Report on the Impact of Bulk Groundwater Withdrawals in the State

House Bill #769, Section 16

As required by House Bill #769, Section 16, ANR Report on Environmental Impact of Groundwater Withdrawals for Bottling Water, the following legislative report addresses the two areas required by the bill:

1. An analysis of the environmental effect of withdrawing and transferring out of the state large volumes of groundwater for the purposes of bottling, including the impact of such withdrawals on drinking water supplies, agricultural use, groundwater tables, and surface water recharge.

2. A summary of the fees charged by other states for the withdrawal of groundwater for bottling or bulk water transfer and a comparison of the fees of other states to the groundwater withdrawal fees charged in Vermont.

In preparing this report ANR staff consulted with interested parties, including public water systems, bottled water companies, environmental groups, representatives of agriculture, and geologic consultants. Several meetings were held to gather input from these parties, as well as a number of telephone conversations. In addition, our state records were reviewed and other state staff was also consulted.

A bibliography of research areas and select associated documents are appended to the end of this report:

Appendix A - Agency Procedure for Determining Acceptable Minimum Stream Flows

Appendix B - Summary of Current Process to Obtain a Permit for Bottled/Bulk Groundwater Withdrawal

Appendix C – Bibliography

Appendix D - Gund Institute Water-Costs

Appendix E - Groundwater Withdrawal Reporting and Permitting Rules

I. A summary of permitted bottled/bulk systems which utilize VT groundwater

A bottled water system means a public water system which bottles drinking water for public distribution and sale. Bulk water means drinking water delivered to consumers or water purveyors by means other than pipeline or bottled water.

The primary way that Vermont bottled/bulk water systems obtain their groundwater is through capturing a portion of what naturally overflows from a spring or from a flowing artesian well. Only one system obtains its groundwater by pumping from a drilled well.

Only four bottled/bulk water systems withdrawing groundwater (see below) are currently permitted for operation in Vermont. Several other systems have gone out of business in the past decade.

Vermont Natural Water Company, located in Brattleboro. They are permitted to withdraw a maximum of 125 gallons per minute through pumping a single drilled well. This company primarily bottles water from its own well and from bulk water deliveries.

Vermont Heritage Spring Water Company, located in Derby. They are permitted to use an aggregate maximum of 5.25 gallons per minute of the overflow from 4 spring sources (Spring #1, Spring #2, Spring #3, and Spring #4). Any required minimum stream flow requirements are to be maintained, although none have been identified at this time. This company primarily bottles its water at its own facility.

Pristine Mountain Springs of Vermont, located in Stockbridge. They are permitted to use a maximum of 600 gallons per minute of the overflow from the single spring source (Colton Spring). This system primarily ships bulk water to be bottled at other facilities. Any required minimum stream flow requirements are to be maintained, although none have been identified at this time. Chalet Village, a public community drinking water system which is supplied water from the same source, has prior rights to the spring water over Pristine Mountain Spring's system use if source water flows become reduced.

Merrill Spring, located in Tinmouth. They are permitted to use a maximum of 35 gallon per minute of the overflow from the single spring source (Merrill Spring SPG-1). Minimum stream flow requirements were established in the permitting process and must be maintained. This system primarily ships bulk water for bottling at other facilities.

In addition, the **Bennington Water Department,** serving water to the **town of Bennington**, has a bulk water loading station at its permitted Morgan Spring to supply bulk water to other public water systems, to bottling facilities, and other individuals. This spring has a total permitted yield of 1,200 gallons per minute. There is a variable demand on it for bulk water use. The spring's primary use is as back-up to supply drinking water to the town users through piping into the Bennington municipal water system which primarily uses surface water.

II. An Analysis of Environmental Effects:

To begin, it is recognized that the monitoring and research necessary to document actual impacts to existing uses and environmental resources has not been performed over the many years that bottled/bulk water sources have been permitted for use. This research has ranked lower in priority than matters where the immediate public health and environmental impacts are known. With that said, the recently adopted *Groundwater Withdrawal Reporting and Permitting Rule* identifies the necessary studies that will be undertaken to address these issues. The required re-permitting of bottled/bulk water systems, with a requirement for the permittee to conduct this research and have it reviewed by ANR staff, provides an opportunity for ANR to collect this information.

a. Impact on drinking water supplies.

There have been no documented adverse impacts on drinking water supplies identified as a result of groundwater withdrawal for the purpose of bulk or bottled water use in Vermont. Anecdotal concerns of impacts have been raised in the past but, in interviewing the interested parties for this report, none of them could verify that these concerns were linked to the actual collection of groundwater for bottled/bulk water use. While it is possible that diversion of spring water can reduce downstream recharge of groundwater, we have received no definitive information that this has affected any drinking water supply in the area of a bottled/bulk water withdrawal.

b. Impact on agricultural use.

Neither the ANR nor the Agency of Agriculture, Food and Market's Resource Management and Environmental Stewardship Division have identified any impact on agricultural use associated with the specific withdrawals for bottled/bulk water in Vermont. Discussions with agriculture representatives and other state program staff did not identify any impacts on agricultural water use resulting from any groundwater withdrawals for bottled/bulk water use.

c. Impact on groundwater table.

There are no documented undue adverse impacts to the groundwater table in the areas of any bottled or bulk water withdrawals. The capture of naturally surfacing overflow does not affect the piezometric head of the water table which the spring is issuing from. In other words, capturing any or all of the issuing spring water will not result in a change in the level of the up gradient groundwater table. In the down gradient direction of a spring, due to the upward hydraulic gradient of the water table creating the spring, it is unlikely that it there is appreciable groundwater recharge in their vicinity, but studies to prove no adverse impact have not been conducted.

Vermont Natural Water Company is the only bottled/bulk water permittee using a pumped drilled well as its water source. Due to a contaminant release in the vicinity of this well, this source was examined and following extensive review it was determined that no adverse impacts would be expected to occur to other water users in the area of the well withdrawal.

At this time, no adverse impacts to the groundwater table have been identified or reported for this well. Development in the vicinity of this well is served by a connection to the Brattleboro Municipal Water System, which is supplied by a surface water source remote from this location.

d. **Impact on surface water recharge.**

The ANR currently has not documented undue adverse impacts to surface water recharge in the areas of bulk or bottled water withdrawals. In the past, the Clear Source (previously known as Vermont Pure) water system located in Randolph allegedly caused a small stream (Blaisdell Brook) to have adverse diminished flows due to spring water withdrawals. This company ceased operations in April, 2008. The Watershed Management Division in developing their stream flow impairment list (303 List of Waters, part (f) list) has not found flow impairment to be an issue for those streams currently associated with bottled/bulk groundwater withdrawals. The *Agency Procedure for Determining Acceptable Minimum Stream Flows*, adopted July 14, 1993, (Appendix A) will be utilized for determining adverse stream flow impacts in the required future re-permitting of the bottled/bulk water supplies.

e. **Other environmental effects.**

The department lacks sufficient staff resources to properly evaluate the environmental effects of increased trucking traffic and other related issues, such as increased air pollution from the traffic to and from the facility, and traffic noise. Data from the most productive bottled/bulk water supplier, Pristine Mountain Springs, indicates about 5 - 20 tanker trucks a day leave the Stockbridge facility. Determining whether this level of traffic results in a meaningful contribution to traffic, air pollution or noise would require a detailed study beyond the scope of this report.

Conclusions

At the writing of this report, the ANR has no documented instances of undue adverse environmental effects due to transporting bottled/bulk water out of state. However, in the future re-issuing of existing bottled/bulk water source permits, these permittees will be required to undertake studies to determine if any measurable adverse effects are found on drinking water supplies, agricultural use, the groundwater table, and surface water recharge. These studies are required by and described in the *Groundwater Withdrawal Reporting and Permitting Rule, EPR Chapter 24*, (Summary (Appendix B) and Rule (Appendix E) attached). Since 1992, the state permitting process for bottled/bulk water withdrawals has required special studies for addressing aquifer depletion and when existing uses are likely to be affected. If potential adverse impacts were indicated, the permitted withdrawal rate would be set at such a level that would prevent those impacts. The state's current source water permitting program for bottled/bulk drinking water supplies requires that all groundwater and surface water uses (e.g. wetlands, stream flows, drinking water use, and agricultural use) occurring within the area of influence of the spring or well withdrawal be evaluated for potential adverse effects. During the permitting process, if adverse impacts are anticipated to occur, then the withdrawal volume is adjusted so that no adverse impacts are expected to occur, and only that reduced volume is permitted for withdrawal. This process requires a detailed and extensive study consisting of data collection and analysis to

be undertaken. Although ANR has not documented instances of adverse environmental impacts from bottled/bulk groundwater withdrawals following a source permit being issued, the follow-up data collection to prove that such impacts have not occurred has not been performed. The re-permitting of the bottled/bulk water systems should provide more definite information in this regard.

III. Future monitoring and research

In the coming year, the Drinking Water and Groundwater Protection Division of ANR will continue to research documented impacts of withdrawing groundwater for bulk water and bottling purposes in New England.

IV. Summary of Fees Charged by States for Groundwater Withdrawal

Following a website search and phone calls, many states do not appear to charge fees specifically for the withdrawal of groundwater for bottled or bulk water use. Some states do charge fees for registration of bottled/bulk water withdrawal, while in other states the fees are triggered by a withdrawal rate.

The information below regarding fees for groundwater withdrawals is not intended to be comprehensive for a number of reasons. Many states have multiple agencies governing groundwater withdrawals. For instance, departments of the environment, agriculture, health, consumer protection and even transportation may have a hand in regulating groundwater withdrawals in a state. Each of these agencies was not exhaustively researched for fees related to groundwater withdrawal. Some states did not explicitly have any fees identified. In addition, states may charge infrastructure or construction fees which may be difficult to separate from groundwater withdrawal fees. The effort provided here was to look solely at fees specific to withdrawing groundwater. The triggers for state oversight also varied considerably, some on differing volumetric measures, land use, water use, time frames, and fee types. In addition, a number of websites of other agencies/groups were reviewed (Appendix C) These included the Northeast Bottled Water Association, the U. S. Food and Drug Administration, the International Bottled Water Association, National Science Foundation International, the National Groundwater Association, and the National Conference of State Legislatures. Additionally, the Gund Institute associated with the University of Vermont was contacted (Appendix D). However, these resources all indicated they did not have the specific information available to the extent relevant to this report. Based on the above complexity, it is difficult to find any common thread that unites the states' information to make an "apples to apples" comparison. What is provided below is a relative comparison revealing the complicated nature of the issue.

V. States Summary:

Unless noted otherwise, the fees below are assessed on an annual basis and apply to any groundwater withdrawal.

Definition: An acre-foot represents the amount of water it would take to cover an acre of land 12 inches deep. The term is commonly used in irrigation and water resource calculations.

Alaska's groundwater withdrawal fees are based on the rate of the withdrawal. For example: $200 for 5,000 gallons per day (gpd) or less, $450 for greater than 5,000 gpd and no more than 30,000 gpd, $550 for greater than 30,000 gpd and no more than 100,000 gpd and $900 for greater than 100,000 gpd.

Arizona has Active Management Areas which are locations where groundwater has been heavily withdrawn; such areas include mining or irrigation sites. In these areas the State charges water user's $1-3 per acre-foot of water withdrawn. Municipal water systems pay $0.0055 per gallon of water withdrawn for their water supply permit.

Arkansas has a $10 annual water use fee on any non-domestic well that is capable of producing greater than 35 gallons per minute.

California charges the majority of water users (persons, applicants, land owners) $100 plus an additional fee of $0.030 per-acre foot greater than 10 acre feet.

Connecticut charges a fee of $2,050 for withdrawals over 50,000 gpd but less than 500,000 gpd. For withdrawals over 500,000 gpd but less than 2 million gpd, a fee of $4,000 is charged. A fee of $6,250 is charged for withdrawals over 2 million gpd.

Florida requires a one- time well construction fee and a Consumptive Use Permit (CUP). Five water management districts issue such permits and annual costs range from $2,700 to $11,500 depending on the volume of water used.

Georgia's Environmental Protection Division issues permits for surface and groundwater withdrawals greater than 100,000 gpd on a monthly average. The permits are issued free of charge. Their law does not transfer to the permit recipient any property rights to the water upon issuance of the permit beyond the right to reasonable use of the water.

Hawaii has a groundwater use permit that requires one-time $25.00 filing fees and a $400.00 public notice fee.

Indiana does not require permits. However for a high-capacity water well it may be necessary to register the well as a Significant Water Withdrawal Facility (SWWF). A SWWF includes any combination of wells, surface water intakes, and pumping apparatus that supply, or can supply, at least 100,000 gallons of water per day to a common collection or distribution point.

Iowa requires a Water Use Permit of any person or entity that withdraws 25,000 gallons or more in a 24-hour period during any calendar year. The permit lists the amount of water allowed to be withdrawn each year and is valid for 10 years. The cost to apply for the permit is $350.

Kansas, through the Department of Agriculture, Division of Water Resources, issues permits for surface and groundwater withdrawals under the Water Appropriation Act. No permit is required for water used solely for domestic purposes. In order to obtain a permit, one must file an application accompanied by a filing fee which is determined by the amount of water to be appropriated per acre feet. Fees for 0-100 acre-feet are $200.00, for 101-320 acre-feet it is $300.00 and for more than 320 acre-feet it is $300.00 plus $20.00 for each additional 100 acre-

feet or any part thereof. Public water systems pay $0.03 per thousand gallons along with a "clean water protection fee" of $0.03 per thousand gallons for a water supply permit.

Kentucky permits any withdrawals, diversions or transfers of any surface, ground or spring water averaging more than 10,000 gallons per day, in most cases regardless of the purpose for which the water is used. There is no fee.

Maine charges a base fee of $250 and uses a sliding-scale of $50/million gallons pumped or fraction thereof for (1) withdrawing at least 75,000 gallons during any week or at least 50,000 gallons on any day when located at a distance of 500 feet or less from a coastal or freshwater wetland, great pond, significant vernal pool habitat, water supply well not owned or controlled by the applicant or a river, stream or brook; or (2) withdrawing at least 216,000 gallons during any week or at least 144,000 gallons on any day when located at a distance of more than 500 feet from a coastal or freshwater wetland, great pond, significant vernal pool habitat, water supply well not owned or controlled by the applicant or a river, stream or brook.

Maryland issues a permit for the withdrawal of groundwater but a fee is not charged for their permit.

Massachusetts has a Safe Drinking Water Act Assessment that assesses users of all public water systems, much the same as Vermont does. The Assessment is collected each year through one bill sent to each public water system. The revenue, approximately $2.1 million per year, pays for technical and compliance assistance programs for public water systems. The Assessment is $8.50 per million gallons of water used. The minimum bill is $20.

Michigan requires reporting of groundwater withdrawals of over 100,000 gpd and also requires a fee of $200 if the annual volume pumped is over 1.5 million gallons.

Minnesota issues a water use (appropriation) permit for users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year and charges $150.

Mississippi charges a $10 permit fee for a groundwater withdrawal of any size that serves a public water system, irrigation, industrial, commercial and other uses.

Missouri's groundwater users having a water source and the equipment able necessary to withdraw or divert 100,000 gallons or more per day (70 gallons per minute) are considered major water users in Missouri. All major water users are required by law to register water use annually and there is no fee. However, customers who receive drinking water from Missouri's community public water systems pay a fee, considered a user fee. Households pay from $1.08 to $3.24 annually (about the price of one liter of commercial bottled water). The amount is based on the size of population served by the water system. For customers with larger water meters (for example, businesses, industrial users, etc.), the fee generally ranges from $7.44 to $82.44 per meter annually, with a maximum of $500 per year. The fee generates $4.6 million annually and provides 43 percent of the funding needed to implement, administer and enforce public drinking water requirements that ensure safe drinking water is provided to the public.

Montana requires a groundwater permit for anyone who anticipates using more than 35 gallons a minute or 10 acre-feet a year. The fee for this permit is $125.

Nebraska requires registration fees based on the use and pumping rate of wells; the fees are divided between the DNR and Health and Human Services (HHSS). There is a $70 fee for wells that are designed and constructed to pump less than 50 gallons per minute and a $110 fee for wells that are designed and constructed to pump 50 gallons per minute or more.

North Carolina has a one-time fee of $50.00 for groundwater withdrawals over 100,000 gpd

New Hampshire has a Groundwater Withdrawal Program. Withdrawals of 57,600 gallons per day must obtain a large groundwater withdrawal permit but there is no withdrawal or permit fee.

New Jersey regulates all users of water that have the capacity to divert in excess of 100,000 gallons per day. Fees range from $200-$8,000.

Rhode Island has a water surcharge of $0.0292/100 gallons sold by suppliers of water. There is no separate fee for groundwater withdrawals and the only fees involved would be the wetlands permit application fees ($600 - $1500) if wetlands were impacted.

Texas has 13 groundwater conservation districts that may charge fees not to exceed $1.00 per acre foot annually for agricultural use and $10 per acre foot payable annually for any other use.

Vermont charges $1,390 per year for a bottling/bulk facility withdrawing groundwater. A public community drinking water supplier pays $0.0439 per 1,000 gallons of water produced annually. A non-drinking water facility, such as industrial bio-mass boiler for a steam driven turbine, withdrawing greater than 57,600 gpd of groundwater pays an operating fee of $2,300 annually.

Virginia's groundwater withdrawal permit fees range from $6,000 to $12,000 and are good for ten years.

Washington has a $50 application fee. The fee to appropriate new water is assessed at the rate of $1 per 4.488 gpm, with a minimum fee of $50 and a maximum fee of $25,000. The fee to store water is assessed at a rate of $2.00 for each acre foot of water, with a minimum fee of $50 and a maximum fee of $25,000. The fee to change, transfer or amend an existing water right certificate, permit, or claim is $0.50 per 4.488 gpm, with a minimum fee of $50 and a maximum fee of $12,500. A fee of $1.00 for each acre foot of water must be paid to change an existing storage right. There is a minimum fee of $50.00 and a maximum fee of $12,500.

VI. Summary of State Bottled Water License/Operating Fees

Although many states do not charge a specific bottled water withdrawal fee, eighteen states do charge a licensing/operating fee for a bottled water facility. In Vermont, an operating permit fee is required, which must be paid annually. Bottled water license renewal among the other states may be annual or otherwise.

2012 BOTTLED WATER LICENSE/OPERATING FEE SCHEDULE

State	Fee for the original State License	Fee for license renewal	Notes:
Arkansas	$50.00	$50.00	
California	$473 - $1335.00	$473 - $1335.00	For bottlers distributing greater than 5000 gallons per week $473 for less than 5000 gallons per week
Connecticut	$300.00	$150.00	
Illinois	$150.00	$150.00	
Louisiana	$20.00	$20.00	License fee is $20.00 Per brand/resp party/type
Maine (Product)	$150.00	$150.00	
Maine (Bev Container Reg)	$500.00	$500.00	Initiator of deposit fee (may not be the responsibility of the bottler)
Massachusetts	$300.00	$300.00	
Michigan (Product)	$25.00	$25.00	License fee is $25.00 Per brand/type
Mississippi	$200.00	$200.00	
Nevada	$175.00	$175.00	
Nevada (labels)	$83.00	$83.00	Label review fee is assessed once/label @ $83.00 Per label
New Hampshire	$400.00	$400.00	
New Jersey	$1,000.00	$650.00	Initial license fee is per Source
North Dakota	$65.00	$65.00	License fee is $65.00 Per Brand/Type
Oklahoma	$350.00	$250.00	
Rhode Island	$550.00	$550.00	
Vermont	$1,390.00	$1,390.00	For an Operating permit per year per facility
West Virginia	$100.00	$100.00	
Wyoming	$100.00	$50.00	

Appendix A:

AGENCY PROCEDURE FOR DETERMINING ACCEPTABLE MINIMUM STREAM FLOWS

July 14, 1993

Introduction

It is the policy of the State of Vermont to protect and enhance the quality, character and usefulness of its surface waters, prevent the degradation of high quality waters, and prevent, abate or control all activities harmful to water quality. It is further the policy to assure the maintenance of water quality necessary to sustain existing aquatic communities and seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality.

At the same time, it is the policy of the State of Vermont to promote a healthy and prosperous agricultural community, to maintain the purity of drinking water and assure the public health, to decrease Vermont's dependence on non-renewable energy sources, and to allow beneficial and environmentally sound development. (10 V.S.A. §1250 and State of Vermont Executive Order regarding the State Energy Policy)

The procedures described below are applicable to Agency determinations of acceptable minimum stream flow, made pursuant to a) permits issued under 10 V.S.A. Chapter 43 (Dams); b) issuance of water quality certificates pursuant to Section 401 of the Federal Clean Water Act and FERC licensing or relicensing actions; c) stream alteration permits or stream flow regulation under 10 V.S.A. Chapter 41; d) authorization by the Commissioner of Fish and Wildlife to obstruct streams pursuant to 10 V.S.A. Section 4607, and e) positions taken before Act 250 district environmental commissions with respect to projects affecting stream flow.

The foundation of state statutes protecting the natural flow of Vermont's rivers and streams is that the natural flow should be protected and maintained in the public interest. All reasonable alternatives to altering stream flow and water conservation measures should be thoroughly considered before reduction of the natural flow rate is considered. Only when a comprehensive analysis of such measures is completed can a reasoned and rational balance be defined between legitimate but competing users of the stream.

The intent of this procedure is to assure a consistent process is used in determining acceptable minimum stream flows when there are existing or potential competing uses of the water. This does not necessarily mean that a uniform minimum stream flow number will be reached in every case. What it does mean is that the minimum stream flow numbers will be derived using a consistent procedure.

General Procedure

Determination of acceptable conservation flows are made to assure the passage of adequate water to maintain fisheries interests, aesthetic qualities, recreational and potable water supply uses appropriate to the body of water in question. In general, minimum flows adequate to maintain fisheries interests are sufficient to simultaneously maintain acceptable aesthetic qualities and recreational uses. The procedures below therefore focus primarily on determining fisheries related minimum flow requirements. The Agency reserves the right to require, or to recommend to other regulatory bodies, maintenance of minimum low flows in excess of or less than fisheries requirements where specific facts of the proposed project clearly show such higher or lower flows are needed to properly balance the many competing water uses at the site consistent with applicable statutes or rules. Where the Agency needs additional information to make a determination of flow needs for non-fisheries issues the Agency may request that water users perform special studies.

This procedure may be viewed in three (3) simplified steps. First, the Agency will accept the U.S. Fish and Wildlife Service recommended minimum flows of 0.5 csm (cubic feet per second per square mile)

(summer), 1.0 csm (fall and winter), and 4.0 csm (spring) as a presumption that stream values and uses are protected with little or no further field examination of the water in question or hydrologic computations.

Secondly, applicants may conduct flow gaging of the subject stream to establish a valid statistical relationship with a long- term stream gage station, which relationship would then be used to compute applicable stream flow statistics as used in the U.S. Fish and Wildlife Service policy.

Finally, where an applicant wishes to seek Agency approval for lower conservation flows, applicant may conduct site specific studies such as the U.S. Fish and Wildlife Service's Instream Flow Incremental Methodology (IFIM) protocols, or other approved habitat assessment methods. Results of valid evaluations, while costly and time consuming, may provide specific habitat information on which to make minimum flow judgements. Where Agency approved evaluations are available, the Agency will use this information to make judgements on acceptable low flows, which judgements may be greater or lesser than the U.S. Fish and Wildlife Service presumptive flow recommendation. It should be noted that some streams are not physically conducive to IFIM analysis, other evaluation methods may be necessary, and that IFIM analysis conducted to date tend to support conservation flows at the February median flow value for the fall/winter period.

Permits and decisions issued pursuant to this procedure shall provide opportunity for the Agency to reopen permits to review and modify conservation flow requirements at anytime after the initial five years when the Agency demonstrates that conflicting uses exist which require a balancing of those uses or that existing environmental problems require a review. Where the conservation flow requirements are contained in permits or approvals issued by other governmental authorities, the Agency will recommend inclusion of similar reopening conditions. In the event Agency rules governing determination of acceptable minimum stream flow change during the term of any permit, the Agency will not reopen the permit for that reason until it has made an affirmative finding that environmental damage or harm is resulting from the permitted minimum flows.

Procedure

A. U.S. Fish and Wildlife Threshold

The Agency will accept minimum stream flows described in the U.S. Fish and Wildlife Service "Interim Regional Policy for New England Stream Flow Recommendations" dated February 13, 1981, subject to the exceptions and modifications described later in this procedure. That policy (attached) calls for year-round release of 0.5 csm unless superseded by spawning and incubation flow requirements, in which case a flow of 1.0 csm for fall/winter spawning and incubation and/or 4.0 csm for spring spawning and incubation shall be required.

The Agency shall assume that fall/winter and spring spawning and incubation requirements exist within a stream unless a site specific determination is made that such requirements do not exist. The Agency may at its own initiative and with available information, or with information provided by the applicant, determine that significant spawning and incubation are not indigenous to the impacted stream segment. The impacted stream segment shall be that reach which extends downstream of the project to a point where 95% of the spawning/incubation flows have been restored by other flows of the drainage basin.

Alternatively, the Agency will use a determination of the median flow for a river or stream segment based upon continuous gage data over a ten year period from a gage located on the same river as the river segment in question and where that gage station and data are acceptable to the Agency. The gage data must be unregulated with defined accuracy and precision, and be from a hydrologically similar watershed region in the river basin as the river segment. The median flow shall be taken as the median of all days of record for that period. The applicable record for hydrological analysis and the periods defining the seasons for the purposes of issuing permits are shown in the following table.

Season	Period	Record for Hydrologic Analysis
Summer	June 1 - Sept. 30	August
Fall/winter	October 1 - March 31	February
Spring	April 1 - May 31	April/May

B. Stream Hydrologic Analysis

When the stream segment is not suited to a habitat assessment or when the applicant elects to conduct stream gaging, a hydrologic evaluation of the stream may be used to determine the appropriate stream flow statistics.

The applicant shall gage the stream for a period of not less than 3 months for the summer or fall/winter spawning and incubation seasons of interest. Applicants shall gage for not less than 2 1/2 months during the spring spawning and incubation period.

The highest 10% of the average daily flows measured at the study stream shall be eliminated and the remaining flows contained in this record shall be regressed against contemporaneous data from a suitable long-term gage to derive an equation that can reliably predict flows at the study site from gaged flows at the long-term gage. The long-term gage must be effectively unregulated, located in a similar basin and acceptable to the Agency.

The analysis shall be considered successful if a correlation coefficient of 0.9 or greater is attained. The equation can then be used to estimate monthly median flows for the study site for the long-term gage statistics. If the gaging period is doubled over a period of at least two years, then the minimum acceptable correlation coefficient shall be 0.8.

Alternatively, the regression equation can be used to estimate monthly median flows for the study site from the long-term gage statistics through the use of confidence intervals. The value used as a flow standard shall be the higher +95% confidence interval value corresponding to the median value for the long-term gage.

The gaging data set shall be furnished to the Agency on 3 1/2 or 5 1/4 inch disc, and the statistical analysis shall be provided.

Acceptable gaging periods are shown in the following table.

Season	Period
Summer	July 1 - Sept. 30
Fall/winter	December 15 - March 15
Spring	March 15 - May 31

C. Instream Flow Incremental Method (IFIM)

The Instream Flow Incremental Methodology (IFIM) is a problem-solving framework and set of comprehensive procedures for making decisions regarding stream flow. The methodology provides a basis for describing the relationship between stream flow and habitat for fish and other aquatic organisms.

The method does not generate a single solution, but predicts the impacts of different alternatives. Professional judgement on the part of applicants and the Agency plays a critical role in determining an acceptable stream flow regime.

The Agency will accept use of the IFIM as a basis for establishing conservation flows. Applicants should recognize that IFIM evaluations provide a basis for conservation flow determination which is more site specific that the U.S. Fish and Wildlife Service policy approach, and that the resulting Agency judgement as to conservation flows may be greater or less than the U.S. Fish and Wildlife Service policy flows or low median monthly flows.

The Agency will accept conservation flows that provide a high level of aquatic habitat protection, except where compelled to reduce standards to properly balance against other competing water uses which apply to the stream segment.

The results of an IFIM evaluation may support a conclusion that acceptable minimum flows are less than the median monthly flow for the time period of interest. Where IFIM results support such a conclusion, the Agency will approve such lower flows provided the approved fall/winter minimum flow is not less than two-thirds of the median monthly flow for the period of interest unless a valid study approved by the Agency demonstrates that ice formation would not be exacerbated. The latter restraint is included to help assure that no undue damage to fisheries will result from exacerbated ice conditions.

The Agency recognizes that there are certain streams which by reason of their size, basin areas, channel shape or other characteristics are not susceptible to IFIM analysis. The stream hydrologic analysis described in B above or another acceptable method as described below may be accepted in such cases in lieu of an IFIM evaluation.

D. Other Methods

The Agency will consider other methods of determining required conservation flows which applicants may wish to propose. In general, the Agency will accept alternative methods of analysis where it concludes the new method is of equal or greater reliability than the methods outlined above. An applicant is encouraged to seek Agency approval of such alternative methods before commencing such investigations.

E. Offstream Uses of Water - Special Policies

Domestic Water Supplies

Many municipalities throughout Vermont draw most or all of their drinking water from surface streams or lakes, and have done so for a number of years, sometimes dating back to the last century. For new water supply systems or for existing water supply systems which are beginning the planning and engineering phase of modifying their systems, it is the policy of the Agency to encourage municipalities to institute water conservation measures and evaluate alternative sources. The Agency will request that all reasonable water conservation measures be evaluated as part of the studies and that all economically reasonable conservation measures be instituted in order to reduce water consumption demands prior to the Agency considering approval of minimum stream flows below those prescribed by the procedure. Possible conservation measures include water metering, system flushing during high stream flow periods, repairing leaks in distribution systems, requiring industrial users to recycle water or take process water from a non-potable source for which minimum flows can be maintained.

Where minimum flows cannot be achieved through conservation, additional water sources and/or storage should be explored. It is recognized that some options such as storage required to provide minimum stream flows may in some cases be extremely expensive. The economic stress to a municipality must be

defined and based on engineering studies before reduced instream quality will be considered as part of a balancing process.

It is the purpose of this procedure to recognize that while all legitimate uses of the water body are to be protected to the extent possible, the bias is in favor of public water supply systems only after all water conservation and feasible alternatives have been explored.

Hydroelectric and Hydromechanical

Vermont rivers have served as a source for the production of hydroelectricity for over a century and have provided water to power our mills since the early settlement period. Population increases and the demand for on-peak energy production have resulted in utilities operating some of their projects in a manner which is incompatible with environmental goals with respect to flow maintenance (*Hydropower in Vermont: An Assessment of Environmental Problems and Opportunities*, 1988).

This minimum flow procedure makes a distinction between the river reach downstream of the project tailrace and the bypassed reach between the intake and the tailrace. Flow released at the tailrace of a project can be used to produce energy while water spilled at a dam and passed through a bypass reach may not be usable to produce energy.

Hydropower facilities shall be encouraged to operate in a true run-of-the-river mode to reduce conflicts with other uses and values. For run-of-the-river projects, the General Procedure shall be used to set flows for river management during special conditions after storage depletion (i.e. flashboard replacement, maintenance drawdown, power audits). During extended periods of non-operation, all inflows shall be required to be spilled over the project dam. For projects not operating in a run-of-the-river mode the General Procedure shall be applied to flow setting for the downstream river reach.

Bypasses shall be analyzed case-by-case. Generally, the Agency shall recommend bypass flows of at least 7Q10 in order to protect aquatic habitat and maintain dissolved oxygen concentration in the bypass and below the project. Higher or lower amounts of bypass flows shall be prescribed as a function of the uses and values to be restored or protected in the bypassed reach. In assessing values, consideration shall be given to the length of the bypass; wildlife and fish habitat potential; the aesthetic and recreational values; the relative supply of the bypass resource values in the project area; the public demand for these resources; and any additional impacts of such flows upon citizens of the State of Vermont. Bypass flows shall be at least sufficient to maintain dissolved oxygen standards and wastewater assimilative capacity. Where there are exceptional resource values in need of restoration or protection, the general procedure shall be followed. In most cases, a portion or all of the bypass flows must be spilled over the crest of the dam to reoxygenate water, provide aquatic habitat at the base of the dam and assure aesthetics are maintained.

In order to fulfill Agency responsibilities to strike a balance between competing water uses in the public interest, any deviations from minimum flow requirements as defined by the General Procedure will require an assessment of water and energy conservation alternatives.

Snowmaking

[This section has been removed. Snowmaking water withdrawals are now subject to a separate procedure dated March 4, 1994.]

***De Minimis* Withdrawals**

It is recognized that certain withdrawals are so small in relation to the stream flow even during periods of drought, that the resultant impact on the natural stream values is negligible. In such cases, it is the Agency's policy to permit such withdrawals of water regardless of the natural instantaneous stream flow.

For the purposes of this procedure, a withdrawal rate equal to or less than .005 cubic feet per second times the drainage area in square miles at the proposed withdrawal site, or 5% of the 7Q10 stream flow is considered a *de minimis* impact on the stream flow.

Permittees are not entitled to extract *de minimis* withdrawal flows in addition to flows specified in a project specific permit or certificate. In the case where there may be cumulative impacts of *de minimis* withdrawals, the Agency may require a site specific review.

F. Prior Permits/Approvals/Practices

Applicants may seek permits, approvals or Agency positions to modify existing projects for which earlier permits or approvals were granted and where such permits specified acceptable conservation flows less than would be determined by this procedure. Where the conservation flows specified in earlier permits do not correspond with the conservation flows determined under this procedure, or where earlier operating practices resulted in release of substandard low flows, the Agency will generally require that the flows determined under this procedure be restored as of the earliest practical date. The Agency will negotiate a schedule of actions and mitigating measures which will restore acceptable flows at the earliest practical date. The Agency shall consider any public benefits or detriment realized by restoration of acceptable conservation flows compared to any public benefit or detriment realized by the continued release of less than acceptable conservation flows. The Agency may conclude that the greatest public benefits are realized by continued release of less than acceptable conservation flows determined under this interim procedure.

G. Decision Authority

Decision authority for permits issued under V.S.A. Chapter 43 (Dams); water quality certificates issued pursuant to Section 401 of the Federal Clean Water Act; and stream alteration permits issued under 10 V.S.A. Chapter 41 shall rest with the Commissioner of Environmental Conservation or his designee. Decision authority for approvals of fish passage obstructions issued under 10 V.S.A. Section 4607 shall rest with the Commissioner of Fish and Wildlife or his designee. Decision authority for positions taken before Act 250 district commissions or subsequent appeals shall rest with the Secretary of the Agency of Natural Resources or his designee.

Appendix B:

Summary of Current Process to Obtain a Permit for Bottled/Bulk Groundwater Withdrawal

The current *Groundwater Withdrawal Reporting and Permitting Rule*, last revised June 22, 2011 sets forth the requirement to permit all bottled/bulk groundwater withdrawals of any withdrawal rate. The bottled/bulk groundwater system is required to apply both the *Water Supply Rule* requirements for a public water system and the *Groundwater Withdrawal Reporting and Permitting Rule* for an industrial/commercial groundwater withdrawal of greater than 57,600 gallons per day (gpd) in order to obtain a Source Water Permit.

The following is a bulleted description of the steps to obtain a Source Water Permit for a Domestic (in-state) Bottled or Bulk Water System:

- The applicant develops a project description and plan, provides notice to the public and presents the plan at a public meeting for input prior to applying to the agency for a permit.
- The withdrawal site(s) and source construction plan is evaluated by the program staff for potential environmental and current use issues. If the site is approved, source construction can begin.
- A hydrogeologic model and area of influence for the withdrawal is developed that includes inventories of existing uses, surface water and wetlands, and potential sources of contamination. A source testing plan is created to test the yield of water source, and evaluate possible or actual impacts under design conditions on the identified uses and environmental resources. If approved, source testing can begin which includes performing the studies and/or monitoring to address impacts. For spring sources, the determination of yield is to collect flow and related data for one year to cover high and low flow periods.
- A public notice and informational meeting is held by the applicant to gather input on the draft final report prior to submittal to the agency for review.
- A number of criteria need to be substantiated prior to issuance of the Source Water Permit. This criteria includes that there are no undue adverse impacts on:
    - Existing drinking water sources;
    - Other uses of water (i.e. agricultural withdrawals) ;
    - Permitted public water systems;
    - Significant wetlands;
    - Streams, rivers, lakes and ponds; and
    - Other water resources (i.e. vernal pools).
- Additionally, they must show:
    - Consistency with regional and town plan;
    - Efficient use of the water;
    - Withdrawals will not be violating the Vermont water quality standards;
    - Water quality meets drinking water standards;
    - An aquifer safe yield.is established;
    - Ownership or control of the Source Isolation Zone

    - A source protection area delineating the recharge area for the source with associated public notice requirements, and
    - Have an approved source protection plan.
- The final report is submitted for review and if all of the issues are adequately addressed then a permit is issued.
- The Groundwater Withdrawal Permit would include:
    - A schedule for monitoring for potential adverse impacts,
    - Any required minimum stream flows to maintain,
    - A maximum withdrawal rate, with possible seasonal restrictions,
    - reporting of water production,
    - A requirement to resolve undue adverse effects if one has occurred and notification,
    - A statement of priority of groundwater use during water shortages for drinking water, farming, or dairy processing,
    - The use of the water, and
    - Duration of the permit.

Appendix C:

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Idaho Department of Water Resources

Illinois Department of Natural Resource Division of Water Resource Management

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Iowa Department of Natural Resources–Water Supply Engineering Section

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New Mexico Water Use and Conservation Bureau

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Appendix D:

Gund Institute Water-Costs

Company	QTY	wholesale	WS/gallon	retail	Ret/gallon	% markup	store gross profit/gal
Evian	1 liter	$1.79	$6.78	$2.65	$10.03	48.04%	$3.26
Fiji	1 liter	$1.67	$6.32	$2.59	$9.80	55.09%	$3.48
Desani (filtered tap water)	591 ml	$0.63	$4.04	$1.25	$8.01	98.41%	$3.97
Desani (filtered tap water)	1 liter	$1.13	$4.28	$1.79	$6.78	58.41%	$2.50
Poland Sps	1 liter	$0.75	$2.84	$1.35	$5.11	80.00%	$2.27
Vt Pure	1 liter	$0.50	$1.89	$0.99	$3.75	98.00%	$1.85
Nirvana (adirondacks)	3 liters	$0.90	$1.14	$1.69	$2.13	87.78%	$1.00
Average		**$1.17**	**$3.90**		**$6.52**	**75.10%**	**$2.62**

Conversion 1 gallon =
3.785411784 liters

Rent capture for bottlers			WS/gallon	*cost of water	Bottler gross profit/gal	**Bottler costs: 10c	Bottler net profit/gal
Evian	1 liter	$1.79	$6.78	$0.01	$6.77	0.10	$6.67
Fiji	1 liter	$1.67	$6.32	$0.01	$6.31	0.10	$6.21
Desani (filtered tap water)	591 ml	$0.63	$4.04	$0.01	$4.03	0.10	$3.93
Desani (filtered tap water)	1 liter	$1.13	$4.28	$0.01	$4.27	0.10	$4.17
Poland Sps	1 liter	$0.75	$2.84	$0.01	$2.83	0.10	$2.73
Vt Pure	1 liter	$0.50	$1.89	$0.01	$1.88	0.10	$1.78
Nirvana (adirondacks)	3 liters	$0.90	$1.14	$0.01	$1.13	0.10	$1.03
Average			**$3.90**	$0.01	**$3.89**		**$3.79**

*** source=** **Pristine Springs financial statement** **$500,000/30,000,000 gals = .0167c/gal**

**** Source =** **http://www.anglingmatters.com/ww_midwest.htm**

From the September 25, 2000 Memorandum from Dennis L. Schornack, (Michigan) Governor John Engler, and Sharon Rothwell, Chief of Staff for the Office Special Advisor for Strategic Initiatives for the Office of the Governor, to of the Governor (obtained through a Freedom of Information Act request), "The bottled water industry is highly profitable. "Using industry figures (IWBA) for production costs **(6-11 cents/gal)** and retail prices ($3/six-pack of 24 oz bottles) for "Ice Mountain," the label Perrier uses for the Midwest, Perrier stands to clear $.5-1.8 million/day.

24 x 16.9oz bottles: Walmart, Walgreens, CVS			16.9oz =	0.13	gallons	
water	0.0013	0.0013	1c/gal		x24	
trucking	0.0065	0.0065	5c/gal		405.6	oz
bottle purchased	0.06				3.17	gallons
botle-make		0.02			$2.49	price
cap	0.01	0.01			$0.79	$/gallon
label	0.03	0.03				

	0.1078	$0.068
number of bottles	24	24
Total for 24 pack	2.5872	$1.63
Sale Price	2.49	$2.49
	0.0972	$0.86

Appendix E:

Groundwater Withdrawal Reporting and Permitting Rules

Environmental Protection Rules

Chapter 24

Effective: December 11, 2009
Amended: June 22, 2011

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Subchapter 1 – Purpose and authority

§ 24-101. Authority

These rules are adopted under the authority of the Secretary pursuant to 3 V.S.A. § 808, 10 V.S.A. § 1392(d), 10 V.S.A. § 1417(c) and 10 V.S.A. Chapter 48, Subchapter 6.

§ 24-102. Purpose

Consistent with the requirements of 10 V.S.A. Chapter 48 it is the purpose of this rule to protect and manage groundwater resources. This rule provides the regulatory framework for the withdrawal of more than 57,600 gallons per day of groundwater for commercial and industrial uses. Additionally, this rule requires any person who withdraws more than 20,000 gallons per day of groundwater for certain uses to report that withdrawal to the secretary.

§ 24-103. Severability.

The provisions of any section of these rules are severable. If any provision of these rules is ruled invalid or if any application of these rules to any person or circumstance is invalid, the invalidity shall not affect other provisions or applications that can be given effect without the invalid provision or application

Subchapter 2 – Definitions

§ 24-201. Definitions.

As used in these rules, the following terms shall have the specified meaning or the meaning given to them in 10 V.S.A. § 1416 . If a term is not defined it shall have its common meaning:

(1) "Agency" means the agency of natural resources.

(2) "Aquifer" means a water bearing stratum of permeable rock, sand, gravel or other soils.

(3) “Area of contribution” means the geographic area supplying groundwater to a point or points of groundwater withdrawal, groundwater discharge to the land surface, groundwater discharge to significant wetlands, or groundwater discharge directly to surface water.

(4) “Area of influence” means, the geographic area where the piezometric surface of the groundwater is lowered due to influence of a groundwater withdrawal. Impacts on surface water, including changes in flow or water surface elevation are included in the area of influence. This is not the same as the area of contribution to a point of groundwater withdrawal.

(5) “Baseline withdrawal” means highest amount withdrawn by a person within a twenty four hour period from January 1, 2005 through December 31, 2010.

(6) “Bottled water” means any non-carbonated, non-flavored water placed in a sealed container for sale or distribution to the public with the express or implied intent of providing water for human consumption.

(7) “Bottled water system” means a public water system that bottles drinking water for public distribution and sale. A domestic bottled water system is a bottled water system with at least one source located within Vermont. An imported bottled water system is a bottled water system with all sources located outside of Vermont.

(8) “Bulk water” means drinking water delivered to consumers or water purveyors by means other than pipeline or bottled water.

(9) “Effluent water resource” means the reach of a water resource where the piezometric surface of the groundwater is higher than the surface water elevation at that location at that time (e.g. a gaining stream).

(10) “Estimated yield” means an estimate of the maximum short-term withdrawal rate that a source or an existing source can produce (e.g. driller’s estimated yield).

(11) “Existing source” means a location where a person withdraws, or is permitted to withdraw groundwater or surface water for any purpose in existence at the time a proposed source applies to the Secretary for a permit, amendment, or renewal.

(12) "Farming" means farming as the term is defined in 10 V.S.A. § 6001(22).

(13) “Flowing artesian well” means a well that intersects groundwater with a piezometric elevation above the top of the well casing. If the well is left uncapped, groundwater will flow freely from the well at a rate dependent on the elevation of the piezometric surface and the physical properties of the aquifer.

(14) "Groundwater" means water below the land surface in a zone of saturation, including springs. This term does not include surface water.

(15) “Influent water resource” means the reach of a water resource where the piezometric surface in groundwater is lower than surface water elevation at that location at that time (e.g. a losing stream).

(16) “Interference” means the measurable or predicable impact to a water resource or an existing source caused by a withdrawal from a proposed source.

(17) “Monitoring well” means a device used to monitor the depth or elevation of the piezometric surface, or groundwater quality.

(18) “Ownership or legal control” means an easement, right of way, deed or other legal document that creates an enforceable permanent property interest that transfers all development rights to the applicant within the source isolation zone of the proposed source.

(19) “Permanent legal access” means an easement, right of way, deed or other legal document that creates an enforceable permanent property interest that provides access to the tract of land for the purposes of construction, operation and maintenance of the proposed source and control of land use activities surrounding the source.

(20) "Person" means any individual, partnership, company, corporation, cooperative, association, unincorporated association, joint venture, trust, the state of Vermont or any department, agency, subdivision, or municipality, the United States government or any department, agency, or subdivision, or any other legal or commercial entity.

(21) “Place of business” means one or more contiguous parcels of land owned or controlled by the same person.

(22) “Proposed source” means the location proposed to be permitted under these rules.

(23) “Public water supply” means a public water supply as defined in 10 V.S.A. § 1671.

(24) “Pumping test” means a method to test a well in order to determine aquifer characteristics, source interference, safe yield, area of influence, and other aquifer parameters.

(25) “Pumped well” means a well with a pump or other device used to mechanically extract groundwater.

(26) “Qualified professional” means a person with training or experience in hydrogeology, surficial geology, and bedrock geology sufficient to adequately prepare the hydrogeologic studies and analyses required by these rules.

(27) “Safe yield” means an amount of groundwater that can sustainably be withdrawn from a proposed source that will not cause an undue adverse effect on existing sources or water resources.

(28) "Secretary" means the secretary of the agency of natural resources or the secretary's duly authorized representative.

(29) “Significant wetland” means a wetland defined as a “significant wetland” under the Vermont wetlands rule.

(30) "Spring" means a location, whether developed (e.g. by a spring box or tile) or undeveloped, where groundwater flows naturally to the surface of the earth prior to the development of the spring. For purposes of these rules, developed spring is considered a well when groundwater is withdrawn from the source at a rate greater than its overflow discharge.

(31) "Surface water" means all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs and all bodies of surface waters, artificial or natural, that are contained within, flow through or border upon the state or any portion of it.

(32) “Tract of land” means one or more contiguous parcels of land owned or controlled by the same person.

(33) “Undue adverse effect” means an effect from the withdrawal of groundwater that meets the undue adverse effect criteria of § 24-511.

(34) “Water budget” means an assessment of the water resources and existing sources, including the water inputs (precipitation, regional flow of surface water or groundwater, and anthropogenic recharges) and outputs (evapotranspiration, runoff, existing sources and surface water and groundwater flow out of the area being assessed). A water budget shall be calculated using climatic normals (e.g. precipitation, evapotranspiration, and temperature).

(35) “Water resource” means groundwater, surface water, and significant wetlands.

(36) "Well" means any hole drilled, driven, bored, excavated, or created by similar method into the earth to locate, monitor, extract, or recharge groundwater. This term does not include springs.

(37) “Wetlands” means those areas of the state that are inundated by surface or ground water with a frequency sufficient to support significant vegetation or aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction. Such areas include but are not limited to marshes, swamps, sloughs, potholes, fens, river and lake overflows, mud flats, bogs, and ponds, but excluding such areas that grow food or crops in connection with farming activities.

(38) “Withdrawal” means the intentional removal of groundwater by any method from a source or sources.

Subchapter 3 – Groundwater Withdrawal Reporting

§ 24-301. Groundwater reporting requirements.

(a) Any person withdrawing more than 20,000 gallons per day of groundwater, averaged over a calendar month at a single tract of land or place of business shall file a groundwater report with the Secretary on or before September 1 for the preceding calendar year. The following are exempt from the reporting requirement:

(1) a groundwater withdrawal for fire suppression or other public emergency purposes;

(2) a groundwater withdrawal reported to the agency of natural resources under any program that requires the reporting of substantially similar data;

(3) a groundwater withdrawal for domestic, residential use;

(4) a groundwater withdrawal for farming;

(5) dairy processors and milk handlers licensed in accordance with 6 V.S.A. § 2721;

(6) a groundwater withdrawal for public water systems, and

(7) a groundwater withdrawal for closed loop, standing column, or similar non-extractive geothermal heat pumps.

(b) The groundwater report shall be submitted on a form prescribed by the Secretary and shall, at a minimum, include:

(1) A map with the withdrawal location or locations if the report covers more than one existing source.

(2) The average daily rate of withdrawal from each existing source~~.~~

(3) The metered or estimated frequency, in number of days and amount, that a withdrawal exceeded 20,000 gallons per day from each existing source. If an estimate is used it shall use the methods established in § 24-302.

(4) The estimated yield of each existing source.

(5) The use or uses of the water withdrawn from each existing source.

(6) The metered or estimated total ~~of~~ withdrawal per month at a single tract of land or place of business. If available, a person shall provide metered data from the existing source or sources. In the case of a person who bulks or bottles water, that person shall provide metered data from a meter, separate from the master withdrawal meter, to measure the amount of water delivered to the bulk water

hauling connection or to the bottling line. If metered data is not available and an estimate is used it shall use the methods established in section § 24-302.

(7) Where feasible, the distance of each withdrawal from the nearest surface water and significant wetland.

(8) Whether the groundwater source is a spring, a free flowing artesian well, or a pumped well.

(9) Any other additional information the Secretary deems appropriate as a part of this reporting requirement.

§ 24-302. Methods of estimating water withdrawals

(a) Any of the following methods may be used to estimate the total ~~of~~ withdrawal per month at a source:

(1) permitted wastewater discharge plus consumptive use;

Note: an example of this approach could include the person's wastewater discharge permit amount plus a metered or calculated process amount that is not discharged (for example the water used in brewing beer or bottling water);

(2) well pump rating in gallons per minute multiplied by the number of minutes the pump runs per cycle times the number of cycles per day;

Note: For example, a well pump that is rated at 75 gallons per minute X 30 minutes/cycle X 10 cycles/day = 22,500 gallons per day);

(3) flow from springs may be measured by use of a weir, or a calibrated bucket and stopwatch; or

(4) other methods as approved by the Secretary in writing.

(b) Any of the following methods may be used to estimate the amount of water delivered to the bulk water hauling connection or to the bottling line:

(1) for bulk water hauling, calculate the volume of the bulk hauling container multiplied by the number of containers filled per year;

(2) for bottling lines, calculate the volume of the bottles filled multiplied by the number of bottles filled per year; or

(3) other methods as approved by the Secretary in writing.

Subchapter 4 – Groundwater Withdrawal Permitting

§ 24-401. Permit required.

(a) New withdrawals. On and after July 1, 2010, no person shall make a new groundwater withdrawal for commercial or industrial uses of more than 57,600 gallons a day from any source on a single tract of land or at a place of business without first receiving a groundwater withdrawal permit. New groundwater withdrawals for bottled or bulk water uses that meet the jurisdictional requirements of this subsection shall comply with subsection (d) of this section.

(b) Increased withdrawal from a previously permitted source. On and after July 1, 2010, no person shall increase a groundwater withdrawal for commercial industrial, bottled or bulk water uses to an amount greater than 57,600 gallons a day from any source on a single tract of land or at a place of business without first receiving a groundwater withdrawal permit. Increased withdrawals of groundwater for bottled or bulk water uses that meet the jurisdictional requirements of this subsection shall comply with subsection (d) of this section. The expansion of a withdrawal includes:

(1) an additional withdrawal from one or more new source; or

(2) an increase in the rate or quantity of a withdrawal from an existing source above the maximum rate set forth in any permit previously issued under this section.

(c) Previously unpermitted withdrawals for commercial, industrial, bottled or bulk water withdrawal. For a commercial or industrial withdrawal in existence prior to July 1, 2010, no person, shall increase their withdrawal, without first receiving a groundwater withdrawal permit if either of the following occur:

(1) If the withdrawal is increased by 57,600 gallons per day; or

(2) If the withdrawal is greater than 57,600 gallons per day and withdrawal is increased to an amount 25 percent or greater of the baseline withdrawal.

(d) A bottled water supply shall obtain a source permit under the Vermont Water Supply Rule using the requirements of this Groundwater Withdrawal and Permitting Rule. A bottled water supply shall continue to be required to obtain a construction and an operating permit under the Vermont Water Supply Rule.

(e) Circumvention. The Secretary may require a person to obtain a permit under this subchapter when the Secretary, in his or her discretion, determines that a withdrawal, subdivision of land, transfer of property, or other action circumvents the requirements of this rule.

§ 24-402. Exemptions from the permitting requirements.

The following are exempt from the permitting requirements of this section:

(1) a groundwater withdrawal for fire suppression or other public emergency purpose;

(2) a groundwater withdrawal for domestic, residential use;

(3) groundwater withdrawal for farming;

(4) dairy processors and milk handlers licensed in accordance with 6 V.S.A. § 2721;

(5) a groundwater withdrawal for public community water systems;

(6) a groundwater withdrawal for transient noncommunity systems, unless more than 57,600 gallons per day is used for commercial, industrial, bottling, or bulk purposes.

(7) A groundwater withdrawal for nontransient noncommunity systems, unless more than 57,600 gallons per day is used for commercial, industrial, bottling, or bulk purposes.

(8) a groundwater withdrawal for the investigation or remediation of a release of a hazardous material that is being supervised by the Secretary under 10 V.S.A § 6615b or 10 V.S.A. chapter 159 subchapter 3; and

(9) a groundwater withdrawal for closed loop, standing column, or similar non-extractive geothermal heat pumps

§ 24-403. Pre-application public informational meeting.

(a) Informational meeting required. At least 30 days before filing an application for a permit under this subchapter, the applicant shall hold an informational meeting in the municipality in which the withdrawal is proposed. At the informational meeting the applicant shall describe the proposed project and provide attendees with the opportunity to comment on the proposed project.

(b) Notice. Notice for the informational hearing shall be provided by posting the time and location of the meeting in the municipal offices, notifying adjoining landowners, the municipal legislative body in the municipality where the facility is located, and any person on a list of interested persons maintained by the Secretary of the meeting, and by publishing in a local newspaper. Notice shall be provided at least 10 days before the meeting. The applicant shall also notify the Secretary of the time and location of the meeting at least ten days before the meeting.

§ 24-404. Groundwater withdrawal permit application.

(a) The applicant shall submit an application to the secretary with a form prepared by the secretary. At a minimum, the application shall include the following:

(1) The name, mailing address, and daytime telephone number of the applicant. If the applicant is not the property owner of the property where the proposed source is located, the property owner shall be a co-applicant on the permit.

(2) The GPS location of the proposed source.

(3) The requested withdrawal rate from proposed source, including estimates of the projected mean and peak daily, monthly, and annual withdrawals.

(4) The use of the proposed withdrawal.

(5) If applicable, the previously assigned permitted production rates, established safe yields, or the known withdrawal rates of the applicant's other existing sources on the same tract of land or at the same place of business.

(6) The location of proposed return flow for the withdrawn water, if applicable.

(7) The estimated amount of water that will not be returned to the watershed where the proposed source is located.

(8) A certification that the applicant has met the pre-application public informational meeting requirements of § 24-403.

(9) A description of the alternate means considered for satisfying the applicant's purpose for the withdrawal. The alternatives analysis shall examine whether it is possible to connect to a public community water system and shall examine conservation measures to be implemented to reduce water consumption.

(10) Include the relevant portions of the municipal plan and regional plan, if any, that address the use of groundwater.

(11) A map that shows that the location of the proposed source complies with siting criteria pursuant to § 24-501.

(12) A source construction plan that provides the information required by § 24-502.

(13) A initial conceptual hydrogeologic model of the source prepared in accordance with § 24-503.

(14) The estimated area of influence and a description of how it was estimated using the initial conceptual hydrogeologic model.

(15) A preliminary inventory of existing sources and uses in the estimated area of influence completed in accordance with § 24-504;

(16) A preliminary inventory of surface water and significant wetlands in the estimated area of influence, completed in accordance with § 24-505.

(17) A preliminary inventory of contamination sources completed in accordance with § 24-506.

(18) An estimation of withdrawal effects prepared in accordance with § 24-507.

(19) A description of the source testing program design prepared in accordance with § 24-508.

(20) Any additional information the Secretary determines is necessary to conserve groundwater or to protect human health or the environment.

(b) Notice of application. Prior to determining an application administratively complete, the applicant shall provide documentation of compliance to the secretary of the following notice requirements:

(1) Send a complete copy of the application to each of the following:

(A) The clerk, legislative body, and conservation commission in the municipality in which the project is located.

(B) The clerk of adjoining municipalities.

(C) The regional planning commission of the area where the project is located.

(D) Any public water system permitted by the agency of natural resources in the municipality where the proposed withdrawal is located.

(2) Send a notice of application to all landowners and mobile home park residents within the area of influence of the proposed source or within one quarter mile downstream from a proposed source that is a spring. Notice to the officers of a condominium association shall be deemed sufficient under this subdivision for notice to residents of a condominium. A notice of application shall include, at a minimum, the address of the proposed withdrawal, the use of the proposed withdrawal, a map of the estimated area of influence, where full copies of the application may be reviewed,

how to submit comment on the application to the agency of natural resources.

(3) At the time the application is submitted, publish notice in a newspaper of general circulation in the area of the proposed withdrawal. The notice shall provide the following information:

(A) The location and proposed withdrawal rate of the proposed source.

(B) Locations where copies of the application may be obtained.

(C) That a public comment period is open for 30 days from the submittal date of the application and that comments shall be directed to the water supply division of the Agency.

(4) A copy of the notice required under subsection (b)(3) of this subsection shall be posted in the municipal clerk's office of the municipality in which the proposed source is located.

(c) Web posting. The Secretary may, dependent upon the level of public interest associated with a project, post application materials, meeting notices, regulatory determinations, and other information relevant to the proposed withdrawal's application on the agency web site.

§ 24-405. Application review; source construction approval

(a) After the close of the 30 day comment period, the Secretary shall review the application materials and comments received pursuant to § 24-404 to determine:

(1) The application contains all information required by § 24-404.

(2) The Secretary determines that source construction plan is consistent with the requirements of § 24-502.

(3) All public notification requirements specified by §§ 24-403 and 404 have been satisfied.

(b) After conducting a review of the application the Secretary shall do one of the following:

(1) Notify the applicant that its source construction plan is acceptable and that source construction may commence. Proposed source construction shall be in accordance with the approved construction plan. The applicant shall provide prior notification to the Secretary of the date and times that the proposed sources will be installed and shall provide the Secretary with site access to observe the installation.

(2) Notify the applicant of deficiencies in the application materials, with the proposed source placement, or with the source construction plan and that modifications are to be made to the application materials prior to the Secretary determining that plan is acceptable.

(3) Notify the applicant that the site is not suitable for a permit under this rule and deny the permit application. The following factors shall make a site not suitable for further consideration:

(A) The proposed source does not meet the siting criteria of § 24-501; or

(B) The siting or construction of the proposed source presents a high risk of impact from a potential or actual source of contamination.

(4) Notify the applicant that the site may not be suitable for a permit under this rule because the site or the final proposed withdrawal appear to present a high risk of an undue adverse effect.

§ 24-406. Approval to conduct proposed source testing

(a) After the requirements of § 24-405 have been reviewed the Secretary shall do one of the following:

(1) Notify the applicant that the application and withdrawal testing program design is acceptable and that source withdrawal testing may commence.

(2) Notify the applicant of deficiencies in the program design identified through the source construction or in public comment, which must be resolved before source withdrawal testing may commence.

(3) Notify the applicant that the site is not suitable for a permit under this rule because the site or the final proposed withdrawal appears to present a high risk of an undue adverse effect.

(b) After the applicant receives approval pursuant to subsection (a) of this section, the applicant shall:

(1) Complete withdrawal testing in accordance with the approved proposed source testing plan.

(2) Refine the initial conceptual hydrogeologic model and area of influence for the proposed source in accordance with § 24-510.

(3) Update and revise the contamination source inventory and the inventory of existing sources and surface waters and significant wetlands if greater than 90 days old.

(4) Describe impacts to existing sources, surface water, and significant wetlands.

(5) When an undue adverse effect is predicted to occur as a result of the proposed rate of withdrawal, the applicant shall, in the application and final report:

(A) Reduce the proposed rate of withdrawal to a level where no adverse effect is anticipated; or

(B) Design mitigation measures for review and approval by the secretary.

§ 24-407. Draft final report; public comment period and informational meeting

Notice. Prior to submitting a final report to the Secretary, the applicant shall provide documentation of compliance to the secretary of the following notice requirements:

(1) Send a complete copy of the draft final report to each of the following:

(A) The clerk, legislative body, and conservation commission in the municipality in which the project is located.

(B) The clerk of adjoining municipalities.

(C) The regional planning commission of the area where the project is located.

(D) Any public water system permitted by the agency of natural resources in the municipality where the proposed withdrawal is located.

(2) Send a notice of draft final report to all landowners and mobile home park residents within the area of influence of the proposed source or within one quarter mile downstream from a proposed source that is a spring. Notice to the officers of a condominium association shall be deemed sufficient under this subdivision for notice to residents of a condominium. A notice of draft final report shall include, at a minimum, the address of the proposed withdrawal, the use of the proposed withdrawal, a map of the estimated area of influence, where full copies of the application may be reviewed, the conclusions reached by the applicant in the final report on whether the proposed withdrawal may cause an undue adverse effect and how the applicant plans to respond to those conclusions, and how to submit comment on the draft final report to the agency of natural resources.

(3) At the time the draft final report is submitted, publish notice in a newspaper of general circulation in the area of the proposed withdrawal. The notice shall provide the following information:

(A) That a public comment period is open for 30 days from the submittal date of the draft final report and that comments shall be directed to the water supply division of the Agency.

(B) The time and location of a public meeting to be held on the draft final report and the proposed withdrawal.

(4) A copy of the notice required under subsection (3) of this subsection shall be posted in the municipal clerk's office of the municipality in which the proposed source is located.

§ 24-408. Determinations for issuance groundwater withdrawal permit

(a) The secretary shall issue a groundwater withdrawal permit only if:

(1) The information provided in the application and final report is complete and correct.

(2) The information provided in the application and final report demonstrates that the proposed source satisfies all the following:

(A) is planned in a fashion that provides for an efficient use of water.

(B) results in a safe yield.

(C) will not have an undue adverse effect on existing sources or uses of water.

(D) is consistent with the regional and town plan;

(E) will not have an undue adverse effect on a public water system permitted by the agency.

(F) will not have an undue adverse effect on significant wetlands under the Vermont wetland rules or on other water resources hydrologically interconnected with the well or spring from which the proposed withdrawal would be made.

(G) will not violate the Vermont water quality standards.

(H) For a proposed source with the purpose of bottled water or bulk water:

(i) Meets the water quality parameters established within the Vermont Water Supply Rule.

(ii) Meets Agency protocols for groundwater under the direct influence of surface water, if applicable.

(iii) The Source Protection Area has been publically noticed and the area approved.

(iv) Requirements for the Source Isolation Zone have been satisfied.

(v) An agricultural lands certification has been completed by the applicant, if applicable.

(vi) The Source Protection Plan has been approved.

(I) addresses any other concern that the secretary has identified as necessary for the conservation of water or protection of human health or the environment.

§ 24-409. Groundwater withdrawal permit.

Each permit issued by the Agency for a groundwater withdrawal pursuant to this section shall specify the following information:

(1) The name, mailing address, and daytime telephone number of the permittee.

(2) That the permit is valid for a period of years, not to exceed 10 years.

(3) The maximum permissible water withdrawal rate, including any seasonal variation or limitations upon the withdrawal rate. In the case of springs, the permit may also require a minimum stream flow.

(4) That groundwater withdrawals for drinking water supplies, farming, or dairy processing shall be given priority over the proposed source during times of shortage.

(5) The stated use of the withdrawal.

(6) A schedule for monitoring and reporting production from the proposed source or sources.

(7) A requirement that in the event there are changes to the permittee's address and contact information, the permittee shall provide updated information to the secretary within ten days of the change.

(8) A requirement to report to the secretary as specified in § 24-513 whenever an undue adverse effect has occurred or is occurring.

(9) A requirement to resolve undue adverse effects in accordance with § 24-513 if one has occurred.

(10) Other conditions, as needed, to ensure the conservation of groundwater and the protection of human health and the environment.

§ 24-410. Permit amendments.

(a) Major amendments.

(1) Applicability. Major amendments may include:

(A) A proposed increase in the permitted rate of the withdrawal; or

(B) A proposed change in the location of the withdrawal.

(2) Application. An application for a major amendment to a permit shall be treated as a new application. An application for a major amendment shall be reviewed by the secretary in the same manner as a new application.

(3) Approval. On approval of a major amendment, the secretary will issue an amended permit for the source.

(b) Minor amendments.

(1) Applicability. Minor amendments may include:

(A) A change in the owner of the source or a change to the permittee;

(B) A change to any required monitoring that is part of the permit;

(C) A change to the use of the withdrawal;

(D) A decrease in the permitted rate of withdrawal;

(E) The replacement of an existing well at the same location, at the same depth and for the same rate of withdrawal.

(2) Application. The applicant shall submit an application to the secretary on a form provided by the secretary.

(3) Notice. The applicant shall provide notice of the minor amendment to all other landowners and mobile home park residents in the area of influence, or in the case of springs, one quarter of one mile downstream from the source and post a copy of the minor amendment in the town clerk's office of the municipality where the project is located. The notice shall provide the following information:

(A) The location and a brief description of the proposed amendment.

(B) Locations where copies of the application may be obtained.

(C) That a public comment period is open for 30 days from the date of the application and that comments should be directed to the water supply division of the Agency.

(4) Informational meeting. The secretary may, on his or her motion or by a petition by a member of the public, call a public informational meeting. This meeting shall be noticed at least 10 days before the meeting in the same manner as subsection (b)(3) of this section.

§ 24-411. Notices of closure and conversion.

(a) Notice of closure. A permittee shall file a notice of closure when the permittee permanently ceases the operation of a source. The permittee shall notify the secretary that the closure plan has been properly implemented, and upon receipt of that notification the permit issued under this rule shall be considered voluntarily revoked. Prior to closing the source, the permittee shall submit a source closure for the Secretary's approval that contains the following:

(1) Prior to closing, all water source or holes shall be cleared of any pumps, wires, piping, or other materials that may interfere with effective closing.

(2) Wells shall be completely filled with grout using a tremie pipe. Acceptable grout materials include cement, bentonite chips, or 15 percent by volume bentonite grout slurry.

(3) Developed spring sources shall be closed and returned to predevelopment conditions or closed in accordance with agency guidelines.

(4) A timeframe for the implementation of the closure plan, which shall not be later than one year following the cessation of operating the source.

(b) Notice of conversion. A permitted source shall file a notice of conversion when the permittee converts a source permitted under this rule to a different use that is not subject to a permit under this rule. Upon the day a notice of conversion is received, the permit shall be considered voluntarily revoked.

§ 24-412. Renewal of groundwater withdrawal permits.

(a) Any permittee wishing to renew a groundwater withdrawal permit shall submit an application for a permit renewal at least one year prior to its expiration date.

(b) Minor renewals.

(1) If no change to the approved withdrawal rate is proposed at the time of permit renewal, the renewal application shall include:

(A) The name, mailing address, parcel ID number, and daytime phone number of the permittee;

(B) The permittee's written certification that no change to the previously-approved withdrawal rate is being sought;

(C) An updated inventory of contaminant sources within the area of influence of the withdrawal;

(D) An updated water user and resource inventory within the area of influence of the withdrawal;

(E) An updated map identifying any new tracts of land within the area of influence of the withdrawal that have been formed since original issuance of the permit, or most recent renewal and a description of the water source or sources for the new tracts of land; and

(F) Where monitoring has been performed as part of the permit: A written summary of observations of impacts and any modifications to the impact monitoring program since issuance of the permit; and a written summary of the volume of groundwater produced by the withdrawal since issuance of the permit.

(2) The minor renewal application may reference information already contained in the secretary files if the information has not changed since the most recent permit was issued and meets the current criteria outlined in these rules.

(3) Notice. The applicant shall provide notice of the minor renewal to all other landowners and mobile home park residents in the area of influence, or in the case of springs, one quarter mile downstream from the source, and post a copy of the minor renewal in the town clerk's office of the municipality where the project is located. The notice shall provide the following information:

(A) The location and a brief description of the proposed renewal.

(B) Locations where copies of the application may be obtained.

(C) That a public comment period is open for 30 days from the date of the application and that comments should be directed to the water supply division of the Agency.

(4) Informational meeting. The secretary may, on his or her motion or by a petition by a member of the public, call a public informational meeting. This meeting shall be noticed at least 10 days before the meeting in the same manner as subsection (b)(3) of this section.

(5) A renewed permit shall be valid for a period of no more than 10 years, provided, however, that there shall be no limit on the number of renewals that a permittee may request.

(c) Major renewals. Any renewal that is not a minor renewal is a major renewal. Major renewals shall be treated as a new application. An application for a major renewal shall be reviewed by the secretary in the same manner as a new application.

§ 24-413. Revocation.

(a) General**.** The Secretary may revoke a permit either in response to a petition or on his or her own motion.

(b) Bases for revocation: The bases for revocation are:

(1) violation of a permit condition;

(2) false or misleading information submitted in support of the permit;

(3) violation or failure to comply with the provisions of these rules or authorizing statutes;

(4) the permitted withdrawal is causing an undue adverse impact; or

(5) a petition to revoke submitted by the permittee.

(c) Petition for revocation**.** All petitions for revocation shall be addressed to the Secretary, shall be copied to the permittee and shall include:

(1) the name, address, and telephone number of the petitioner;

(2) the signature of the petitioner;

(3) identification of the specific statutory provision, rule, or permit condition that form the basis of the petition;

(4) a statement of the petitioner's interest in the matter and the petitioner's contentions, including the alleged basis for the revocation of the permit; and

(5) a statement that a copy of the petition for revocation has been sent by the petitioner to the permittee.

(d) Party Status. The Secretary shall determine the right of the petitioner or other persons requesting party status to participate in the proceedings. In determining party status, the Secretary shall consider whether the person is aggrieved. For purposes of this subsection, "person aggrieved" means a person who alleges an injury to a particularized interest protected by this rule, attributable to the

activities authorized under the permit that can be redressed by the Secretary. The secretary and the municipality in which the project at issue is located are automatically parties in a revocation proceeding.

(e) Interested Person Status. Any person who is interested in the revocation proceeding may submit comments on the revocation to the Secretary. Interested persons shall not have Party Status and shall not be allowed to participate in any hearing that takes place on the revocation.

(f) Notice of revocation hearing**.** Notice of a petition for revocation of a permit shall be sent to the permittee, the municipality in which the project is located, and all other parties who would receive notice under § 24-404(b). The notice shall be issued at least two weeks prior to hearing and shall include the following information:

(1) the legal authority for revocation;

(2) a brief statement of facts upon which the proposed action is based;

(3) a statement that the Secretary will hold a hearing for the purpose of determining whether the permit shall be revoked; and

(4) the date, time, and place where the hearing will be held.

(g) Hearing**.** The hearing in a contested case shall be conducted by the Secretary. Any party to the revocation proceedings shall either appear in person shall be represented by an attorney, or appear at the proceeding with an attorney. The burden of proceeding and of proving that the permit should be revoked shall be upon the party petitioning for revocation. The admissibility of evidence in all revocation proceedings shall be determined under criteria set forth in 3 V.S.A. § 810. Upon the request of a party, a hearing shall be transcribed by a qualified stenographer or recorded on an electronic sound device at the election of the party. If transcription by a stenographer is requested, the request shall be in writing and filed at least 10 days before the hearing. Costs shall be borne by the requesting party. The requesting party shall provide one copy of the transcript to the Secretary without cost; other parties wishing a copy shall reimburse the requesting party on a prorated basis.

(h) Examination of evidence, decision and order. The examination of evidence, decision and order shall be governed by the provisions of 3 V.S.A. §§811 and 812. The final decision shall be made within 30 days after the close of the hearing. This decision shall constitute the final decision of the Secretary. Prior to making a final decision, the Secretary shall consider comments submitted by Interested Persons. Copies shall be sent to the permittee, other parties, the legislative body of the municipality, and all affected municipal and regional planning commissions.

(i) Voluntary revocation**.** Notwithstanding the other provisions of this section, the permittee may voluntarily waive the right to have a hearing, in which case the permit may be administratively revoked by the Secretary

§ 24-414. Variances.

(a) To request a variance, applicant shall submit the following information in writing to the Secretary:

(1) The name, mailing address, and daytime telephone number of the person requesting the variance and, if the person is other than an individual, the name and daytime telephone number of an individual who can be contacted regarding the request;

(2) Identification of the source to which the variance request relates by applicant name and municipality and, if a permit has already been issued, the permit number and date of issuance;

(3) Identification of the specific section of the rule for which the variance is being sought. Variances under this rule are limited to variances from: (1) the setback requirement of § 24-501(b); (2) the source construction standards of § 24-502(c); and (3) the source testing requirements of § 24-509;

(4) A full explanation of why a variance is necessary, including the likely consequences if the variance is not granted;

(5) A full explanation of the alternative that will be implemented in lieu of the rule requirement with a full explanation of how the alternative will be as protective of human health and the environment, including groundwater quantity, as adhering to the rule;

(6) Whether the variance is needed for a limited time and, if so, what that time period is; and

(7) A full explanation of how the benefits of granting a variance are consistent with the intent of this rule and 10 V.S.A. Chapter 48.

(b) Notice. Prior to a variance request to the Secretary, the applicant shall provide documentation of compliance to the secretary of the following notice requirements:

(1) Send a complete copy of the variance request to each of the following:

(A) The clerk, legislative body, and conservation commission in the municipality in which the project is located.

(B) The clerk of adjoining municipalities.

(C) The regional planning commission of the area where the project is located.

(D) Any public water system permitted by the agency of natural resources in the municipality where the proposed withdrawal is located.

(E) All landowners and mobile home park residents within the area of influence of the proposed source or within one quarter mile downstream from a proposed source that is a spring. Notice to the officers of a condominium association shall be deemed sufficient under this subdivision for notice to residents of a condominium.

(F) At the time the notice is provided to the public, publish notice in a newspaper of general circulation in the area of the proposed withdrawal and that a public comment period is open for 30 days from the submittal date of the application and that comments shall be directed to the water supply division of the Agency.

(2) A copy of the notice required under this subsection shall be posted in the municipal clerk's office of the municipality in which the proposed source is located.

(c) The Secretary after considering all comment shall grant a variance if the Secretary finds that:

(1) The alternative proposed, if any, will be as protective of human health and the environment, including groundwater quality and quantity, as adhering to the rule; and

(2) The benefits of granting a variance are consistent with the intent this rule and 10 V.S.A. Chapter 48.

(d) In granting a variance, the Secretary shall impose such conditions, including time limitations, as the secretary deems necessary to ensure that the criteria specified in subsection (c) of this section will be met.

(e) No variance shall be granted if the effect of the variance would be to waive or modify a statutory requirement. The Secretary shall issue a written decision on a request for a variance. If the variance is denied, the denial shall specifically set forth the reason for the denial.

Subchapter 5 – Technical standards

§ 24-501. Siting sources.

(a) An applicant shall have permanent legal access over the land surrounding the source sufficient to ensure access to the source, maintenance of the source, and protection of the aquifer from a direct discharge to the withdrawal point.

(b) A source shall be located at a distance sufficient to ensure that the source does not result in the migration of fertilizers or pesticides used on agricultural crop land. In no case may a source be nearer than 50 feet from the property line when the adjacent property is used as agricultural crop land;

(c) Proposed sources shall be located where they will not be subject to damage from vehicles or similar hazards.

(d) Proposed sources developed for the purpose of bottled or bulk water shall have ownership or legal control to Zone 1 of the source protection area established for that source.

§ 24-502. Proposed source construction plan

(a) Plan required. A proposed source construction plan is required prior to the installation of the proposed source to protect the groundwater and other water resources. The source construction plan shall include the following:

(1) A erosion prevision sediment control plan that describes measures to prevent erosion and control sediment;

(2) Measures to be put into place that prevent unpermitted discharges to surface waters;

(3) A groundwater contamination prevention plan that provides specific measures to prevent groundwater contamination including:

(A) The source construction and techniques that will be used.

(B) The proposed site grading and runoff control designed to prevent runoff and surface water infiltration at the proposed source.

(C) Measures that ensure that all source construction shall be thoroughly cleaned and decontaminated before use.

(4) A proposed source drilled, driven or bored greater than 20 feet deep shall be installed by a Vermont licensed well driller who shall file a report with the secretary within 90 days of completion in accordance with the well driller licensing rule.

(b) Construction standards for springs. The following are acceptable materials in the construction of a spring source: grouted concrete tiles; concrete cast in place; or metallic or plastic casing. The applicant shall demonstrate the long term structural integrity and the chemical inertness of the material proposed for use.

(c) Construction standards for wells.

(1) Casing. The casing and liner material used on all water sources shall be of such strength and composition as to prevent the movement of water or contaminants into or out of the water source in the interval cased. The casing or liner shall not distort, collapse, crack, or disintegrate during placement or under normal conditions. The casing and liner shall be adequate to provide for the installation, removal, and maintenance as appropriate of caps, pitless adapters, screens, pumps, pipes, wires or other devices that may be used. Any casing that is driven shall be protected with a firmly attached drive shoe or equivalent. All steel casing shall have full circumferential welds or threaded coupling joints.

(2) Grout.

(A) Grouting or the use of a grout mixture is required and under the following conditions:

(i) Filling the annular space as required in subsection (d)(4) of this section.

(ii) Plugging abandoned wells.

(iii) As needed in the construction or closure of monitoring wells.

(B) A grouting material or mixture shall:

(i) Allow negligible movement of all fluids in the annular space.

(ii) Support and secure the casing.

(iii) Provide negligible shrinkage, breakage, or deterioration of the grout after placement.

(3) Annular space. The annular space shall be grouted for the full length of the unscreened portion of the casing, or the portion thereof below the frost line or pitless adaptor, so that no fluids may move in the zone needing to be grouted.

Note: Under most conditions, driven steel casing shall be considered to have no annular space provided no pilot hole larger

than the casing has been drilled below the depth of the pitless adaptor or the frost line.

(4) Finishing.

(A) Each well shall be finished to prevent damage to the well and minimize the potential for contamination.

(B) The well casing shall extend not less than 18 inches above existing grade, or at least 12 inches above the pump house floor or concrete apron surface. The well shall be covered with a temporary or permanent tight fitting cap or protective structure which cannot be removed or opened without the use of tools, a key, or a combination.

(C) If a proposed source will have an underground enclosure it shall be designed to prevent intrusion by persons or animals and shall be passively drained to prevent any ponding of water in the enclosure. The source shall be capped with a water tight cap meeting the Standard for Watertight Well Caps (PAS-2) adopted by the Water Systems Council, Chicago, IL. A sanitary seal shall not be used. Any source that is buried in a pit, or underground enclosure shall be separately vented. The wiring for the pump shall either be sealed for water tightness where it enters the cap or be contained in a watertight conduit system.

(D) No water source shall be finished, vented or capped in a manner that has any similarity to any oil or gas filling pipe unless specifically and permanently labeled to prevent confusion.

(5) Flowing artesian wells.

(A) All flowing artesian wells shall be constructed, finished, and capped in a manner to prevent depletion of the aquifer, loss of artesian pressure, and erosion of the aquifer confining materials or the land surface. For flowing artesian wells required to be grouted, cement grout is preferred.

(B) Permanent casing and grout shall be provided.

(C) Flowing artesian wells shall not discharge to the ground surface or to a water resource.

(6) Source identification. Proposed sources shall be adequately and permanently identified and marked with a well tag.

(d) Construction standards for monitoring wells. The proposed source construction plan shall describe the installation method or methods and specifications for monitoring wells. The plan shall state whether the monitoring wells are temporary or permanent.

(e) Construction standards for bottled and bulk water systems. A proposed source with the purpose of bottled or bulk water shall be constructed in accordance with the Vermont Water Supply Rule, Appendix A, Subchapter 12 (construction requirements for public water systems).

§ 24-503. Initial conceptual hydrogeologic model and area of influence.

(a) The initial conceptual hydrogeologic model of the withdrawal shall be developed by a qualified professional and identify the sources of information used to develop the model. The initial conceptual hydrogeologic model shall be based on information including:

(1) An inventory of existing sources and uses prepared consistent with § 24-504.

(2) A inventory of surface waters and significant wetlands prepared consistent with § 24-505.

(3) An inventory of contamination sources prepared consistent with § 24-506.

(4) Hydrogeologic mapping information such as surficial material, lineament, and bedrock or other remote sensing analysis.

(5) Geophysical data, if available.

(6) Available climatological data including precipitation data from National Oceanic and Atmospheric Administration and United States Geological Survey stream gauging flow data.

(7) Other data as appropriate.

(b) Where dated environmental data is used to develop the initial conceptual hydrogeologic model, such data shall be adjusted to account for any major land use changes that have occurred.

(c) The initial conceptual hydrogeologic model shall be based on the operation of the withdrawal at the proposed rate without any recharge to groundwater from rainfall or snowmelt over a period of 180 consecutive days.

(d) The initial conceptual hydrogeologic model shall include:

(1) A description of the geology and geomorphology of the region including the governing hydrogeologic characteristics of the

bedrock and surficial geologic formations, including Natural Resource Conservation Service soil maps, as applicable.

(2) Generalized geologic cross-sections through the region, including at least one through the site of the proposed source, based on available information such as well logs, geologic reports, maps, and subsurface data.

(3) An estimated delineation of the area of influence.

(e) The estimated extent of the area of influence and each of its components shall be presented on a United States Geological Survey topographic map or maps at a scale of 1:24,000 or 1:25,000, or at a scale that gives greater detail:

(f) A description of the hydrogeologic cycle and a water budget for the area of influence shall be prepared that describes:

(1) The amounts and timing of precipitation, runoff, infiltration, evapotranspiration, change in storage, based on available climatological data including climatological normals.

(2) The distribution and availability of water necessary to maintain natural resources, existing water uses, and the proposed withdrawal.

(3) The locations and amounts of water use, consumption, discharge, and recharge of water to and from the area of influence.

(4) A description of the likelihood that the proposed source will create an undue adverse effect, considering the water budget, recharge and discharge rates, change in storage.

(g) A preliminary description of the groundwater flow regime for the area of influence that describes hydraulic boundaries, recharge characteristics, and the interaction of surface waters and significant wetlands associated with the withdrawal shall be prepared that includes:

(1) Hydrogeologic conditions, in any unconfined, confining, or semi-confining layers of the overburden, and in the bedrock aquifer.

(2) A description of groundwater flow both in horizontal and vertical directions, under ambient and conceptual operating conditions.

(3) Hydrogeologic influences of regional groundwater flow from all aquifers and surface water bodies, or other water resources in hydraulic communication with the proposed source.

(4) Preferential groundwater flow pathways caused by the properties of the deposits or bedrock.

(h) The initial conceptual hydrogeologic model shall identify data needed to refine the model to complete the report required in § 24-512. Where data gaps are identified during the development of initial conceptual the hydrogeologic model, the model shall:

(1) Identify the data gaps and their significance to understanding the potential impacts of the proposed withdrawal.

(2) Estimate the reasonably suspected hydrogeologic scenario associated with the withdrawal that could occur given the known and unknown model parameters.

§ 24-504. Inventory of existing sources and uses.

(a) The inventory of existing sources and uses in the estimated area of contribution for bottled water or bulk water sources and in the area of influence for all other sources shall:

(1) Identify information sources and describe efforts to collect information pertaining to existing sources and uses within the area of contribution or area of influence as the case may be.

(2) Be used to estimate withdrawal effects in accordance with § 24-507, and to develop notice to interested persons required by subchapter 4 of this rule.

(b) The inventory of existing sources and uses shall be based on the following:

(1) Agency records of existing sources and uses.

(2) Published reports.

(3) Municipal and public inventories, tax maps, and records.

(4) A visual or windshield survey conducted by a qualified professional.

(5) Other records, as available.

(c) The inventory shall identify the use, the purpose of the use, an estimate of the quantity of the use, the tax map and the parcel ID number of the tract of land on which the use occurs, and the name and mailing address of each property owner and operator for each of the following:

(1) Public and potable water supply withdrawals and impoundments.

(2) Users of groundwater and surface water, whether permitted or not permitted. Users of groundwater and surface water include withdrawals, recharges, permitted surface water discharges, and underground injection control authorizations.

(3) Areas served by public or private sewer and the locations of the discharge.

(4) Any other existing source and water uses that might be influenced by the withdrawal.

(d) To the extent the information is available in records of the Agency, provided by source owner, or otherwise known, the inventory of water sources pursuant to subsection (c)(1) of this section shall include the following information:

(1) The installation date of the source and the name and license number of the well installer.

(2) The type of source and its specifications, including overall depth, casing depth, depth to water in the source, depth to bedrock, water source diameter, and water source yield.

(3) Well pump size, depth, and age.

(4) The total number of existing sources on the property.

(5) The number of individuals served by the source.

(6) A description of water treatment equipment installed, if any.

(7) A description of water quantity or water quality problems with the source.

(e) The complete inventory of water resources and uses in the area of influence shall be presented on a USGS topographic map at a scale of 1:24,000 or 1:25,000, or at a scale that gives greater detail

(f) The map required by subsection (e) of this section shall include a map legend that specifies the title, date, and scale of the map and includes a north arrow.

§ 24-505. Inventory of surface waters and significant wetlands.

(a) The inventory of surface waters and significant wetlands in the estimated area of influence shall:

(1) Identify information sources and describe efforts to collect information pertaining to surface waters and significant wetlands within the area of influence.

(2) Be used to estimate withdrawal effects in accordance with § 24-507and develop the notice to interested persons required by subchapter 4.

(3) If the applicant is denied access, the inventory shall based upon data collected from other information sources.

(b) The inventory of surface waters and significant wetlands shall be based on the following:

(1) Agency records of existing sources and uses.

(2) Published reports.

(3) Municipal and public inventories, tax maps, and records.

(4) A visual or windshield survey conducted by a qualified professional.

(5) Other records, as available.

(c) The inventory shall identify the type and location of each water-related natural resource in the area of influence, including surface waters, significant wetlands, springs, vernal pools, and any other water-related natural resources that might be influenced by the withdrawal. The inventory shall:

(1) provide the tax map and parcel ID number of the tract of land on which the surface water or significant wetland lies, and the name and mailing address of each property owner operator;

(2) Describe the current regulatory status of the surface water or significant wetland (e.g. permits issued, if any);

(3) Describe the designated uses of the surface water as provided in its classification in the Vermont Water Quality standards; and provide a list of existing uses of surface water, as identified in accordance with the Agency's anti-degradation implementation policy or rule, whichever is effective.

(d) The complete inventory of water resources and uses in the area of influence shall be presented on a USGS topographic map at a scale of 1:24,000 or 1:25,000, or at a scale that gives greater detail.

(e) The map required by subsection (d) of this section shall include a map legend that specifies the title, date, and scale of the map and includes a north arrow.

§ 24-506. Inventory of potential contamination sources.

(a) An inventory of known and potential contaminant sources in the estimated area of contribution for bottled water or bulk water sources and in the area of influence for all other sources.

(b) The potential contamination source inventory shall:

(1) Be compiled from a search of the following information sources:

(A) Records at the Agency.

(B) Records at the municipalities.

(C) Other records, as available.

(D) A visual or windshield survey.

(2) Identify and describe all known and potential contamination sources, by providing the following information for each known and potential source of contamination:

(A) The site name, parcel ID number, and physical address.

(B) The name and mailing address of each property owner and operator.

(C) For each known source of contamination, a description of the nature and extent of contamination, the agency site identification number, and the status of any site investigation or remedial action.

§ 24-507. Estimation of withdrawal effects.

(a) The estimated effects of the proposed withdrawal on water resources and existing sources and uses in the potential area of influence shall be completed as follows:

(1) Be based on the hydrogeologic model and the potential area of influence identified pursuant to § 24-503.

(2) Be prepared by a qualified professional.

(3) Evaluate the likelihood of affecting the extent of known or potential groundwater contamination identified in the inventory prepared pursuant to § 24-506.

(4) The withdrawal of water shall not cause a contaminant to adversely effect an existing source’s water quality.

(5) Quantify impacts on existing sources and uses identified in the inventory prepared pursuant to § 24-504.

(6) Quantify impacts on surface water and significant wetlands identified in the inventory prepared pursuant to § 24-505.

(7) Evaluate the likelihood that the proposed withdrawal will result in an undue adverse effect or not result in a safe yield.

(b) The applicant shall describe any limitations to the estimate of the withdrawal effects, including but not limited to those arising from data gaps or the complexity of the geology.

§ 24-508. Source testing program design.

(a) The source testing program shall be designed to:

(1) Estimate the effects of the withdrawal on existing sources and uses, surface waters and significant wetlands, and potential contaminant sources under conceptual hydrogeologic model pumping conditions, that is, 180 days of continuous operation of the withdrawal at the requested rate without direct recharge to groundwater from rainfall or snowmelt; and determine whether the proposed withdrawal represents a safe yield.

(2) Estimate the effects of the source under hydrogeologic model conditions and analyze whether the proposed source does or does not create an undue adverse effect at the proposed withdrawal rate.

(3) Address critical data gaps, limitations, or insufficiencies identified in § 24-503 and § 24-507 that are necessary to complete the impact assessment.

(b) If the Secretary determines that the proposed testing program may result in an undue adverse effect to existing sources or uses, surface water, significant wetlands, or may impact a contaminant source, the Secretary may require that the applicant prepare a monitoring and mitigation plan for the source testing program for review and approval by the secretary.

(c) The program shall be designed by a qualified professional and performed by or under the direction of a qualified professional;

(d) As part of the source testing, the applicant shall provide a request for access and informational letter for owners of existing sources and water resources, and for property owners where a surface water or significant wetland is located within the area of influence The request for access and informational letter shall contain the following:

(1) Include the items from an example form letter supplied by the Secretary.

(2) Request monitoring permission and a written response.

(3) Clearly state that it is the applicant's responsibility to prepare the source for monitoring, offer to sample for bacteria (e.coli) prior to and after monitoring at applicant's expense, and offer for the disinfection of the source after monitoring has taken place.

(4) State the monitoring requirements.

(5) Inform the source user and owner that the applicant will supply potable water or cease the withdrawal test should their water supply needs not be met due to withdrawal testing activities.

(6) Identify the name and telephone number of the individual who should be contacted in the event of a water outage during testing.

(7) Be sent via certified mail with return receipt requested, or by another method that demonstrates receipt of the notice, at least 14 days prior to commencing the withdrawal testing program.

(8) Inform the source user and owner that all complaints of an applicant's performance with this notice may be directed towards to the Agency of Natural Resources and provide the name and telephone number of the person handling the permit application at the Agency.

(e) The proposed source testing program shall include the measurement and observation of a representative number and variety of existing sources and water resources so that the data can be used to estimate effects on all water resources and users that might be adversely impacted.

(f) If the applicant is unable to monitor a existing source or water resource, the estimate of the effect of the withdrawal shall:

(1) Be based upon data collected from other nearby sources or water resources that represent the sources or water resources that could not be monitored; or

(2) Be based on an estimate using data collected during the withdrawal testing and analytical techniques.

(g) For all proposed sources, the source testing production rate shall equal or exceed the rate requested in the permit application.

Note: the source testing discharge rate may be less than the rate requested in the permit application, however the rate permitted shall not be greater than the actual withdrawal testing discharge rate.

(h) The source testing program shall be designed to provide data to:

(1) Demonstrate production of the maximum withdrawal rate requested for each proposed source;

(2) Identify the responses of the aquifer and other water resources;

(3) Refine the hydrogeologic model and area of influence delineation in accordance with § 24-510;

(4) Quantify the effects of the source and conclude if the impacts meet the criteria for an undue adverse effects as specified by § 24-511;

(i) For proposed sources with a purpose of withdrawing for bottled or bulk water purposes, immediately following the conclusion of the source test the applicant shall test for the following:

(1) constituents identified in the Vermont Water Supply Rule Section 6.12, Table 6-1 (maximum contaminant levels) where it is indicated that initial source testing is required.

(2) constituents identified in the Vermont Water Supply Rule Section 6.13, Table 6-2 (secondary contaminants) where it is indicated that initial source testing is required.

(j) For proposed sources with a purpose of withdrawing for bottled or bulk water purposes, determine whether the proposed source is groundwater under the direct influence of surface water as required by Vermont Water Supply Rule Appendix A Section 3.4.

(k) The source testing program shall comply with withdrawal testing requirements in § 24-509.

(l) Source testing and evaluation methods, procedures, data, laboratory reports, and other supporting documentation shall be presented in the final report required by § 24-512.

§ 24-509. **S**ource testing requirements

(a) Springs

(1) Yields for springs shall be determined using one of the following methods:

(A) With prior approval by the Secretary, spring yields may be determined from weekly measurements collected between June 1 to November 1. The spring yield determined by this method shall be the minimum flow measured during that period divided by four.

(B) The applicant shall conduct a detailed hydrologic low flow analysis, which must, at a minimum, include monitoring of spring yield on a weekly basis from July 1 to October 15 and from December 15 to March 15 during expected low flow conditions. Monitoring of spring yield for high flow analysis shall occur on a weekly basis from March 15 to July 1 and from October 15 to December 15. The high flow data shall be used to determine the upper withdrawal limit and aerial extent of the recharge area to the spring. The flow data collected during a detailed hydrologic low flow analysis will be used to determine the spring yield in a 1Q20 low flow condition.

(2) If proposed by the applicant in the source testing program developed in accordance with §24-508, and approved by the Secretary, the flow monitoring may also include a nearby stream or river to provide data to aid in the comparative flow analysis.

(4) A comparative flow analysis based on long term flow data from a gauged watershed (e.g., a watershed with a long term USGS gauging station) similar in hydrogeology to the area in which the proposed source spring is located shall be completed to calculate the 1Q20 flow of the spring.

(5) Spring sources shall have a minimum flow rate established that takes into account other uses or allocations for existing sources and water resources in the area of influence. An upper limit on withdrawal rate will also be established based on the high flow measurements.

(b) Pumped groundwater sources

(1) All pumping tests shall consist of and be conducted in the following order: pre-test water level monitoring of the proposed source, existing sources, and water resources, see subsection (b)(4) of this section,; a pumping test; a recovery test; recovery test water level monitoring of the proposed source, existing sources, and water resources, see subsection (b)(6)(B) of this section. The recovery test shall immediately follow the pumping test. Precipitation monitoring shall occur during the entire testing period. All testing data and evaluations (including graphical) appropriate to the testing program shall be provided to the Secretary.

(2) If proposed by the applicant in the source testing program developed in accordance with §24-508, and approved by the Secretary, a short term (i.e., 24-hours or less) test (e.g., step-drawdown test, short term constant discharge test) may be completed to aid in the design of the long term pumping test. Details of such testing shall be included in the source testing program.

(3) Under special circumstances (e.g., possibly associated with the testing of a flowing artesian well), the applicant may propose alternative withdrawal testing procedures (e.g., constant head test) in the source testing program. If proposed, specific details of such testing must be included in the source testing program, including methodologies to evaluate potential impacts to existing sources and water resources. If approved by the Secretary, the alternative testing shall be completed in strict accordance with the methods presented in the source testing program.

(4) Pre-Test Water Level Monitoring

(A) Pre-test water level monitoring in the proposed source, existing sources, and water resources shall occur at all monitoring locations included in the source testing program.

(B) Pre-test water level measurements shall be collected, at a minimum, every four hours for two days prior to the pumping test.

(C) Pre-test monitoring of existing sources in use shall include measurements taken at a time following their longest recovery period, usually between 3 and 5 A.M.

(D) The source testing program prepared by the applicant may include a longer duration or a greater frequency of pre-test monitoring. If approved by the Secretary, this modified pre-test water level monitoring shall occur in strict accordance with the source testing program.

(5) Pumping Test

(A) The pumping test shall be conducted after full recovery from any short term testing (e.g., step-drawdown test, short-term constant discharge test) that may have occurred prior to the start of the pumping test.

(B) The following table shall be used to determine the duration and discharge fluctuations for pumping tests:

Pumping Test Rate (GPM)	**Test Duration**	**Discharge Within:**
40 – 49	72 hours	± 5%
50 – 99	96 hours	± 3%
100 – 199	120 hours	± 3%
200+	168 hours	± 3%

(i) Discharge shall be held constant within the limits presented in the table above. Meter accuracy shall be verified by another independent method (e.g., calibrated bucket and stopwatch).

(ii) Measurements in the proposed source, existing sources, and water resources shall be collected to the nearest 10th of a foot.

(C) During pumping tests, water level and discharge readings measured at the proposed source shall be collected at a

frequency sufficient to allow for accurate aquifer characterization and data analysis. The following table presents suggested reading frequencies.

ELAPSED TIME (MIN)	READING FREQUENCY
0-10	every 1 minute
10-30	every 2 minutes
30-90	every 5 minutes
90-180	every 10 minutes
180-420	every 30 minutes
420-1440	every 60 minutes
1440-end of test	every 2 to 4 hours

(D) During pumping tests, water levels at all existing sources and water resources identified in the source testing program shall be monitored.

(i) Water level readings shall be collected every four hours or more frequently.

(ii) Monitoring of existing sources shall include measurements taken at a time following their longest recovery period, usually between 3 and 5 A.M.

(E) The first 24 hours of the pumping test shall be free of interruptions. If an interruption occurs the test shall be terminated, the source allowed to fully recover, and the test restarted. After the first 24 hours, if the pumping test is interrupted a total of two hours or longer, the test shall be terminated, the source allowed to fully recover, and the test restarted.

(F) The horizontal location shall be established using global positioning system (GPS) technology referenced to NAD83 and reported in units of degrees and minutes and seconds of latitude and longitude with at least three decimal places of precision, or an alternative map or method that provides a higher degree of accuracy; and

(G) The vertical reference point elevation shall be established by (a) reference to a surveyed vertical reference point when one is available at the withdrawal site or monitoring well network, (b) using a global positioning system (GPS) technology referenced National Geodetic Vertical Datum 1988 and with the vertical reference point elevation being accurate to +/- 0.1 foot (c) a method that provides a higher degree of accuracy.

(6) Recovery Testing

(A) Recovery tests shall be conducted immediately following the pumping test and shall include the following:

(i) Water level measurements to the nearest 10th of a foot in the proposed source.

(ii) Monitoring for two days or complete recovery in the proposed source, whichever occurs first.

(iii) Monitoring of water level at timed intervals that will result in evenly spaced plots on semi-logarithmic paper. Suggested times of recovery measurement beginning when the pumping test is terminated are as follows:

RECOVERY TIME (MIN)	**FREQUENCY**
0-10	every 1 minute
10-20	every 2 minutes
20-60	every 5 minutes
60-120	every 15 minutes
120-360	every 60 minutes
360-600	every 120 minutes
600-2880	every 240 minutes

(B) Post-pumping test water level monitoring at all existing sources and water resources shall continue during the recovery test period.

(i) Water level readings shall be collected every four 4 hours or more frequently.

(ii) Monitoring of existing sources shall include measurements taken at a time following their longest recovery period, usually between 3 and 5 A.M.

(7) Precipitation Monitoring

(A) Precipitation data sufficient to determine timing, amount, and type of precipitation shall be collected during the entire testing period (i.e., from the start of the pre-test monitoring to the end of the post-test monitoring). Precipitation data can be collected on-site or be from a nearby National Oceanographic and Atmospheric Administration (NOAA)

weather station or NOAA-certified cooperative observation site.

(8) Pumping Test Data Analysis

(A) All yield and interference analyses shall use methodologies appropriate to the hydrogeologic setting and aquifer type (e.g., unconfined, confined).

(B) Pumping test and recovery test data shall be used to calculate aquifer parameters such as transmissivity and storativity.

(C) All analyses shall be completed using standard and accepted methodologies, as presented in published texts or peer-reviewed scientific journals, unless alternative methodologies are previously approved by the Secretary.

(D) A minimum of two methodologies shall be used to allow for comparison of results and to determine if additional methodologies should be used.

(E) Graphs of drawdown vs. time on cartesian and semi-log and/or log-log paper and graphs of distance vs. drawdown, if appropriate, shall be included for the proposed source, existing sources, and water resources shall be included in the data analysis. A graph of discharge vs. time shall be included on graphs for the proposed source, and precipitation data shall be plotted on each graph of time vs. drawdown for all existing sources and water resources monitored.

(F) The total available head used in yield and interference analyses shall be limited to the maximum drawdown achieved during the withdrawal testing unless limited further by subsection (b)(8)(G) of this section or by a hydraulic base of the source identified during the withdrawal testing that is above the tested depth of the source.

(G) Proposed sources that may be subject to future interference shall be allowed to use only up to 90% of the total available head in the yield analysis. This requirement may be waived by the Secretary for sources at the same place of business or on the same tract of land.

(H) The yield determination shall take into consideration the measured and predicted impacts to existing sources and water resources and any permitted groundwater or water

resource uses in the estimated area of influence. Also, seasonal low static water level and hydrogeologic boundaries affecting the aquifer shall be considered in the yield analysis.

§ 24-510. Conceptual hydrogeologic model refinement.

(a) The applicant shall refine the initial conceptual hydrogeologic model developed in accordance with § 24-503 based on results of the source testing completed in accordance with § 24-509.

(b) If, after the source testing, the applicant elects to reduce the withdrawal volume proposed pursuant to §24-404(a)(3), the applicant shall refine the initial conceptual hydrogeologic model to reflect the revised proposed withdrawal rate.

(c) Hydrogeologic model refinement shall include a refinement of the area of influence estimated in accordance with § 24-503.

(d) The refined hydrogeologic model and area of influence delineation shall be presented with supporting documentation in the final report prepared in accordance with § 24-512.

§ 24-510. Revisions to contamination sources, existing sources, and water resources inventories.

Inventories generated pursuant to §§ 24-504, 505, and 506 used within the final report shall be not more 90 days old on the date of the final report submittal. The applicant shall present the updated and revised inventories in the final report prepared in accordance with § 24-512.

§ 24-511. Undue adverse effect criteria.

(a) For all groundwater withdrawals, a proposed source will be presumed to not have an undue adverse effect when:

(1) For effects on surface water:

(A) If a proposed source does not have a hydrogeologic connection to a surface water within the area of influence, the proposed source is presumed to have no undue adverse effect.

(B) If a proposed source does have a hydrogeologic connection to a surface water, the proposed source shall be presumed to not result in an undue adverse effect to surface water, if the following can be demonstrated:

(i) For proposed sources that are hydrogeologically connected to surface waters that have a flow, the

applicant shall demonstrate that the hydrology criteria of the water quality standards has been met.

(ii) For proposed sources that are hydrogeolically connected to ponds, lakes, and other surface waters without a discrete surface water outlet, the applicant shall demonstrate there is no measurable change in the elevation of the water surface as a result of the withdrawal.

(2) For effects on significant wetlands, if Secretary determines that a proposed source:

(A) Does not have a hydrogeologic connection to a significant wetland located within the area of influence, the proposed source is presumed to not have an undue adverse effect on that significant wetland.

(B) Has a hydrogeologic connection to a significant wetland, but the applicant demonstrates that the proposed source does not impact any function or value of the significant wetland and there is no loss of significant wetland then the proposed source is presumed to not have an undue adverse effect.

(C) Does have a hydrogeologic connection to a significant wetland, the connection will cause in an impact to functions and values the significant wetland, but the impact has been mitigated in accordance with the Vermont wetlands rules then the proposed source shall be presumed to not have an undue adverse effect.

(3) For effects on existing sources, if the Secretary determines that the proposed source:

(A) Does not have a hydrogeologic connection to an existing source located within the area of influence, the proposed source is presumed to not have an undue adverse effect on that existing source.

(B) Has a hydrogeologic connection to an existing source, but the applicant demonstrates that the proposed source does not effect the ability of the existing source to meet its design demand. For purposes of this subdivision, design demand is the value established by the Vermont Water Supply Rule for a use or a value otherwise approved by the secretary.

§ 24-512. Final report.

(a) After withdrawal testing pursuant to § 24-509 is completed, the applicant shall submit a final report to the secretary that includes the following:

(1) All information and materials required in §§ 24-502 through 511, including any updates to the name, mailing address, and daytime telephone number of the applicant and, if the applicant is other than an individual, the name, daytime telephone number and, if available, e-mail address of the individual who will serve as the contact person for purposes of the application;

(2) Certifications that the proposed source is consistent with the municipal plan adopted for the municipality in which the proposed source is located and the portion of the plan upon which the certification is based, and also in conformance with the regional plan adopted for the area in which the proposed source is located and the portion of the plan upon which the certification is based.

(3) The estimated effects of the proposed withdrawal on water resources and existing sources in the area of influence shall be documented as follows:

(A) Be based on the refined conceptual hydrogeologic model and the area of influence identified pursuant to § 24-510.

(B) Be prepared by a qualified professional.

(C) Include a requested withdrawal rate(s), including seasonal limitations as appropriate and necessary to prevent undue adverse effects.

(D) Document that the proposed source will not cause undue adverse effects. If an undue adverse effect may take place, the applicant shall propose a plan to mitigate undue adverse effects.

(4) A description of any data gaps or other limitations to the estimate of the withdrawal effects.

(5) For a proposed source that is for bottled water or bulk water purposes, the final report shall develop a source protection area consistent with Vermont Water Supply Rule, Appendix A Section 3.3.1 (source protection areas) and develop a source protection plan consistent with Vermont Water Supply Rule, Appendix A, Subchapter 21-16 (source protection plan).

(6) When mitigation measures to avoid an undue adverse effect are proposed, they shall be documented and made a of a plan that is included in the final report. A mitigation plan shall consider the following mitigation measures, when applicable, to avoid an adverse effect:

(A) Drill affected source deeper and test for water quantity and quality.

(B) Conduct a yield test on an affected source or re-evaluate existing data.

(C) Connect affected water system onto a permitted public water system.

(D) Develop an alternative water source for the affected source.

(E) Present water usage data from the affected water system that documents a reduction in water demand.

(F) If the existing source is a bedrock well, hydrofracture the well or redevelop by other methods, and test for water quantity and quality.

(G) Mitigate impacts to significant wetlands as approved by the secretary.

(H) Other methods of mitigation approved by the secretary.

(b) In selecting a mitigation measure, the applicant shall select a measure that has been agreed to by the applicant and the owner of the effected existing source. A copy of this agreement shall be provided to the secretary

§ 24-513. Undue adverse effect reporting and response during permit period.

(a) Upon discovery of an apparent undue adverse effect, the permittee shall immediately report to the Secretary a description of the undue adverse effect and its potential cause. An undue adverse impact may be from the pumping test or from the operation of a source.

(b) The Secretary shall notify the permittee within five calendar days of the time when the secretary observes, or another person reports to the Secretary , an unmitigated apparent undue adverse or unanticipated effects.

(c) At the written request of any person, the Secretary shall investigate any allegation of an apparent undue adverse effects including hydrogeologic data supporting the occurrence or potential occurrence of an adverse impact, and determine whether an undue adverse impact has occurred.

(d) The secretary shall notify the permittee after reviewing the allegation whether an undue adverse effect has occurred.

(e) The Secretary may require the applicant, on an emergency basis, to provide emergency mitigation of a water source through the provision of bottled water or another alternate source approved by the Secretary.

(f) Once an undue adverse effect is verified the permittee shall:

(1) Reduce or the withdrawal to the point where the undue adverse effect has ceased or cease the withdrawal.

(2) Present a proposal for resolving the undue adverse effect to the Secretary approval;

(3) Initiate steps to resolve the undue adverse effect in accordance with the approved plan; and

(4) Report on the implementation of the approved plan and its effectiveness in resolving the undue adverse effect.