineers Section 401 of the Federal Clean Water Act requires SRI to obtain a certification from the State of Vermont that the project does not violate applicable Vermont water quality requirements. Jurisdiction as the certifying agency of the State of Vermont lies with the ANR under 10 V.S.A. § 1004.
21. The project is not subject to the provisions of 10 V.S.A. Chapter 41, Subch. 2 (Alteration of Streams), pursuant to 10 V.S.A. § 1021(e) (Supp. 1992).

D. Scope of Review

22. Under the Dam Order appeal, the Board must determine whether the project will serve the "public good." See: 10 V.S.A. § 1086 (defines "public good" as meaning "the greatest benefit of the people of the state."). In determining the public good, the Board must give "due consideration," among other things, to the effect the project will have on each of 13 elements contained within 10 V.S.A. § 1086(a).⁴ To the extent

⁴ The thirteen elements to be considered are: (1) quantity, kind and extent of cultivated agricultural land that may be rendered unfit for use by the project, including both the immediate and long range agricultural land use impacts; (2) scenic and recreational values; (3) fish and wildlife; (4) forests and forest programs; (5) the need for a minimum water discharge flow rate schedule to protect the natural rate of flow and water quality of the affected waters; (6) the existing uses of the water by the public for boating, fishing, swimming and other recreational uses; (7) the creation of any hazard to navigation, fishing, swimming or other public uses; (8) the need for cutting clean and removal of all timber or tree growth from all or part of the flowage area; (9) the creation of any public benefits; (10) the classifica-

that the applicable Vermont Water Quality Standards are not listed among the 13 statutory elements under the dam statute, they are among the "other things" that the Board should consider under 10 V.S.A. § 1086(a). Although the Board must consider and make findings as to each element, In re: Buttolph, 138 Vt. 573, 574 (1980), the Board retains discretion in determining the relative weight to give each one. See: In re: Town of Sherburne, 154 Vt. 596, 607 (1990), involving similar statute requiring the Board to give "due consideration" to a list of statutory elements. It is not incumbent upon the Board to determine that each element individually supports the overall conclusion regarding the project's impact on the public good. Cf. id. at 608. Rather, the Board must weigh all the elements required by the statute to determine whether the "greatest benefit of the people of the state" is served by the project. 10 V.S.A. § 1086(a).

If the agency having jurisdiction finds that the project will serve the public good, the agency shall issue an order approving the application and may attach conditions it considers necessary to protect any of the thirteen elements of the public good. The order must also include conditions for minimum stream flow to protect fish and other in-stream aquatic life. Otherwise the agency must issue its order disapproving the application. See: 10 V.S.A. § 1086(b).

The applicant for a permit, in this case SRI, has the burden of production and persuasion.

23. In determining whether the State should certify the project under Section 401 of the Federal Clean Water Act, the Board must consider the manner in which the project will be operated or conducted and determine that applicable effluent limitations or other limitations or other applicable water quality requirements will not be violated. See 33 U.S.C. § 1341(a)(4). In Vermont, the applicable water quality requirements are set forth in the Vermont Water Quality Standards (VWQS), effective May 27, 1991.⁵ With respect to the 401 Certification, the

tion, if any, of the affected waters under chapter 47 of Title 10; (11) any applicable state, regional or municipal plans; (12) municipal grand lists and revenues; and (13) public safety.

⁵ All parties in this proceeding considered this "edition" of the VWQS as the law of the case, even though SRI applied for a Water Quality Certification on May 7, 1991, twenty days before the effective date of these standards. The Board agrees that application of the current rather than the 1990 VWQS is appropriate in this proceeding for three reasons: 1) the applicant chose not to take advantage of the grandfathering provision of § 1-01 of the 1991 standards, despite the fact that this section was adopted by the Board for the

Board must affirmatively find, like the certifying agency, that there is a reasonable assurance that the activity will be operated or conducted in a manner that will not violate applicable water quality standards. See 40 CFR § 121.2(a)(3).

The applicant for a 401 Certification, in this case SRI, has the burden of production and persuasion.

24. The remaining findings of fact and conclusions of law are organized under the thirteen elements of 10 V.S.A. § 1086(a). To the extent that applicable sections of the VWQS are not addressed under the thirteen elements, they are addressed under "other elements" in Section II(O) below. Findings of Fact and Conclusions of Law are not repeated when applicable to more than one review requirement.

II. Specific Findings and Conclusions

A. With regard to "the quantity, kind and extent of cultivated agricultural land that may be rendered unfit for use by the proposed project, including both the immediate and long term agricultural land use impacts" (10 V.S.A. § 1086(a)(1)):

25. In the preliminary stages of its search for a water withdrawal and storage pond site, SRI identified the following critical criteria: (1) located adjacent to the Mad River; (2) gravity-driven withdrawal system; (3) large enough and has proper subsurface geologic conditions to enable construction of an adequately sized storage pond; and (4) reasonably close to Sugarbush South with available routes for the water transmission pipeline. SRI investigated at least seven alternatives for providing water and storage to meet its snowmaking needs. All of these alternatives were rejected by SRI because they did not meet one or more of the siting criteria.

The site of the proposed water withdrawal facility and pond is the only alternative known to SRI that meets the critical citing criteria.

26. The pond site will occupy approximately 9.6 acres of cleared land, that in the past has been used as a hay field.
27. This former hay field is located in the 100 year floodplain as demarcated in the flood hazard zoning ordinances of the Towns of Waitsfield and Warren.

benefit of applicants like SRI; 2) the ANR applied the 1991 standards in its review of the project; and 3) the 1991 standards reflect the State's current policy with respect to the management and protection of Vermont's water resources.

28. The former hay field is the only possible location on the 176 acre parcel owned by the Kingsburys suitable for the construction of a storage pond of sufficient size to meet the needs of the project.
 29. The property on which the pond will be located is not presently being utilized as cultivated agricultural land and does not have significant value for such use.
 30. The proposed pond site does not possess any unique characteristics to suggest it would be suitable for production of a high value cultivated crop. In fact, the site has several attributes that detract from its viability for production of anything other than forage crops.
 31. The use of the former hay field for the pond site will not have any adverse impact upon, or interfere with the continuation of, agriculture on other lands in the vicinity.
- B. With regard to "scenic and recreational values" (10 V.S.A. § 1086(a)(2)):
32. The existing land uses in the vicinity of the project consist of a mixture of open and wooded lands most of which are undeveloped. There are occasional scattered residences and ancillary buildings.
 33. The project has been designed to minimize negative impacts on scenic or recreational values.
 34. The pond will be created by excavating below the natural contour at the site and will not involve the construction of substantial or highly visible structures such as large berms or dams.
 35. Most of the existing vegetation surrounding the pond including a wetland on its westerly edge will be preserved. A greenbelt between the pond site and the river has been designed to insure that an area of existing vegetation is retained in order to minimize the visual impact of the pond particularly when viewed from Route 100.
 36. The pond has been designed to transition gradually up to the boundary of the existing wetland. This is accomplished by making the pond shallower at the westerly end and by planting appropriate vegetation in the shallow portion of the pond near its the wetland.
 37. The water withdrawal facility will not be readily visible from Route 100 or other public highways or lands.

38. All stream bank areas disturbed as a result of the construction of the project will be promptly stabilized and revegetated.

C. With regard to "fish and wildlife" (10 V.S.A. § 1086 (a)(3)):

39. By designing the pond to be shallow at the westerly end in the vicinity of the wetland and by planting appropriate vegetation in this transitional area waterfowl and other wildlife will be benefited.
40. The Mad River flows in a generally northerly direction from its headwaters through Warren Village, past the project site through Waitsfield Village eventually reaching the Winooski River. The watershed in the headwaters section (i.e. upstream of Warren Village) is primarily undeveloped and forested. Excellent trout habitat is found throughout this area which is characterized by a narrow stream channel, good water depth, and diversity of pool habitats.
41. In the area between the Villages of Warren and Waitsfield, where the project is located, the Mad River loses gradient and becomes wider. The watershed in this section is more developed, primarily residential and agricultural in nature, with some commercial development. The river channel is more uniform in nature, and can be generally described as a series of long shallow riffles (faster moving, relatively shallow areas) and occasional large deep pools (slowest moving, deepest areas). In this area the reduced percentage of pool habitat, the relative lack of large boulders, undercut stream banks and woody debris in the river all contribute to diminish the amount of cover habitat available for adult and juvenile fish. Streamside vegetation in this section includes some vegetation providing shade and cover such as trees and shrubs, but along significant portions of the river bank such vegetation has been removed thus reducing the shading (i.e. cooling) effect of such vegetation.
42. Below Waitsfield Village, the river becomes increasingly affected by historical and present land use practices including reduction of shade and cover vegetation.
43. The Mad River contains populations of brook, brown and rainbow trout as well as nongame species of fish including blacknosed dace, longnosed dace, white sucker, longnosed sucker, creek chub and common shiner. Tributaries of the Mad River also contain populations of trout and other fish.
44. The Vermont Department of Fish and Wildlife currently stocks the Mad River annually with 2,000 brook trout, 1,000 brown

trout and 2,000 rainbow trout. This equates to approximately 250 trout per river mile. The majority of these trout are expected to be removed within a short time as a result of sport fishing and other factors including predation. The remaining stocked trout generally do not survive into the next fishing season.

45. Fish population surveys performed in 1991 along the Mad River in the vicinity of the project indicate between 1.7 and 18.5 pounds of trout per acre. Previous ANR studies of other Vermont rivers have recorded trout populations of between 35 and 350 pounds per acre. The current trout population of the Mad River is substantially less than that of other Vermont rivers preferred for trout fishing such as the Dog River and the Batten Kill. This is largely the result of the combined effect of substantial sedimentation, the lack of adequate cover habitat and high water temperatures during the summer due to a lack of adequate shade, all of which are attributable to historical and current land use practices. A sustained increase in trout populations in the Mad River will require, among other things, concerted, long-term efforts to restore and enhance both in-stream habitat and streamside vegetation.
46. ANR recently conducted a study of fish populations on upland streams in the Mad River watershed, including Clay Brook. In Clay Brook this study concluded that fish populations below Sugarbush's present point of water withdrawal on Clay Brook equal or exceed populations above the withdrawal.
47. Trout population studies conducted to date cannot reliably predict the long-term trout population of the Mad River. Trout populations are naturally subject to very wide fluctuations and thus a one or two year population survey, such as was conducted on the Mad River, may not reflect long-term averages. Other surveys conducted in Vermont by ANR for periods of between five and 20 years indicate fluctuations of between 250 and 810% in pounds per acre and between 440 and 720% in the number of trout per mile in a given stream section.
48. Early winter (October through December) is the critical time period for mobile trout life stages. Stress during this period is caused by declining water temperatures coinciding with high stream flows. During this period the river is typically ice free.
49. Mid-winter high flow events may also adversely affect adult populations by causing an increase in metabolism resulting in an increased demand for non-abundant food. Such events can also cause increased energy exertion by fish to maintain stream position resulting in weight loss, stress, flushing and

mortality. Substrate scouring caused by winter high flow events may also result in the loss of incubating eggs.

50. The United States Geological Survey ("USGS") gauging station in Moretown (Moretown gauge) is located on the Mad River approximately ten miles downstream from the project site. The Moretown gauge automatically records the river flows every fifteen minutes and the USGS publishes a daily record of flows. The USGS has published these data since 1929.
51. SRI conducted an analytical comparison of the hydrology of the Mad River at the proposed point of withdrawal with the sixty-three years (1929-1991) of flow data then available from the Moretown gauge. On the basis of that analysis SRI concluded there was a one-to-one correlation between unitized flows (i.e. flow measured as csm rather than as total volume or cubic feet per second) at the Moretown gauge and the site of the proposed withdrawal. On the basis of that conclusion SRI relied on the flow data at the Moretown gauge to predict flows at the proposed withdrawal site.
52. It is standard and accepted procedure for hydrologists to assume that, absent a major withdrawal, discharge or impoundment in between, two locations on the same river within close proximity such as the Moretown gauge and the proposed withdrawal site will have the same unitized flow.
53. SRI installed a stilling well to automatically record river depth at the project site. These measurements were used to create a rating curve to depict the relationship between water depth and stream flow. Using this rating curve, stream flows were then calculated for all time periods for which accurate river depth data were available from the stilling well. SRI also collected actual in-stream flow measurements at the stilling well site using a hand-held velocity meter.
54. SRI prepared an October 6, 1989 report entitled Mad River Snowmaking Withdrawal Hydrologic Evaluation ("1989 Hydrologic Evaluation") using the record of daily flow data collected from December 15, 1986 to November 30, 1987 at the stilling well site, including the stilling well data and the velocity meter data.
55. A significant portion of the wintertime stilling well data collected in 1986-87 was rendered unreliable by ice influences. The USGS experiences this same problem at the Moretown gauge and reports its winter data as "estimated values."
56. On January 31, 1991, the ANR performed an analysis of SRI's flow data, taking into account stilling well data subjected

to ice influences, and found that the available data were not sufficient to support SRI's earlier conclusion that there was a one-to-one correlation between flows at the Moretown gauge and at the project withdrawal site.

57. ANR did not consider this situation sufficiently serious to warrant denial of SRI's applications for either the Dam order or the 401 Certification, but instead imposed a condition allowing for the adjustment of the step-down formula based on the evaluation of additional winter flow data with which to recalculate the correlation between flows at the Moretown gauge and at the project withdrawal site.
58. While the one to one correlation is apparently "in the ballpark," given the relative paucity of reliable winter flow data at the proposed withdrawal site, it is unclear what the exact statistical relationship is between unitized flows at the proposed withdrawal site and the Moretown gauge. Until this statistical relationship is accurately defined by means of regression analysis based on adequate and reliable data the step-down formula and minimum flow rate cannot be properly calculated.
59. If that process shows that the correspondence is other than one-to-one, SRI has agreed that the minimum flow rates imposed by any permit should be adjusted to reflect the modified correspondence value. For example, if flows at the withdrawal site are typically .6 csm, when flows at Moretown gauge are .5 csm⁶ (a five-to-six ratio), the minimum flow rate at the withdrawal site of 0.5 csm would be proportionally increased to .6 csm, (the winter 7Q2 at that location) and the low flow pipe would reach maximum withdrawal capacity of 3,000 gpm at 1.21 csm instead of 1.01 csm ($1.01 \text{ csm} \times 0.6 \div 0.5 = 1.21$) presuming the relationship between the two sites remains linear over the range of stream flow values.
60. Provided that, as required by the order below, an accurate correlation between the Moretown gauge and the withdrawal site is determined and the step-down formula adjusted accordingly prior to the initial commencement of water withdrawal, the accuracy and reliability of SRI's evidence based on the assumed one-to-one correlation in flows will not be affected because the relative differences will remain the same. The Board believes that the conditions set forth in this Order adequately address the problems inherent in the data flow correlation submitted for this proceeding.

⁶ The winter seven-day median low flow (7Q2) used in the "Egg Mortality Study" (see findings #84 through #99).

61. The ANR has prepared at least two interim draft low flow procedures in recent years modeled on the New England Flow Policy. However, neither of these interim drafts has been proposed or adopted as either a rule or procedure under the Vermont Administrative Procedure Act (3 V.S.A. Chapter 25). The 1990 draft provided for no more than a five percent reduction in available habitat as a result of any reduction in stream flow. The 1991 draft does not limit habitat reduction to 5% but instead refers to maintaining a high level of habitat protection.
62. In 1981, the U.S. Fish and Wildlife Service (USFWS) adopted a "New England Flow Policy" that was last amended in 1983. This policy provides a useful framework for analysis in this proceeding, but is not dispositive. Compliance with this policy is not required under Vermont or federal law applicable in this proceeding.
63. The purpose of the New England Flow Policy is to provide guidance on what minimum flows are necessary to protect the biological integrity of streams. Such minimum flows are referred to as "aquatic base flows" (ABF). This policy describes three alternative methods by which acceptable aquatic base flows can be determined.
64. The first alternative is where inadequate flow records exist or for rivers regulated by dams or upstream diversions. In such cases USFWS recommends an ABF derived from the average of the median August monthly records for representative New England streams. This ABF applies at all times of the year, unless superseded by spawning and incubation flow recommendations. The USFWS recommends flows of 1.0 csm in the fall/winter and 4.0 csm in the spring for the entire applicable spawning and incubation periods.
65. The second alternative is where a minimum of 25 years of USGS gauging records exist at or near a project site on a river that is basically free flowing. In such cases USFWS recommends an ABF equivalent to the median August flow for the period of record unless superseded by spawning and incubation flow recommendations. The USFWS recommends flows equivalent to the historical median stream flow throughout the applicable spawning and incubation periods.
66. The third alternative is to allow stream specific minimum flow proposals that are "biologically justified" on the basis of site specific study.
67. SRI relied upon the New England Flow Policy and supported its proposed minimum flow rate on the basis of study and analysis

designed to meet the "biological justification" provision under the third alternative.

68. The size and health of the existing populations of fish and other aquatic biota in a complex river ecosystem are subject to many unknown and uncontrollable variables. Aquatic habitat in the river, however, is quantifiable and may be analyzed with an acceptable degree of scientific rigor. There exists a widely accepted and standardized computer modeling technique for studying aquatic habitat known as the Instream Flow Incremental Methodology ("IFIM").
69. IFIM employs a computer modeling system, called the Physical Habitat Simulation System (PHABSIM), and site specific information for a given stream to predict the effects of changes in flow on fish or aquatic biota habitat by life stage. Variables such as temperature, water velocity, depth and substrate type (i.e. type of river bottom -- sandy, silty, gravelly, cobbly, etc.) under certain flow rates are analyzed to estimate the amount of habitat that may exist for a particular species or life stage under various stream flows.
70. The IFIM methodology was developed as a tool to provide options for consideration by policy makers. IFIM does not give a single value for acceptable habitat under predicted flow conditions. Rather, the IFIM produces a range of values for the amount of suitable habitat under each flow regime considered. The more site specific and less extrapolated data that are entered into the computer model, the more likely the predictions made in the IFIM will be representative of actual habitat conditions.
71. The presence of ice in the stream channel may affect the hydraulic modeling used in an IFIM study so that the habitat-flow relationship predicted by the IFIM may be less accurate when ice is present. Under such circumstances the IFIM results should be interpreted conservatively. The ANR uses the IFIM methodology in determining acceptable minimum stream flows even in cases where the presence of ice is a factor because there is no better methodology available.
72. SRI performed an IFIM study over a 5.2 mile long portion of the river extending above and below the withdrawal site. This study area includes the area most affected by the proposed withdrawal which extends from the point of withdrawal downstream past the river's confluence with Mill Brook ("affected reach"). As part of this study, four stations, each with five specific cross-sections, were selected by SRI, with the concurrence of ANR, as representative of the entire reach -- two stations upstream and two stations downstream of the withdrawal site.

73. The importance of each variable considered in the IFIM study changes according to the species and life stage that is critical at any given time, and in response to natural pressure from other species. For example, juvenile and adult brook trout are generally found in the upland mountain streams that are steeper in gradient, faster-flowing and more bouldery, such as the headwater of the Mad River and many of the river's tributaries. Brown and rainbow trout are the predominant trout species in the lower gradient, valley bottom section of the Mad River between Warren and Waitsfield villages within which the 5.2 mile IFIM study area was located.
74. In SRI's IFIM study the focus was on the project's effect on available habitat for brown trout during spawning and incubation periods. This species and life stage were selected because rainbow trout generally have lesser habitat needs (i.e. lower flow requirements) than brown trout. Brown trout spawning and incubation life stages were selected on the following basis: (a) maximum habitat for brown trout spawning and incubation occurs at higher flows than for brown trout juvenile habitat; (b) spawning (October 15 to November 30) and incubation (through the winter until early spring) is the most critical life stage that occurs during the period when water will be withdrawn for snowmaking; and (c) it is consistent with the New England Flow Policy that recommends August median flows to sustain juvenile and adult populations, and higher flows in winter if spawning and incubation are occurring in the river.
75. Trout were also selected as the barometer or surrogate for overall aquatic habitat protection in the Mad River, because protection of adequate habitat for fish, being at the top of the food chain and requiring the most habitat in absolute terms, reasonably ensures habitat for lesser aquatic organisms, particularly macroinvertebrates. This concept of "surrogacy" or "guilding" is a standard, well-accepted practice in IFIM analysis. Guilds are the different levels in an aquatic food chain, (i.e. macroinvertebrates (aquatic insects)), prey fish species, predator fish species (trout), etc.).
76. The IFIM study also focused on impacts to riffle habitat because that habitat is essential for brown trout spawning and incubation, and is the habitat that would be the most severely affected by any changes in stream flow, depth or velocity caused by the water withdrawal.
77. The IFIM computer models use field measurements of substrate, depth and velocity, in conjunction with accepted "habitat suitability indices" (SI curves), to calculate cell

suitability values at various flows at each of the study station cross-sections. Using the cell suitability values, the model then calculates habitat supply curves for each species and life stage at each study station. Finally, having selected the critical species and life stage, a single composite habitat supply curve is produced for the entire study reach. This composite "curve" provides brown trout spawning and incubation habitat supply, called "weighted usable area" (WUA), for the affected study reach as a function of unitized stream flows.

The habitat supply curve was used as the basis for the step-down formula proposed by SRI to insure that the availability of brown trout spawning and incubation habitat will not be reduced by more than five percent.

78. IFIM studies for macroinvertebrates are relatively scarce and sufficient supporting literature (e.g. validated SI curves) is not available to make IFIM study worthwhile in the Mad River. However, SRI evaluated the impact of its proposed withdrawal on six different macroinvertebrates using SI curves. This evaluation indicates that the withdrawal could result in the reduction of up to 6.5% of available macroinvertebrate habitat at a minimum flow rate of .5 csm.
79. SRI's proposed withdrawal regime consists of three components each designed to minimize the potential adverse effects of the withdrawal on brown trout spawning and incubation habitat as an indicator for impacts on habitat for other fish and aquatic biota.
80. The first component is the high-flow pipe that operates only at instream flows above 1.2 csm. The maximum or optimum habitat for brown trout spawning and incubation occurs at flows of about 1.3 csm.

Flows at or above 1.2 csm during the snowmaking season typically represent run-off events rather than base flows. Thus, although there are no restrictions on the withdrawal of water when flows exceed 1.2 csm, the amount of water withdrawn under such conditions will not have any significant impact on the available habitat for brown trout. The capacity to withdraw large volumes of water at flows above 1.2 csm and the ability to refill the storage pond in as little as twelve hours are critical to minimizing withdrawals at lower stream flows when more substantive reductions in available habitat will result.
81. The second component is the step-down formula for withdrawal. Under the step-down formula on any given day for any given in-stream flow between 0.50 and 1.2 csm, SRI's proposed

withdrawal will produce only minimal changes in the naturally existing habitat. These incremental changes will not exceed a five percent reduction of the existing habitat for brown trout spawning and incubation.

82. The third component of SRI's proposed water withdrawal regime is the minimum flow rate, the flow at which no water will be withdrawn under any circumstances.
83. Trout eggs must obtain oxygen to sustain their metabolic needs. The embryo's oxygen transfer rate depends largely upon dissolved oxygen levels and flow velocities within the redd (the spawning or nesting place). The flow velocity within the redd is influenced by the permeability of the substrate and the velocity of water flowing over the redd. Redds imbedded with fines or sediment have less permeability and generally poor egg survival. A higher water velocity in the stream is needed to compensate for the decrease in permeability. Stream flow adequate for spawning may not suffice for incubation.
84. To determine what flow rate is "biologically justified" in the Mad River, SRI conducted a study referred to as the "Egg Mortality Analysis." This analysis focused on the incubation of brown trout eggs, the life stage most at risk due to low flows during the snowmaking season. The analysis was designed to answer the question: What flow regime in the Mad River during the snowmaking season could be biologically significant to the continued survival of incubating brown trout eggs.
85. Trout typically spawn in gravelly areas and bury their eggs two to three inches deep in the substrate. Brown trout spawn mostly during late October to early November. The eggs overwinter in the stream substrate and hatch in early spring.
86. Brown trout spawning and incubation principally takes place in riffle habitat. Because such areas tend to be relatively shallow, they represent the habitat most severely affected by water withdrawals.
87. Egg mortality in the winter is primarily attributed to de-watering of egg-laden substrate, which can cause either desiccation (drying out) and/or freezing of eggs.
88. Egg desiccation does not appear to be a significant factor in winter egg mortality since trout eggs can survive at above-freezing temperatures for several weeks buried in substrate that has been exposed due to the reduction in stream flow.
89. Few studies precisely follow patterns of winter egg mortality and measure or account for all winter variables including the scouring effect of ice on redds.

90. The "Egg Mortality Analysis" assumed that there are some naturally-occurring conditions that exert some biological influence over egg mortality due to freezing. Given the range of weather conditions that occur in Vermont in mid-winter, it would generally take three to four days of continuous de-watering for freezing to penetrate to sufficient depths into the substrate to cause significant mortality to brown trout eggs.
91. The "Egg Mortality Analysis" further assumed that because of the nature of mid-winter base flow conditions, a winter low flow event of seven days duration would generally be necessary to produce continued exposure of three to four days (i.e. 3 1/2 days). Accordingly, SRI selected the median seven-day winter low flow (7Q2). The winter 7Q2 flow for the Mad River at the Moretown gauge is .5 csm.
92. To test its hypothesis that the winter 7Q2 flow of 0.5 csm was a flow event of sufficient magnitude, duration and frequency that it could be of some biological significance, SRI reviewed the record of flow data from the Moretown gauge in conjunction with available temperature records from the National Weather Service at the Burlington airport, the only daily weather data available in the State of Vermont dating back to the full period of record at the Moretown gauge.
93. That analysis concluded that in three out of four years over the entire sixty-three year period of record at the Moretown gauge, the naturally-occurring winter 7Q2 flow could result in freezing, and thus mortality, of brown trout eggs laid at the river margins that would be exposed, or de-watered at that flow.
94. SRI's analysis thus concluded that the winter 7Q2 flow is a naturally-occurring event of such magnitude, duration and frequency that it could be expected to assert some biological influence over egg survival, and that the incremental changes in flow down to 0.5 csm induced by the proposed withdrawal would have no significant effect on egg mortality beyond that which occurs naturally in the Mad River.
95. Based on the entire sixty-three years of record at the Moretown gauge, winter flows at or below 0.5 csm do occur naturally and with some frequency, particularly in the critical period of January and February when flows are generally the lowest and temperatures generally the coldest. In the four representative years used by SRI, the percentage of flows at or below 0.5 csm during the snowmaking season ranged from 8.8% (1934) to 54.4% (1948). Typically 33% of the

days in January and February had flows at 0.5 csm or less. Seventeen out of sixty-one years showed natural river flows at 0.5 csm or less in February for seven days or more.

96. The proposed withdrawal will have a very limited effect on the width and depth of the affected reach. The maximum reduction in width (based on an average width 45.85 feet) would be 0.8% or 4.4 inches. The depth of the river in riffle areas between flows of .5 csm and .79 csm is reduced by no more than $\frac{1}{4}$ inch.
97. The cell suitability values generated as a result of the IFIM analysis can be used to predict where spawning and incubation are most likely to occur. Based on the cell suitability data, it is apparent that there is little, if any, brown trout spawning and incubation habitat at the river's margins. Therefore it is likely that few, if any, brown trout eggs would in fact be deposited in those portions of the river margins likely to be de-watered by the incremental flow reductions proposed by SRI down to the minimum flow rate of 0.5 csm.
98. All of the brown trout spawning habitat with suitability of 50% or greater is located well within the more central portions of the Mad River. Habitat in these areas are not significantly affected even at flows of .5 csm. Given the very limited changes in river width and depth due to the proposed withdrawal it is reasonable to assume that SRI's proposed withdrawal regime will not de-water the more suitable egg incubation areas or have an effect on mortality rates of the brown trout eggs.
99. SRI chose to rely upon the New England Flow Policy's third alternative, requiring the showing of a "biological justification," to support its choice of a low flow limit below the February median low flow. The Board concludes that, although SRI is not legally obligated under the law applicable in this proceeding to comply with requirements of the New England Flow Policy, it has met the "biological justification" test.
100. In evaluating the impact of the proposed withdrawal on in-stream temperatures, the most critical factors are the temperature difference between the air and the water and the surface area of water exposed to air. The changes in the surface area of the Mad River as a result of the proposed withdrawal are nominal. For example, at a flow of 1.1 csm, the median monthly flow for December, the withdrawal would reduce the width of the Mad River from 47.17 feet to 46.80 feet a net reduction of .37 feet or 0.79%. Since the thermal conductivity of water is constant upstream and downstream of

the withdrawal site, the change in heat loss as a result of the withdrawal is also .79%. The effect of such nominal changes in the surface area and therefore thermal conductivity of the Mad River is de minimus and will not result in a temperature change or rate of change that will have an undue adverse effect on aquatic biota or wildlife (VWQS § 3-01(B)(2)(a)). Nevertheless, such thermal impacts will be monitored as part of the fourteen-year monitoring requirement provided for as a condition in the order below.

101. The monitoring plan will generate site specific information regarding the Mad River to identify any significant physical or biological changes associated with water withdrawal. This plan will result in the identification and assessment of other natural and anthropologic factors that are, or may be, limiting trout populations within the river. The overall plan design is intended to integrate both physical and biological data to arrive at a quantitative and qualitative understanding of mechanisms that are controlling trout populations within the Mad River. The monitoring plan will also evaluate the extent to which the step-down formula and minimum flow rate protect fish and aquatic biota habitat. On the basis of the results of this long-term monitoring plan, the step-down formula and minimum flow limit may be revised.
102. Although the Board does not have the present ability to evaluate the potential of the restoration and enhancement program to offset habitat loss and wildlife impact, the Board believes that such a program can be cooperatively developed and implemented. The Board sees no impediment in permitting this project with conditions for plans to be devised, reviewed and approved as the project proceeds. Cf. Abenaki Nation of Missisquoi v. Hughes, Docket No. 2:92-CV-279, 1992 WL 319987 (D.Vt. October 22, 1992).
103. Accordingly, the step-down formula and minimum flow rate proposed by SRI as modified by the order below will limit the reduction of critical habitat in the Mad River as a result of the proposed withdrawal in a manner that avoids an undue, adverse impact on wildlife fish and aquatic biota.

D. With regard to "forests and forest programs" (10 V.S.A. § 1086(a)(4)):

104. There are no known forests or forest programs that will be impacted by the project.

E. With regard to the need "for a minimum water discharge flow rate schedule to protect the natural rate of flow and the water quality of the affected waters" (10 V.S.A. § 1086(a)(5)):

105. While there will be no "discharge" from the project, there is a need to maintain a minimum flow sufficient to protect the natural rate of flow and the water quality of the affected reach of the Mad River. The step-down formula and minimum flow rate set forth in Table 1 subject to the conditions of the order below, will address this need.
106. Issues related to the maintenance of adequate minimum flow in the Mad River are considered under Section III C "Fish and Wildlife" above.
- F. With regard "to the existing uses of the waters by the public for boating, fishing, swimming, and other recreational uses" (10 V.S.A. § 1086(a)(6)):
107. The Mad River is used for a variety of recreational purposes including swimming, fishing and boating. These uses constitute "existing uses" as that term is defined in the VWQS (§ 1-03 (B)(13)).
108. The project will withdraw water from the river when in-stream flows are below 1.20 csm and only during those times of the year (generally November-March) when these recreational uses are either absent or uncommon.
109. The river is used for kayaking during spring runoff beginning as soon as the ice has gone out of the river and continuing as long as there are sufficient flows, typically a few weeks.
110. Public access to the land between the pond and the river as well as to the Mad River itself will be increased as a result of the project. Working in concert with local and regional officials, SRI has agreed to set aside and dedicate an eight foot wide pedestrian and bicycle easement between the storage pond and the river for use as part of a future recreational path to run through Waitsfield and Warren.
111. Boating, swimming and other recreational uses of the Mad River do not occur during the time that the weir will be in place. The weir will be installed not earlier than November 1 each year and removed by March 15, or as soon as the ice goes out of the river, whichever is later. The permanent base of the weir will be constructed at the same elevation as the streambed. Accordingly, the weir will not pose an impediment to boating, fishing, swimming or other recreational uses.
112. The theoretically available habitat of the river in the section that encompasses the affected reach is not presently utilized to anywhere near its potential capacity by existing trout populations. The habitat restoration and enhancement management plan made a condition of this permit, has the

potential to result in a net increase in usable fish habitat and a corresponding increase trout populations.

113. Neither the structures associated with the project nor its operation (i.e. water withdrawal from the river to the pond) will result in any undue adverse effect on existing uses of the Mad River by the public for boating, fishing, swimming, and other recreational uses.

G. With regard to "the creation of any hazard to navigation, fishing, swimming or other public uses" (10 V.S.A. § 1086(a)(7)):

114. The permanent structures associated with the water withdrawal facility are designed to minimize their potential to create hazards to navigation, fishing, swimming or other public uses.

115. During those portions of the year when navigation, fishing and swimming occur, the Mad River will not be affected by the project.

116. There are no existing or planned municipal water systems using the Mad River as a source of water.

117. There are no existing or planned municipal sewage disposal plants discharging into the Mad River. The project will not have a substantial impact on the assimilative capacity of the Mad River for sewage disposal, or withdrawal capabilities for water systems.

118. The project will not create an undue hazard to navigation, fishing, swimming, or other public uses.

H. With regard to "the need for cutting clean and removal of all timber or tree growth from all or part of the flowage area" (10 V.S.A. § 1086(a)(8)):

119. No clear-cutting of timber is required to construct the project. The pond will be located in an existing field. Although some individual trees located along the periphery of

the field are to be removed, a natural buffer strip of trees or greenbelt will remain between the western bank of the river and the easterly edge of the pond.

120. The impact on trees and tree growth as a result of the project is de minimus.

I. With regard to "the creation of any public benefits" (10 V.S.A. § 1086(a)(9)):

121. The Sugarbush resort's share of the Vermont ski market has declined from 8.5% in 1986 to 6% in 1990-1991, a decline of over 29%. During this period, Sugarbush's skier days have declined from 385,000 to 263,000, a loss of 122,000 skier days while Vermont ski areas with 80% or better snowmaking coverage experienced an increase in skier days. A significant factor in this decline is the lack of adequate snowmaking capacity at Sugarbush South that is needed in order for Sugarbush to remain competitive with other ski areas in Vermont and New England.
122. The adverse economic and social impacts resulting from the recent decline in Sugarbush's share of the Vermont skier market are substantial and adversely affect the economy of several towns in the Mad River valley. The expansion of snowmaking capabilities at Sugarbush South is an integral part of SRI's overall efforts, that include major new investments, to reverse this trend and recapture a market share more representative of its historical share of the Vermont skier market.
123. Economic benefits from a more competitive Sugarbush Resort would include additional sales and rooms and meals tax revenues and increased economic activity in the Mad River Valley generally.
124. If Sugarbush South can increase its market share, it will tend to stabilize property values in the Mad River Valley communities, thereby stabilizing local property tax revenues, and perhaps generate additional income to the state through the property transfer tax.
125. As a result of the project, a substantial number of temporary construction jobs will be created at Sugarbush South over a period of several years. The work force at Sugarbush South could increase by between 5 and 12 permanent and 40 to 70 seasonal employees.
126. The pedestrian and bicycle easement between the storage pond and the river will be part of a future recreational path through Waitsfield and Warren. This easement will increase public access to, and enjoyment of, the river for its aesthetic value and for a variety of recreational uses.
127. The project as approved in accordance with the order below will result in the implementation of a twenty-year management

plan for the Mad River that will among other things, restore and enhance fish habitat and stream bank vegetation in and along the Mad River.

128. There is still much to learn about the impact of winter flow reductions on fish and aquatic biota including its affect on ice formation. The project as approved by the order below will result in the implementation of a fourteen-year monitoring study. The data from the monitoring plan regarding any impacts of the withdrawal on fish or aquatic biota will assist the state in making future management decisions regarding water withdrawals.

129. The project will enhance municipal fire protection by providing a reliable source of water for a fire hydrant system to be installed on the Sugarbush Access Road.

130. The Towns of Waitsfield and Warren will be provided a substantial portion of the gravel excavated in the construction of the pond to be used for municipal purposes.

J. With regard to "the classification of the affected waters" (10 V.S.A. § 1086(a)(10)):

131. The Mad River is currently classified as Class B waters.

132. The affected waters are not classified as Outstanding Resource Waters.

133. The project will have no impact on and will allow for the maintenance of the existing classification of the affected waters.

K. With regard to "any applicable state, regional or municipal plans" (10 V.S.A. § 1086(a)(11)):

134. The project has been reviewed by the Towns of Waitsfield and Warren and found to conform to their respective municipal plans.

135. The project has been reviewed by the Mad River Valley Planning District and found to conform to its applicable policy and planning documents.

136. The project has been reviewed by the Central Vermont Regional Planning Commission and found to conform to the regional plan.

137. The project is in compliance with the municipal plans of the Towns of Waitsfield and Warren and the regional plan of the Central Vermont Regional Planning Commission.

138. The project is not in conflict with provisions of any applicable state plan.

L. With regard to "municipal grand lists and revenues" (10 V.S.A. § 1086(a)(12)):

139. The project and its associated transmission pipeline will cost in excess of four million dollars to design and construct.
140. The purpose of the project is to increase the amount of water available for SRI's future plans to enhance snowmaking capabilities at Sugarbush South in order to reverse SRI's recent decline in its share of the Vermont skier market. Toward that objective SRI is prepared to invest twenty-four million dollars to construct the project and make other future on-mountain improvements that are not the subject of this proceeding including expansion of the snowmaking system.
141. The economy of the Mad River Valley generally and that of the Towns of Waitsfield and Warren in particular, are affected by the competitive position of Sugarbush relative to other ski resorts. These municipalities have shown a decline in room and meals receipt between 1983 and 1991, roughly the period during which Sugarbush's share of the Vermont skier market has been declining.
142. With SRI's proposed investment of up to twenty-four million dollars, the Town of Warren grand list will expand and the town will receive increased revenues through assessment and taxation of the value of the project and pipeline and other future improvements that will be constructed as part of the snowmaking system expansion.
143. A decline in assessed property values and therefore property tax revenues in the Waitsfield/Warren area corresponds to the decline in the number of skier days at Sugarbush during the mid-1980's. Expanded snowmaking capacity at Sugarbush South is expected to increase the number of skier days which will in turn increase economic activity in the Mad River Valley generally and in the Towns of Waitsfield and Warren specifically.
144. The project is likely to have a positive impact on the grand lists and revenues of the Towns of Waitsfield and Warren, as well as other Mad River valley municipalities, as a result of increased property values.
145. The project is likely to have a positive impact on the revenues of the Towns of Warren and Waitsfield as a result of tax assessments on the proposed physical improvements.

M. With regard to "public safety" (10 V.S.A. § 1086(a)(13):

146. The construction near the withdrawal site of an upstream bank depression and a downstream overflow channel will offset the limited potential flood impacts of the project and satisfy the Federal Emergency Management Agency that no net gain in flood level will occur as a result of the project.
147. The increase in size of the Special Flood Hazard Area is contained solely within the 176 acre project site and results in no adverse impact on public safety.
148. The pond and water withdrawal facility including the temporary weir are designated as Class 3 or "low hazard" structures by ANR.
149. As a result of the storage pond and connecting pipeline, public safety will be enhanced by improving fire protection.

N. With regard to other factors related to a determination of public good other than compliance with the Vermont Water Quality Standards:

150. SRI's competitors in the New England region currently achieve snowmaking coverage over between 60% and 95% of their ski terrain. The average is 77% coverage.
151. Sugarbush South currently has snowmaking on only 80 of its 250 acres of ski terrain or 32% coverage. The project is an integral part of an overall plan by SRI to expand its ski terrain to 350 acres and expand its snowmaking capacity to be able to reliably achieve coverage over 255 acres or 70% coverage. SRI considers this level of snowmaking coverage at Sugarbush South necessary in order to allow it to be competitive within the New England region.
152. In order to assess whether any proposed water withdrawal regime, will consistently provide sufficient water to allow SRI to reliably achieve its goals of 70% snowmaking coverage, SRI has developed the so-called "mass balance" analysis. This analysis takes into account available daily river flows compared to average daily snowmaking demand and also accounts for pond storage. The daily snowmaking demand was determined by taking the average annual projected cumulative water availability of 378 million gallons, and parceling that water out into levelized daily quantities based on SRI's historical usage patterns at Sugarbush North where water availability has generally not been a limiting factor for snowmaking.
153. The snowmaking demand curve produced by looking at several years of snowmaking production records at Sugarbush North, is

a bell-shaped curve in which demand rises throughout the fall, peaks at Christmas and New Years, remains fairly constant through mid-winter, and then tapers off at the end of March. This demand curve reflects and incorporates the impact of factors other than water availability, such as temperature, humidity, natural snowfall, electrical power availability, manpower and other snowmaking strategy considerations.

154. The levelized daily demand in the Sugarbush South "mass balance" analysis reflects these same factors. However, the daily demand quantities are different from Sugarbush North for a variety of reasons including differences in the amount and type of ski terrain. The Sugarbush South "mass balance" model is broken down into the several "interval completion periods" that SRI has used to assess the efficacy of each withdrawal proposal. The daily demand within each interval completion period changes at certain times because of the imposition of the historical demand curve.
155. Actual production of snow in a given year, or on any particular day or series of days, may not be consistent with the "mass balance" analysis, because of the variability of weather, power and other snowmaking considerations. Actual snow production may be higher or lower, but over time it is expected that once future improvements are made, snow production at Sugarbush South will mirror the "mass balance" analysis because the snowmaking system will have an output capacity well above the average daily demand. In the initial interval completion period usage of 1,080,000 gallons requires a capacity of only 750 gpm; in the second interval completion period usage of 2,160,000 gallons requires a capacity of 1,500 gpm; and in the third interval period usage of 4,320,000 gpm requires a capacity of 3,000 gpm. When all factors are favorable for maximum capacity snow production, and the system runs at its maximum of 5,000 gpm, shortfalls on other days can be quickly made up. The availability of water on a consistent basis, is thus the key to SRI meeting its snowmaking needs as determined by its analysis.
156. SRI has a peak power/load shedding agreement with Green Mountain Power Company which encourages SRI to make snow efficiently and to conserve power.
157. In order for SRI to justify its estimated twenty-four million dollar investment in the project under consideration in this proceeding, it must have the capacity to deliver 80% of planned completion or better, in five out of six years. In addition the project must achieve a sufficiently high percentage completion rate particularly during the period from

December 15 through January 5 which includes the all-important Christmas and New Years holidays when as much as 25% of total ski area revenue is generated.

158. Five alternative step-down withdrawal schemes were presented to the Board during the course of this proceeding. Although these alternatives were offered for various reasons by the participating parties, the Board allowed introduction of all five for the purpose of comparing snowmaking completion rates. The five alternatives were: (1) a step-down to .5 csm (winter 7Q2 at Moretown gauge); (2) a step-down to .79 csm (the February median monthly flow at Moretown gauge); (3) a step-down to .5 csm with a 50% pond trigger⁷ at an intermediate value of .61 csm; (4) a step-down to .5 csm with a 50% pond trigger at .79 csm; and (5) a step-down to .5 csm with a 40% pond trigger at .79 csm.
159. The addition of a pond trigger mechanism to the step-down formula has the affect of giving added emphasis to the pond's storage capacity and reduces the number of days at which withdrawals will occur during relatively low flow (i.e. < 1.0 csm) conditions.
160. In considering the possible pond triggers provided for in the alternatives discussed above the Board considered intermediate flows such as the February median monthly flow (.79 csm) and the winter 28Q2 (.61 csm). The winter 28-day (the number of days in February) low flow "rolling" median value (or winter 28Q2), calculated without regard to the calendar for November through March, would be 0.61 csm.
161. The February median monthly flow has no demonstrated biological significance as a low flow event of discernible magnitude, duration and frequency. The median monthly flow is simply an arbitrary, calendar-based number calculated only on a hydrological basis; half the twenty-eight daily mean flows in February can be expected to be greater than that value, and half less. Fish and other aquatic populations react to the events of discernable magnitude duration and frequency as they actually occur, not to the turn of the calendar.
162. Alternative one, a minimum flow rate of .5 csm that, after a six year phase-in period, would be otherwise unrestricted, is identical to the minimum flow rate established by ANR in the Dam Order and 401 Certification now under appeal.

⁷ The "trigger" means that water may be withdrawn down to the lower flow limit if and only if the storage pond then holds less than a specified percentage of its capacity.

163. Alternative three, a minimum flow rate of .5 csm but with a pond trigger flow of .61 csm would adequately meet SRI snowmaking needs and would achieve the goal of 80% completion in five of six years on average.

164. Alternative three would allow SRI to expand snowmaking at Sugarbush South virtually as well as alternative one, but would result in substantially fewer withdrawals during low flow conditions:

	<u>Withdrawal Alternative 1</u>	<u>Withdrawal Alternative 3</u>
# years 80% of overall planned completion	51	51
# years planned completion for Interval 2 (Christmas/New Years)	57	55
Cumulative % completion	92.1%	91.7%
# of days withdrawal would occur at flows < .79 csm	35	29
# of days withdrawal would occur at flows < .61 csm	14	8

O. With regard to other factors related to compliance with applicable water quality standards:

165. It is policy of the state of Vermont to assure the maintenance of water quality necessary to sustain existing aquatic communities and at the same time to manage the waters of the state to, among other things, allow beneficial and environmentally sound development. 10 V.S.A. § 1250 and VWQS § 1-02(A)(4) and (7).
166. The project does not involve the discharge of waste into the waters of the state and therefore the provision in § 1-03(A) pertaining to the "significant alternation of aquatic biota" is not applicable.
167. The VWQS (§ 1-03(A) and § 2-02(B)) require that the waters of the state be managed to protect the beneficial values and uses associated with the water's classification.
168. All waters in the Mad River watershed affected by this project are currently classified as Class B waters. The beneficial values and uses for Class B waters (VWQS § 3-03(A)) are:

values Water of quality that consistently

exhibits good aesthetic value and provides high quality habitat for aquatic biota, fish and wildlife.

Uses Public water supply with filtration and disinfection; irrigation and other agricultural uses; swimming, and recreation.

169. The project as approved by the order below will reduce flows in the Mad River between November 1 and March 31 in accordance with the step-down formula. Under the step-down formula, the rate of withdrawal will decrease as the in-stream flow approaches the minimum flow rate of .5 csm. When in-stream flows are at or below the minimum flow rate no withdrawal would be allowed. This minimum flow rate, the winter 7Q2, is significantly higher than naturally occurring low flow conditions, so-called 7Q10 flows, which typically occur in summer months. The minimum flow rate and other conditions established by the order below are sufficient to insure that the waters of the state affected by the project will consistently exhibit good aesthetic value.
170. Based on the IFIM analysis and other studies it is estimated that the proposed withdrawal would result in a habitat loss of up to five percent in the affected reach of the Mad River for the most sensitive trout species and life stages. Habitat losses for macroinvertebrates could be slightly greater.
171. These estimates of impacts on fish and aquatic biota habitat assume that all of the water needed to meet Sugarbush South's projected snowmaking needs, 378 million gallons on an average annual basis, would be withdrawn from the Mad River and that the minimum flow rate of .5 csm would apply without a pond trigger restriction.
172. The conditions in the Board order below including the requirement to limit withdrawal from the Mad River to that amount needed to supplement water already available from Clay Brook (currently 48 to 60 million gallons) and to reduce withdrawal during low flow conditions by imposing the .61 csm pond trigger on the minimum flow rate of .5 csm, as provided for in the order below, will reduce adverse impacts and will protect high quality habitat for aquatic biota, fish and wildlife in all affected waters of the state.
173. In addition, impacts on fish and aquatic biota will be carefully monitored for a period of 14 years. The order below provides for amendment of the terms under which the withdrawal of water is allowed as needed to insure that any adverse impacts including, but not limited, to impacts on fish and aquatic biota habitat are not "undue."

174. There are no existing or proposed public or private water supply systems utilizing the affected waters of the state.
175. There are no known existing or proposed uses of water from the affected waters of the state for irrigation or other agricultural uses during the period between November 1 and March 31.
176. There are no known existing or proposed commercial enterprises that depend directly on the preservation of an existing level of water quality utilizing the affected water of the state.
177. The project as approved by the order below will not affect the waters of the state in a manner that would either: (1) result in an undue adverse effect on any beneficial value or use or (2) be incompatible with attaining and maintaining all beneficial values and uses associated with the assigned classification.
178. The VWQS (§ 1-03(B) and § 2-02(B)) require the protection of "existing uses." Such uses are defined as (VWQS § 1-01(B) (13)):

those uses which have actually occurred on or after November 28, 1975, in or on a water body whether or not the standard for classification of the particular water body.
179. The project as approved by the order below will maintain the level of water quality necessary to: (a) protect and maintain all existing uses (VWQS § 1-03(B)(1)); and (b) insure that after considering the provisions of § 1-03(B)(2)(a), aquatic biota, fish and wildlife will not be significantly impacted; and (c) insure that it will not result in significant degradation of any existing use (VWQS § 1-03(B)(2)(6)).
180. Winooski One claims, in essence, that its use of the waters is an existing use under the VWQS, and that Winooski One will be adversely impacted financially by the withdrawal of water by SRI for snowmaking.
181. The Mad River is a tributary of the Winooski River. Winooski One asserts that it has or will have a commercial hydroelectric facility located a considerable distance downstream of the project on the lower Winooski River.
182. There is no evidence in the record of this proceeding regarding whether Winooski One's actual or prospective use of the waters of the lower Winooski River for commercial hydroelectric purposes has actually occurred on or after November 28, 1975.

183. Winooski One's use is not a use in or on the water body (i.e. the Mad River) in question.
184. Even if Winooski One is an "existing use" the VWQS do not require that proposed new uses of the waters, such as the proposed withdrawal, must have absolutely no impact. The requirement to "maintain and protect" existing uses does not mean for example that an existing use dependent on a certain level of water quality such as swimming results in the categorical prohibition of any upstream discharge of waste that results in even a nominal diminution of water quality. Similarly an existing use of water for commercial hydroelectric purposes does not categorically prohibit any upstream use that may affect stream. Rather, § 1-03(A) of the VWQS requires a determination as to whether the new upstream use (in this case a withdrawal of water) would either preempt any downstream existing uses or subject those uses to risks or adverse impacts to the extent that they would not be maintained and protected.
185. It is standard and accepted procedure for hydrologists to assume that two locations on the same river in relatively close proximity would have similar unitized flows provided that there were no major withdrawals, discharges, impoundments or other factors between the two points in question that would invalidate such an assumption.
186. The ratio between the size of the watershed of the Mad River at the project's proposed withdrawal site and the watershed of the Mad River at the Moretown gauge is 3:1. Moreover, there are no major withdrawals, discharges or impoundments between those two locations.
187. The ratio between the watershed of the Mad River at the project's proposed withdrawal site (approximately 46 sq. mi.) and the watershed of the lower Winooski River at the Winooski One site (approximately 1100 sq. mi.) is nearly 25:1. Moreover, there are several major dams including hydroelectric dams, discharges and water withdrawals that are located between these two sites. Additionally, a number of other factors including: inputs of groundwater from valley bottom aquifers, different climate patterns within the nearby 1100 square mile watershed, differences in terrain, the presence of major tributaries and other factors combine to make any effort to compare unitized flows between these two sites totally unreliable.
188. Although some water flowing by the project site reaches the Winooski One site in a matter of a few days, it is not true that for every gallon withdrawn at the project site, flows at the Winooski One site are reduced by a similar amount.

189. Given the lack of proximity between the project site and the Winooski One site the impact of the project, if any, on Winooski One is indistinguishable from the effects on flow in the lower Winooski caused by the many natural and man-made factors discussed in finding 188 above.
190. The Board concludes that the project's impact, if any, on Winooski One will neither preempt the use of waters in the lower Winooski for the generation of hydroelectric energy nor subject that use to any undue risk or adverse impact.
191. Section 1-04 (Discharge Policy) generally and § 1-04(B) (Assimilative Capacity) of the VWQS pertain to the discharge of wastes and the allocation of wasteload capacity among such discharges. The project under review in this proceeding does not involve the discharge of wastes or the withdrawal of water from a lake (VWQS § 1-04(A)(8)) and therefore the Discharge Policy and Assimilative Capacity provisions are not applicable.
192. The existing water quality of the Mad River generally exceeds one or more of the applicable water quality criteria and therefore "that high quality shall be maintained and protected in the public interest of the fullest extent possible in accordance with the provisions of this section" (VWQS § 1-03 (C)).
193. Under VWQS § 1-03(C), the Board can allow a limited reduction in water quality with regard to the affected water quality criteria where substantial and widespread adverse economic or social impacts would otherwise occur, unless the public benefits of maintaining the existing level of water quality exceed the public benefits that would accrue from allowing the limited reduction in quality.
194. Because the project does not involve the discharge of any waste into the waters of the state, it will not affect water quality with regard to the following water quality criteria: dissolved oxygen, phosphorus, nitrates, sludge deposits or solid refuse, settleable solids, floating solids, oil, grease, scum or total suspended solids, alkalinity, pH, toxic substances, radioactive substances, turbidity, escherichia coli, color, taste and odor (VWQS § 3-01(B) (1,3,4, 6-11) and § 3-03 (B) (1-4)).
195. Other than such limited duration impacts as may occur during construction (VWQS § 2-04(B)) the project's effect on water quality in the waters of the state is limited to those impacts associated with the reduction in the quantity of water in the

Mad River as a result of the withdrawal. The only water quality criteria affected by the reduction in the quantity of water in the Mad River are temperature and aquatic habitat (VWQS § 3-01 (B) (2 & 5)).

196. Existing flows in the Mad River at times exceed those necessary to meet the temperature and aquatic habitat criteria. The project will have some effect on these water quality criteria and therefore any reduction in existing flows may constitute a reduction in water quality that can only be allowed in accordance with the provisions of VWQS § 1-03(C).

197. The portion of the water quality criterion for temperature relevant in this proceeding (VWQS § 3-01(B)(2)(a)) provides that:

The change or rate of change in temperature, either upward or downward, shall be controlled so as to prevent any undue adverse effect on aquatic biota and wildlife

198. The water quality criterion for aquatic habitat (VWQS § 3-01 (B)(5)) is:

No change from background conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes.

199. The adverse economic or social impacts on the people of the state resulting from the maintenance of the higher quality of the Mad River (i.e. existing natural stream flow) and therefore the prevention of any water withdrawal by SRI for snowmaking or fire protection purposes, would be substantial and widespread. Such adverse impacts are not warranted by the economic, social and other benefits to the people of the state resulting from the maintenance of such a higher level of water quality (i.e. preserving existing natural stream flow natural temperatures variation and all existing aquatic habitat). (VWQS § 1-03(C)(1)(a & b)). Indeed the Board notes no party in this proceeding argued that no withdrawal, and therefore no reduction in water quality with regard to temperature and aquatic habitat, should be allowed.

200. The degree of reduction in the flow of the Mad River during the snowmaking season allowed by the order below is the minimum necessary to avoid substantial and widespread adverse economic or social impacts on the people of the state (VWQS § 1-03(C)(1)(a & b)). The degree of reduction in the flow of the Mad River during the snowmaking season allowed by the

order below will maintain the degree of water quality necessary to maintain and protect all existing uses as well as all applicable water quality criteria.

201. The project does not affect any waters designated as an Outstanding Resource Water, and therefore VWQS § 1-03(D) is not applicable.
202. Sections 3-01 (General Water Quality Criteria), § 3-03 (Class B Waters), and § 3-06 (Radioactive Wastes), require that specified water quality criteria be met in Class B waters. Of these criteria only temperature (§ 3-01(2)) and aquatic habitat (§ 3-01(4)) are applicable to the project.
203. The project, under the terms of the order below, will not be operated or conducted in a manner that will violate the water quality criteria for temperature or aquatic habitat.
204. The project will not affect the water quality of the waters of the state to an extent that existing aquatic communities will not be sustained.
205. The project if constructed and operated in accordance with the terms of the order below constitutes beneficial and environmentally sound development.

III. Additional Conclusions

A. Policy Issues

206. The central public policy issue raised in this proceeding is: What minimum winter time flow must be maintained in the Mad River after allowing for the withdrawal of water for snowmaking purposes in order to adequately protect fish and aquatic biota.
207. The State of Vermont has not adopted, either by statute or by rule, a specific policy related either to water withdrawal for snowmaking specifically or to water withdrawal generally.
208. Vermont state agencies charged with reviewing the impacts of development on water resources have issued permits on a case-by-case basis to projects involving the withdrawal of water for snowmaking purposes, and have set conditions designed to protect, among other things, minimum stream flows, as well as fish and aquatic biota habitat.
209. For example, when Okemo Mountain sought approval of construction of a pump house, an intake structure, pipeline and withdrawal of 3,000 gallons of water per minute from the Black River, the Environmental Board issued an amended Act 250

permit requiring the ski area to maintain a minimum flow of at least 0.78 csm downstream from the point of withdrawal and the submission of a proposal for a habitat enhancement program. Okemo Mountain, Inc., (Revised) 2S0351-12A-EB, Permit Conditions #1 and #2 (July 23, 1992); Okemo Mountain, Inc., (Revised) 2S0351-12A-EB, Findings of Fact, Conclusions of Law, and Order (July 23 1992).

210. This case-by-case approach to reviewing the impacts of water withdrawal projects on state water resources and establishing minimum stream flows and other limitations is followed in a number of riparian states east of the Mississippi. See, e.g., Conn. Gen. Laws Ann. ch. 21G; N.J. Stat. Ann. § 58:1A-5.
211. SRI has demonstrated a need to utilize water withdrawn from the Mad River to enhance its existing snowmaking capacity at Sugarbush South. Meeting this need will provide substantial public benefits to several towns in the Mad River Valley and to the State of Vermont.
212. In determining how this need can best be met the water available from Clay Brook must be considered in determining when, and under what circumstances, water can be withdrawn from the Mad River in a manner that after considering all factors best serves the public good.
213. SRI has met its burden of proof by a preponderance of the evidence that the project when constructed and operated in accordance with SRI's proposal will serve the public good. However, the Board has concluded that it is necessary to modify the dam permit issued by ANR in order to enhance protection of fish and aquatic biota and to limit withdrawals to what the Board believes to be SRI's current need.
214. To properly husband the allocation of finite public resources (i.e. the flow of the Mad River) to meet other needs in the future, the Board is only allowing the withdrawal of the amount of water that it has concluded is necessary to meet SRI's snowmaking needs and has required that the water available from Clay Brook for snowmaking must be considered in determining when that need is adequately met.
215. SRI has met its burden of proof by a preponderance of the evidence that the project when constructed and operated in accordance with the order below will comply with all applicable Vermont water quality requirements. However, to insure that any adverse impacts the project may have on the waters of the state are the minimum possible and fully comply with all applicable provisions of the VWQS, the applicant has been required to take all measures reasonably available to

insure that among other things, any adverse impacts on fish and aquatic biota are not undue. These measures include the design of the water withdrawal facility, the withdrawal by gravity using the low and high flow pipes, the pond storage, the use of the pond trigger mechanism, the step-down formula, minimum flow rate, the requirement of additional winter flow data prior to initial withdrawal, the monitoring plan, the Mad River management plan and the other requirements specified in the order below.

216. Administrative bodies such as the Board are creatures of statute and have only such powers and authority as are conferred by the applicable statute(s) and/or regulation(s). See, e.g., Westover v. Village of Barton Electric Dept., 149 Vt. 356, 358 (1988); Trybulski v. Bellows Falls Hydro-Electric Corp., 112 Vt. 1, 7 (1941).
217. This Board does not have the authority to hear and determine disputes between riparian users regarding use or allocation of the waters, and particularly claims for "compensation" in connection with such matters. Such disputes can and must be heard by the Superior Court, which is the court of general civil jurisdiction in Vermont. See, e.g., In re Buttolph, 147 Vt., 641, 643 (1987) ("Buttolph" III); Kasuba v. Graves, 109 Vt. 191, 198-99 (1937); Laurie v. Silsby, 82 Vt. 505 (1909).
218. An administrative agency cannot adjudicate private damage claims or provide general equitable relief. These matters are reserved to the courts. In re Buttolph, 147 Vt. 641, 643 (1987); Glass v. Delaware & Hudson Railroad Co., 135 Vt. 419, 422 (1977); Willette v. Department of Social Welfare, 129 Vt. 270, 277 (1971); Trybulski v. Bellows Falls Hydro-Electric Corp., 112 Vt. 1, 8-9 (1941).

B. Public Trust Doctrine:

219. The common law public trust doctrine as reflected in the Vermont Constitution, Chapter II, Section 67, of the Vermont Constitution applies to the "boatable" waters of the State of Vermont.
220. The Mad River is a "boatable" water.
221. VNRC argues that the public trust doctrine prohibits the use of the public "boatable" waters for any private purpose. The Board has previously ruled otherwise. In re: Appeal of Angney, Docket No. 89-14, (1991), affirmed, In re: Angney, Docket No. S96-91 LaCa (Sept. 4, 1992).
222. VNRC further argues that the Board lacks jurisdiction to make the necessary threshold determination as to whether the

proposed water withdrawal is for private or public purposes. This argument appears to be based upon the belief that the Board's jurisdiction to hear these appeals is dependent upon an express determination by the Vermont Legislature that withdrawal of waters for snowmaking is consistent with the public's rights under the public trust doctrine, that such legislative approval has been enacted, and further that the Legislature has expressly delegated to the Board the power to make public trust determinations. VNRC argues that the present dam statute does not refer to or provide adequate statutory guidance for determining whether use of the Mad River for snowmaking is a "public use." VNRC points to, among other authorities, State of Vermont and City of Burlington v. Central Vermont Railroad, 153 Vt. 337 (1989).

223. The Board believes that the work of determining the implications of the common law public trust doctrine as reflected in the Vermont Constitution is best left to the judicial and legislative branches. See, Okemo Mountain, Inc., #2S0351-12A-EB, Memorandum of Decision at 4 (Sept. 18, 1990); Westover v. Village of Barton Electric Department 149 Vt. 356 (1988). Nevertheless, the Board holds the opinion that the public trust doctrine as reflected in the Vermont Constitution, Chapter II, Section 67, does not preclude the Board from considering these appeals on the merits.
224. First, the Board believes that VNRC reads the Central Vermont Railway case too broadly. That case involved questions of the applicability and interpretation of the public trust doctrine with regard to the title to a strip of lakeshore property that a railroad company filled pursuant to legislation. The Court concluded that the land at issue was owned in fee simple by the railroad but impressed with the public trust doctrine, and that the Legislature had not intended to grant the lands at issue free from that trust. 153 Vt. at 347, 351-352. Moreover, although this case suggests in dicta that the Legislature's supervision and control over trust property "cannot be delegated," id. at 352 fn. 11, the Legislature has in fact created by statute several regulatory schemes that effectively delegate supervision over the private use of such property to agencies of the State, primarily the ANR. See, e.g., 10 V.S.A. Chapter 43 (Dams); 29 V.S.A. Chapter 11 (Lakes and Ponds Encroachment Permits); 10 V.S.A. Chapter 41 (Stream Alteration); 10 V.S.A. Chapter 47 (Discharges).
225. Second, the Legislature has given primary jurisdiction to the Board to hear de novo appeals from ANR Dam orders and 401 Certifications. The task of the Board is to evaluate a project in light of the considerations contained within the applicable statutes and to issue or deny a permit or certification as appropriate.

226. It is axiomatic that the Board must act within the boundaries of its enabling legislation. In re: Agency of Administration, 141 Vt. 68, 75 (1982). To deny the parties timely review on the merits of a project, pending resolution of public trust and constitutional challenges, would thwart the Legislature's intention under the Dam statute and the intention of Congress under the 401 Certification process.
227. State water quality management policy, set forth in 10 V.S.A. § 1250 (Supp. 1992) presumes a balancing between the goals of, on the one hand protecting and enhancing water quality, and on the other allowing environmentally sound development. (WRB In re: Kidder Brook, Docket No. 11-4, October 11, 1989).

C. Summary Conclusion:

228. On the basis of its record in this matter, having given due consideration to, among other things, the project's effect on the factors specified in 10 V.S.A. § 1086(a) and whether it will violate applicable provisions of the VWQS, the Board concludes that:
- a. With respect to the Dam Order appeal, the project will serve the public good and the Board shall issue an order approving the application, subject to the conditions below for minimum stream flow to protect fish and aquatic biota.
 - b. With respect to the 401 Certification appeal, the operation of the project shall be conducted in a manner that will not violate applicable VWQS, subject to the conditions set forth below.

IV. FINAL ORDER

A. Order:

1. The ANR's Order of Approval issued to SRI and Elwin R. and Janice Kingsbury, on January 8, 1992 is hereby affirmed, subject to by the Conditions set forth below.
2. The ANR's 401 Certification issued on May 6, 1992, is hereby affirmed, subject to the Conditions set forth below.

B. Conditions

1. The project shall be constructed and operated in accordance with exhibits 1, 2, 10, and 77 except to the extent modified by the conditions below. Any modifications to the approved construction plans and specifications shall be submitted to the Secretary and approved in writing.

2. Construction of the project shall only occur between April 15 and November 15. Construction of the project shall be commenced within one year of the date on which all approvals required for construction become final and all applicable appeal periods have expired. Construction of the project shall be completed within 18 months of the date construction is commenced.
3. The water withdrawal facility and pond may be used for fire fighting purposes at any time but shall be used for snowmaking purposes only between November 1 and March 31. When operated for snowmaking purposes the withdrawal of water from the Mad River shall comply with Table 1⁸, except as modified by these conditions. In addition:
 - a. Snowmaking shall be limited to 255 acres of ski terrain at Sugarbush South in accordance with exhibits 17, 18, and 19; and
 - b. The existing water withdrawal from Clay Brook must be utilized, to the fullest extent authorized by any applicable state or federal permits, prior to utilizing water withdrawn from the Mad River; and
 - c. For the first year (operational year 1) following the initial commencement of operation, the project shall not reduce the minimum flow rate below .79 csm; and
 - d. For the next five subsequent years (operational years two-six), the project shall not reduce the minimum flow rate below .61 csm; and
 - e. Following the sixth operational year, the project shall not reduce the minimum flow rate below .61 csm except at those times when the pond is storing less than 50% of its capacity. When the pond is storing less than 50% of its capacity, the minimum flow rate may be reduced to .50 csm.
4. Prior to the initial commencement of water withdrawal the permittee shall submit to the Secretary of ANR (Secretary) a minimum of 15 days of flow data for the Mad River at the site of the water withdrawal facility collected in January or February.

⁸ The flow values specified in Table 1 and the conditions in this order assume a 1:1 correlation between flows at the Moretown gauge and flows at the withdrawal site and are therefore subject to periodic adjustment as provided for in condition 5.

5. The winter flow data for the Mad River obtained in accordance with this Order shall be used along with all other available and reliable winter flow data, among other things, to define the statistical relationship as expressed by a regression equation between flows at the Moretown gauge and at the water withdrawal facility. The minimum flow rates provided for in condition 3 shall be periodically recalculated by the Secretary using the most reliable available data. On the basis of these recalculations the minimum flow rates shall be adjusted up or down provided that the minimum flow rate of .50 csm may only be adjusted to a higher value. These periodic adjustments shall be made in accordance with the following schedule:
 - a. The initial recalculation shall be made, after considering the flow data required by condition 4, by the June 15, prior to operational year one and shall apply to operational year one.
 - b. The second recalculation shall be made by June 15 following completion of operational year one and shall apply to operational years two through six.
 - c. The third and final recalculation shall be made by June 15 following completion of operational year six and shall apply to operational years seven through twenty.
6. Consistent with the study proposal for the monitoring of any impacts of the water withdrawal on the Mad River outlined in exhibit 77 entitled "Physical and Biological Impacts of Water Withdrawal from the Mad River":
 - a. The permittee shall within 45 days of this decision submit for the review and approval of the Secretary a detailed monitoring plan. This plan shall include monitoring upstream of the withdrawal facility to serve as a "control" against which impacts downstream of the withdrawal can be reliably compared; and
 - b. The permittee shall respond within 30 days to any requests by the Secretary for additional information regarding the monitoring plan; and
 - c. The permittee shall begin implementing the monitoring plan prior to the initial commencement of water withdrawal and within 30 days of approval by the Secretary.
 - d. The permittee shall continue monitoring any long-term impacts of the water withdrawal in accordance with the approved plan for a period of not less than 14

consecutive years (operational years one through fourteen) following the initial commencement of the water withdrawal.

7. The Secretary may at any time, after public notice in accordance with applicable state law and notice by U.S. Mail to all parties to this proceeding, amend the minimum flow rates established in condition 3 as appropriate under applicable law on the basis of the results of the monitoring study provided for in condition 6 above.
8. Consistent with the "Proposal to Initiate and Develop a Mad River Management Plan" (exhibit 10):
 - a. The permittee shall, prior to the commencement of construction, submit for the review and approval of the Secretary a detailed management plan for the Mad River that shall continue for the duration of this order. This management plan shall provide for the restoration and enhancement of fish and aquatic biota habitat and shall be designed so that it will not interfere with the collection of data to assess the withdrawal's impact under the monitoring plan required by condition 6 above.
 - b. The permittee shall hold one or more public informational meetings convenient to the waters affected to explain the proposed management plan and invite public comment. The permittee shall provide not less than 30 days actual notice of the proposed management plan to the Secretary and shall publish notice of the public informational meeting(s) not less than 30 days prior to the first meeting. Such notice shall include a concise summary of proposed management plan and information regarding where interested members of the public could review the proposed management plan. The permittee shall tape record the informational meetings and provide a copy of the tape recording and a written summary of all comments received to the Secretary of ANR within 30 days of the last meeting.
 - c. The permittee shall begin implementing the management plan prior to the initial commencement of water withdrawal and within 30 days of approval by the Secretary.
9. On motion to the Board, by either the permittee or ANR, the Board may adjust the schedule required by conditions 4, 6, or

- 8 above if it determines that an alternative schedule is necessary to allow adequate time for the required actions to be accomplished.
10. Prior to the initial commencement of water withdrawal the permittee shall design and install a gauging station with a heated flume at the point of withdrawal that accurately records in-stream flows at 1.2 csm or less. The permittee shall also take such measures as are necessary to measure in-stream river flows greater than 1.2 csm using the rated river cross-section method as defined by ANR.
 11. During the period when the stop logs and vertical posts are in place, flows shall be measured as daily average values, hourly values, and minimum daily instantaneous flows. For each day that the withdrawal of water occurs, hourly rates of withdrawal, daily maximum withdrawal rates, total daily volumes with daily average rates, and minimum instantaneous below-weir flows shall be recorded. For days during the period between October 1 and March 31 where no withdrawal occurs, only daily average flow data must be recorded. No flow data need to be collected between April 1 and September 30.
 12. The flow data required by conditions 10 and 11 shall be provided to the Secretary in table form, both hard copy and computer readable. These data shall be filed monthly within 21 days of the end of the preceding month along with a narrative description of flow and water use conditions throughout each month as well as any operational problems encountered and responses taken.
 13. The permittee shall insure that any technicians who collect and maintain flow and withdrawal records at the gauging station are properly trained by a registered professional engineer. Calibration of the gauging station and the measurement devices on the low flow pipe shall be done under the supervision of a registered professional engineer or approved by the same.
 14. By October 15 of each operational year, the heated flume and intake riser spillways shall be surveyed by a registered land surveyor or professional engineer to confirm that the elevations have not shifted due to soil movement, high water damage or any other cause. The results of this annual survey shall be filed with the Secretary by October 30 each operational year.
 15. If the gauging station or low flow pipe are not fully operational for any reason, all withdrawal via the low flow pipe shall be discontinued immediately. The Secretary shall be

notified of this situation within 24 hours, or in the case of a weekend or state holiday by noon on the immediately following work day.

16. The stop logs and vertical posts in the diversion weir shall be installed no earlier than November 1 and removed by March 15 or immediately after ice goes out, whichever later occurs.
17. Prior to the commencement of any construction in the vicinity of the greenbelt area adjacent to the Mad River as shown on exhibit 1 the permittee shall install a physical barrier to prevent the intrusion into the greenbelt area of construction equipment and notify the Secretary. The Secretary shall have five business days following notice to inspect the barrier and make reasonable adjustments to its location prior to the commencement of any construction activities in this area. During construction, mature trees along the edge of the greenbelt shall be protected from damage using plywood sheets or other measures. The greenbelt shall not be altered during the term of this permit without prior written approval of the Secretary.
18. Within 90 days after the commencement of construction the permittee shall submit for the review and approval of the Secretary a landscaping plan for the area disturbed in conjunction with construction of the project including any riprapped areas adjacent to the Mad River. With regard to any woody species using in the landscaping plan the permittee shall give consideration to using only those species natural to Vermont. The approved plan shall be implemented within the construction completion requirements established by condition 2 above.
19. The permittee shall, by filing an updated construction schedule for the entire project, notify the Secretary at least 48 hours prior to commencement of any construction. The permittee shall notify the Secretary within 48 hours of completion of construction of the water withdrawal facility and the pond, and arrange for a final inspection of each component of the project.
20. The permittee shall engage a professional engineer registered in the state of Vermont under 26 V.S.A. Chapter 20 who has experience in the design and investigation of dams to supervise the construction of the water withdrawal facility and pond authorized by this Order. 10 V.S.A. Section 1090. The engineer shall:
 - a. Prior to the commencement of construction, certify in writing to the Secretary that the design and specifications of the water withdrawal facility including the

gauging station are consistent with, and capable of reliably implementing, all requirements of condition 3 above; and

- b. During construction submit status reports, results of testing or other reports required by this order, including on a bi-weekly basis copies of daily project reports including compaction, soils, concrete or other material testing results to the Secretary; and
 - c. Prior to their operation, submit record ("as built") drawings of the water withdrawal facility and the pond to the Secretary; and
 - d. Prior to operation of the water withdrawal facility, submit an analysis of the calibration of the instrumentation at the gauging station; and
 - e. Prior to the impoundment of any water in the pond, certify in writing to the Secretary that the water withdrawal facility and pond have been completed in accordance with this order and that in the engineer's opinion water may be safely impounded.
21. Following written notice by the permittee that all information required by condition 20 c, d, and e has been submitted, the Secretary shall have fifteen business days to inspect the pond and water withdrawal facility and either issue a written approval to impound water or to explain in writing why no approval is being given, itemizing the actions that need to be taken to allow the impoundment of water. Failure of the Secretary to act within the time period specified shall be deemed approval to impound water.
22. This Order does not grant any exclusive rights or privileges that would impair any rights possessed by other riparian or littoral owners or the State of Vermont. It does not grant any right, title or easement to or over any land not owned in fee by the applicant or in which the applicant does not hold easement rights, nor does it authorize any violation of federal, state or local laws or regulations.
23. Nothing in this Order shall relieve the permittee from its legal or equitable duties, obligations and liabilities resulting from such ownership or operation of the project.
24. The Commissioner of ANR's Department of Environmental Conservation may conduct periodic inspections of the dam in accordance with 10 V.S.A. §§ 1105 and 8005.
25. There shall be no desilting, so-called, of the pond except upon prior written approval of the Secretary and upon such

terms or conditions as the Secretary shall specify.

26. The permittee shall repair and maintain the water withdrawal facility, and pond in a manner consistent with protection of the public and the beneficial values and uses of the Mad River from harm.
27. The terms and conditions of this Order are binding upon the permittee and its heirs, successors and assigns.
28. In addition to any other remedy at law or in equity, this Order may be suspended or revoked at any time after reasonable notice and opportunity to be heard, upon failure of the permittee to comply with any condition of this Order, or any rule or law applicable to this Order. Continuing jurisdiction is reserved unto the Secretary for these purposes.
29. This Order shall expire twenty years from the date the permittee obtains approval to impound water in the pond in accordance with condition 21 above.

TABLE 1 9

NATURAL RIVER FLOW		MAXIMUM WITHDRAWAL RATE		
CSM	CFS	GPM		
		YEAR 1	YEAR 2-6	YEAR 7+
0.30	21.00	NO WITHDRAWAL	NO WITHDRAWAL	NO WITHDRAWAL
0.31	21.48	NO WITHDRAWAL	NO WITHDRAWAL	205
0.32	21.96	NO WITHDRAWAL	NO WITHDRAWAL	410
0.33	22.44	NO WITHDRAWAL	NO WITHDRAWAL	615
0.34	22.92	NO WITHDRAWAL	NO WITHDRAWAL	820
0.35	23.40	NO WITHDRAWAL	NO WITHDRAWAL	1025
0.36	23.88	NO WITHDRAWAL	NO WITHDRAWAL	1230
0.37	24.36	NO WITHDRAWAL	NO WITHDRAWAL	1435
0.38	24.84	NO WITHDRAWAL	NO WITHDRAWAL	1640
0.39	25.32	NO WITHDRAWAL	NO WITHDRAWAL	1845
0.40	25.80	NO WITHDRAWAL	NO WITHDRAWAL	2050
0.41	26.28	NO WITHDRAWAL	205	1252
0.42	26.76	NO WITHDRAWAL	410	1374
0.43	27.24	NO WITHDRAWAL	615	1496
0.44	27.72	NO WITHDRAWAL	820	1618
0.45	28.20	NO WITHDRAWAL	1025	1740
0.46	28.68	NO WITHDRAWAL	1231	1862
0.47	29.16	NO WITHDRAWAL	1436	1984
0.48	29.64	NO WITHDRAWAL	1640	2106
0.49	30.12	NO WITHDRAWAL	1845	2228
0.50	30.60	NO WITHDRAWAL	2050	2350
0.51	31.08	NO WITHDRAWAL	2255	2472
0.52	31.56	NO WITHDRAWAL	2460	2594
0.53	32.04	NO WITHDRAWAL	2665	2716
0.54	32.52	NO WITHDRAWAL	2870	2838
0.55	33.00	NO WITHDRAWAL	3075	2960
0.56	33.48	NO WITHDRAWAL	3280	3082
0.57	33.96	NO WITHDRAWAL	3485	3204
0.58	34.44	NO WITHDRAWAL	3690	3326
0.59	34.92	NO WITHDRAWAL	3895	3448
0.60	35.40	NO WITHDRAWAL	4100	3570
0.61	35.88	NO WITHDRAWAL	4305	3692
0.62	36.36	NO WITHDRAWAL	4510	3814
0.63	36.84	NO WITHDRAWAL	4715	3936
0.64	37.32	NO WITHDRAWAL	4920	4058
0.65	37.80	NO WITHDRAWAL	5125	4180
0.66	38.28	NO WITHDRAWAL	5330	4302
0.67	38.76	NO WITHDRAWAL	5535	4424
0.68	39.24	NO WITHDRAWAL	5740	4546
0.69	39.72	NO WITHDRAWAL	5945	4668
0.70	40.20	NO WITHDRAWAL	6150	4790
0.71	40.68	NO WITHDRAWAL	6355	4912
0.72	41.16	NO WITHDRAWAL	6560	5034
0.73	41.64	NO WITHDRAWAL	6765	5156
0.74	42.12	NO WITHDRAWAL	6970	5278
0.75	42.60	NO WITHDRAWAL	7175	5400
0.76	43.08	NO WITHDRAWAL	7380	5522
0.77	43.56	NO WITHDRAWAL	7585	5644
0.78	44.04	NO WITHDRAWAL	7790	5766
0.79	44.52	NO WITHDRAWAL	7995	5888
0.80	45.00	NO WITHDRAWAL	8200	6010
0.81	45.48	NO WITHDRAWAL	8405	6132
0.82	45.96	NO WITHDRAWAL	8610	6254
0.83	46.44	NO WITHDRAWAL	8815	6376
0.84	46.92	NO WITHDRAWAL	9020	6498
0.85	47.40	NO WITHDRAWAL	9225	6620
0.86	47.88	NO WITHDRAWAL	9430	6742
0.87	48.36	NO WITHDRAWAL	9635	6864
0.88	48.84	NO WITHDRAWAL	9840	6986
0.89	49.32	NO WITHDRAWAL	10045	7108
0.90	49.80	NO WITHDRAWAL	10250	7230
0.91	50.28	NO WITHDRAWAL	10455	7352
0.92	50.76	NO WITHDRAWAL	10660	7474
0.93	51.24	NO WITHDRAWAL	10865	7596
0.94	51.72	NO WITHDRAWAL	11070	7718
0.95	52.20	NO WITHDRAWAL	11275	7840
0.96	52.68	NO WITHDRAWAL	11480	7962
0.97	53.16	NO WITHDRAWAL	11685	8084
0.98	53.64	NO WITHDRAWAL	11890	8206
0.99	54.12	NO WITHDRAWAL	12095	8328
1.00	54.60	NO WITHDRAWAL	12300	8450
1.01	55.08	NO WITHDRAWAL	12505	8572
1.02	55.56	NO WITHDRAWAL	12710	8694
1.03	56.04	NO WITHDRAWAL	12915	8816
1.04	56.52	NO WITHDRAWAL	13120	8938
1.05	57.00	NO WITHDRAWAL	13325	9060
1.06	57.48	NO WITHDRAWAL	13530	9182
1.07	57.96	NO WITHDRAWAL	13735	9304
1.08	58.44	NO WITHDRAWAL	13940	9426
1.09	58.92	NO WITHDRAWAL	14145	9548
1.10	59.40	NO WITHDRAWAL	14350	9670
1.11	59.88	NO WITHDRAWAL	14555	9792
1.12	60.36	NO WITHDRAWAL	14760	9914
1.13	60.84	NO WITHDRAWAL	14965	10036
1.14	61.32	NO WITHDRAWAL	15170	10158
1.15	61.80	NO WITHDRAWAL	15375	10280
1.16	62.28	NO WITHDRAWAL	15580	10402
1.17	62.76	NO WITHDRAWAL	15785	10524
1.18	63.24	NO WITHDRAWAL	15990	10646
1.19	63.72	NO WITHDRAWAL	16195	10768
1.20	64.20	NO WITHDRAWAL	16400	10890
> 1.20	> 55.2	3000 GPM + ALL FLOW IN EXCESS OF 1.2 CSM		

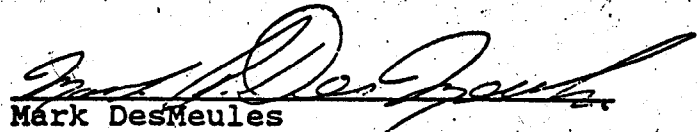
flow values
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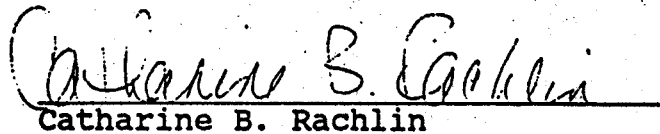
C. Further Appeals

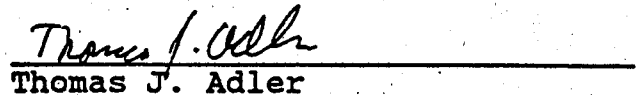
With respect to either the Dam Order appeal (Board Docket No. 92-02) or the 401 Certification appeal (Board Docket No. 92-05), any party to the applicable proceeding before the Board may appeal from the final order of this Board to the Washington Superior Court, the court of the county in which the project is to be constructed. See 10 V.S.A. § 1099(a); 10 V.S.A. § 1024(b).

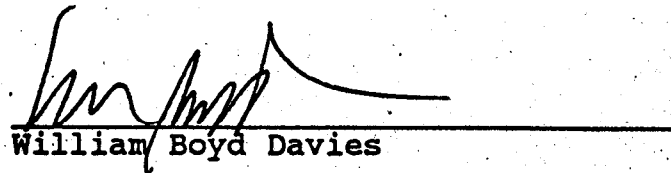
Dated at Montpelier, Vermont this 8th day of February, 1993.

Vermont Water Resources Board


Mark DesMeules


Catharine B. Rachlin


Thomas J. Adler


William Boyd Davies