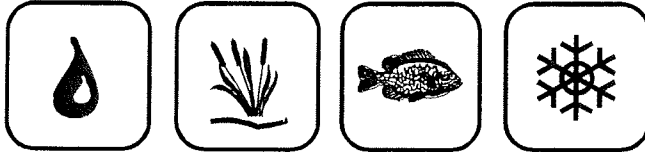


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## TOWN OF WAITSFIELD NEW PUBLIC COMMUNITY WATER SYSTEM Waitsfield, Vermont

### SOURCE PROTECTION PLAN

#### 1.0 INTRODUCTION

This Source Protection Plan (SPP) has been prepared by Pioneer Environmental Associates, LLC. (Pioneer) for the Town of Waitsfield's new Public Community Water System (PCWS) located in Waitsfield, Vermont. The water system will be owned and operated by the Town of Waitsfield. The source of water for the PCWS will be a single bedrock well designated Well R-1. The well has a documented surplus yield of water compared to the current demand of the system. The well completion report is provided on page 1 of the Appendix. Well construction and yield characteristics of Well R-1 are presented in Table 1.

Table 1: Summary of Well Characteristics					
Source ID	Total Depth (ft)	Depth to Bedrock (ft)	Casing Below Ground Surface (ft)	Permitted Yield (gpm)*	Maximum Yield (gpm)*
Well R-1	385	89	118	186	269
*gpm = gallons per minute					

## 2.0 SOURCE PROTECTION AREA

A source protection area (SPA) has been designated for Well R-1 as shown on the Source Protection Area map and the Potential Sources of Contamination (PSOC) map on pages 2 and 3 of the Appendix, respectively. This SPA was originally submitted for approval by the Vermont Water Supply Division (WSD) in Pioneer's *Source Evaluation Report: Well R-1* dated March 22, 2007. The SPA delineation was reviewed by the WSD. The State had no comments or objections in a review letter dated March 8, 2007. The SPA map depicts Zones 1, 2, and 3 of the SPA, and the two-year travel boundary.

Zone 1 of the SPA is a circle with a 125-foot radius around Well R-1. In accordance with the requirements of section A-3.3.1.2(b)(1) of the Water Supply Rule (Rule), source testing demonstrated that a source isolation zone reduction to 125 feet is appropriate due to an extensive confining layer above the bedrock aquifer surrounding the well (Pioneer 2007).

Zone 2 of the SPA is the area where direct recharge to the bedrock aquifer most likely occurs, based on surficial geologic information. Due to the strong upward gradient measured at piezometers near Well R-1, the confining layer, and the well's artesian flow, recharge is not likely to occur in the vicinity of Well R-1 itself. Therefore, the area beneath

the confining layer was delineated as Zone 3. The extent of the confining layer was delineated from well logs in the area, and was estimated to correspond to the 1,320 foot elevation contour. Land area upgradient from the 1,320-foot contour, as far as the two-year travel boundary, was delineated as Zone 2. Any area beyond a two-year travel distance to the well is not considered "one where there will be probable impact from potential sources of contamination," as defined in section A-3.3.6.3 of the Rule, and therefore was delineated as Zone 3 (Pioneer 2007).

Zone 3 consists of land areas within the wellhead protection area (WHPA) where the confining layer prevents direct recharge to the aquifer, and all land area topographically upgradient from the two-year travel boundary.

A two-year travel boundary was delineated as part of the WHPA. Calculations indicated that groundwater in the overburden soils at the site flows 1,613 feet within two years. Because groundwater flow within the rock fractures inside the pumping zone of influence is expected to be extremely rapid, the two-year travel boundary extends to 1,613 feet upgradient from the edge of the well's zone of influence. The well's zone of influence was measured from the source testing data. Where the confining layer exists over the bedrock, the surface environment is isolated from the aquifer. Therefore, areas where the confining layer exists are excluded from the two-year travel zone.

The parcel mapping for the area encompassed by the SPA is presented on the PSOC map included on page 3 of the Appendix. A total of 12 different property owners are included

within the SPA. Historic and present land use within the SPA is forested land, agricultural land, and single family residences. Much of the former agricultural land has long since been replaced by a mature northern hardwood forest.

### 3.0 POTENTIAL SOURCES OF CONTAMINATION

The potential sources of contamination (PSOC) within the SPA consist of roadways, on-site, residential septic systems, agricultural activities, and an electric transmission line. The PSOCs are shown on the PSOC map on page 4 of the Appendix. Page 5 of the Appendix lists PSOC owner information.

PSOC 1, Roadways, low risk: Roadways are present within Zones 2 and 3 of the SPA. Palmer Hill Road and Long Road pose a low risk to Well R-1. These roadways are a PSOC because of vehicle traffic utilizing the roadways, (e.g., garbage trucks, fuel delivery trucks, vehicles with maintenance issues such as oil leaks). The risk posed by PSOC 1 is considered low because the amount and likelihood of any emissions to groundwater from residential roadways are minimal. No chloride was detected in a sample from Well R-1 during the December 2006 constant discharge test, indicating that road salt application is not affecting the well. The Town of Waitsfield does not apply salt to Long Road because it is unpaved. Reed Road is currently an unimproved light-duty road that is used primarily for water system operation and maintenance, and therefore is not a PSOC.

PSOC 2, On-Site Septic Systems, low risk: Eight on-site septic systems are located within the SPA. All systems are a low risk to the PCWS, based on results of water quality testing in Well R-1 completed by Pioneer at the end of the December 2006 constant discharge test. No coliform bacteria and no chloride were detected, and the nitrate concentration of 0.382 mg/L is typical of natural levels. The lack of elevated levels of these wastewater indicators confirms that the well is not contaminated by septic systems. Complete water quality results are presented in the Source Evaluation Report: Well R-1 (Pioneer 2007). Therefore, PSOC 2 represents only a low risk to the water quality of Well R-1.

PSOC 3, Agricultural Land Use, low risk: Two agricultural sites are located within the SPA. Parcel 20001.000 has livestock and pastures located within the property boundaries. Parcel 20004.000 is an established horse farm. A minimal risk of contamination is associated with the waste produced from the livestock. However, since the livestock have a significant amount of land to utilize, the waste is dispersed over a large area. This agricultural land is not used to harvest crops and no pesticides or fertilizers are applied to these parcels. The low nitrate level and absence of coliform bacteria in the well indicate that agricultural activities are not impacting Well R-1. Therefore, PSOC 3 represents only a low risk to the water quality of Well R-1.

Electrical transmission lines pass through Zones 2 and 3 of the SPA. This particular line is owned and operated by Green Mountain Power (GMP). GMP's policy is to manually

remove vegetation from power line rights-of-way, rather than application of herbicides. Therefore the power lines are not considered a PSOC.

#### 4.0 MANAGEMENT PLAN

Management of PSOC within the SPA is essential in maintaining acceptable water quality at the PCWS source. The following mechanisms would help ensure proper management of the PSOC.

##### Notification of Key Town and State Personnel

The following key town, water system, and state personnel need to be notified of any potential water quality threats within the SPA:

##### *Waitsfield Town Clerk:*

- Ms. Jennifer Peterson  
Nine Bridge St.  
Waitsfield, Vermont 05673  
(802) 496-2218

*Waitsfield Town Health Officer:*

- Dr. Francis Cook  
859 Old County Rd.  
Waitsfield, Vermont 05673  
(802) 496-3838

*Town of Waitsfield Water System:*

- Valerie Capels – Town Administrator  
Nine Bridge St.  
Waitsfield, Vermont 05673  
(802) 496-2218

*Department of Environmental Conservation:*

- Mr. Scott Stewart  
DEC Water Supply Division  
103 South Main Street  
Waterbury, Vermont 05671-0403  
(802) 241-3426

- Ed Stanak – Natural Resources Board-Act 250  
DEC Barre Regional Office  
5 Perry St., Suite 80  
Barre, VT 05641-4268  
(802) 476-0186

Copies of a letter to be sent to these key personnel notifying them of the implementation of this SPP, and their responsibilities associated with it, are included on pages 5 and 6 of the Appendix. This letter would be sent after final approval of this SPP by the WSD.

#### Identification and Notification of Landowners within the SPA

Names and addresses of all landowners within the SPA are included in the list presented on page 6 of the Appendix. Following approval of this plan, all landowners would be notified of their property's presence within the SPA, and steps that should be taken to ensure continued protection of drinking water quality. A copy of a sample letter to be sent to these landowners notifying them of the implementation of this SPP, and their responsibilities associated with it, is included on pages 7 through 9 of the Appendix. This letter would be sent after final approval of this SPP by the WSD.

Generally, management of land uses and PSOCs within the SPA would be through public educational efforts via the letters discussed above which discuss the landowner's presence within the SPA and basic management techniques that can be used to minimize risk to

groundwater quality. If the Town of Waitsfield so desires, they may implement local ordinances geared toward minimizing contamination risks within the SPA.

### SPP Updates

The Town of Waitsfield will update this SPP every three years after it has been approved. This will involve an update of the landowner list, PSOC inventory, and updated notification letters to any new landowners and to the owners/operators of any new PSOC, informing them of their presence within the SPA and proper PSOC management techniques. The listed key personnel would also receive notification of PSOC changes within the SPA.

The Town of Waitsfield will control the 125-foot radius well isolation zone by easement. The Town would manage the isolation zone, which will only be used for water-system components as allowed by the Rule, Appendix A, section 3.3.1.2(e)(1). No other changes in land use would occur in the vicinity of this well. No prohibited land uses, as specified in the Rule, Appendix A, Section 3.3.1.2(e)(2), would be allowed within the 125-foot radius well isolation zone.

## **5.0 CONTINGENCY PLAN**

In the event of prolonged contamination, hazardous waste spill event or catastrophic loss of the current water supply, the water system operator should follow the following contingency plan:

System Failure due to Bacterial Contamination:

1. In the event that water from the well becomes biologically contaminated, pumped groundwater would be chlorinated before distribution. The water system is designed to be equipped with standby chlorination equipment. The well and storage tank will be shock-chlorinated if samples indicate that the problem persists.
  
2. The water system operator will obtain samples from the finished water. If bacterial contamination persists, the well will be deactivated.
  
3. In the unlikely event that water from the well becomes biologically contaminated, and is not treatable with chlorination, potable water will be trucked in from water haulers in the area and deposited in the storage tank. A list of bulk water haulers is provided in the Appendix, page 10. This is considered an emergency source of water, and therefore a boil water notice will be issued, as required by the Rule. See page 11 of the Appendix for a sample Boil Notification to be delivered to all residents. The WSD will be promptly notified (1-800-823-6500) that an emergency source is being used. Bottled water may also be provided to residents for drinking.

System Failure due to Catastrophic Loss of Supply:

1. The first course of action to be followed if there is a shortage of water is to determine if it is due to an easily repairable problem (i.e., well pump motor failure, leaking water main, leaking reservoir, booster pump motor failure, or a malfunction with electronics or controls), or due to a more serious situation (i.e., depletion of the aquifer or collapse of the well borehole). The operator should initially inspect the water system to check for leaks, functioning of the control switches and motors, and proper electrical current to diagnose any water shortage. Measurement of static and operating water levels in the well, in conjunction with pumping rates, is recommended to diagnose potential problems with the well and aquifer. Down-well camera inspection may be useful to determine the nature of well problems.

2. In the event that there is a loss of supply (i.e., severe drought, or collapse of the well), potable water will be trucked in and deposited into the water storage reservoir. This is considered an emergency source of water, and therefore a Boil Water Notification will be issued, as required by the Rule. The WSD will be promptly notified (1-800-823-6500) that an emergency source is being used. Bulk water haulers are listed on page 10 of the Appendix. See page 11 of the Appendix for a sample Boil Water Notification to be delivered to all residents.

In the event of prolonged water shortages, the system operator will notify all water users of the problem, and may require water conservation measures (i.e., banning lawn watering, car washing, and other non-essential uses of water). The WSD will be promptly notified of system failure (1-800-823-6500).

3. A second option in the event that there is a loss of supply (i.e., severe drought, or collapse of the well) is to provide water from the emergency well (the LeClair Well), located next to the water storage tank. See Source Protection Area map on page 2 of the Appendix. The emergency well has a driller's reported yield of 18 gallons per minute (gpm), with most of the water encountered between 325 to 480 feet deep. Therefore an emergency pump that can produce 18 gpm may be set 480 feet deep. The emergency well can be activated by installing a temporary pump in the well and connecting it with hoses to the chlorination building so the water can be chlorinated and fed into the storage tank. A generator should be used to supply power to the temporary pump. This is considered an emergency source of water, and therefore a boil water notice will be issued, as required by the Rule. The WSD will be promptly notified (1-800-823-6500) that an emergency source is being used. See page 11 of the Appendix for a sample Boil Notification to be delivered to all residents.

4. Residents will be asked to limit non-essential water usage.

5. Well Modification: In some situations, bedrock wells can lose yield due to accumulation of fine material (silt, clay minerals, and rock particles) in the fractures leading to the wellbore. Removal of this material by high-pressure jetting can successfully improve a well's yield in some cases. A well investigation (see item 1 above) is recommended prior to any well modifications, and the WSD must be notified before performing the modifications. Hydrofracturing or deepening of the well may be a viable option to increase yield.

Loss of Water Due to Hazardous Spill Event:

1. The water system operator should contact the following Agencies in the event of a hazardous spill:
  - Vermont Water Supply Division, Waterbury, VT:  
Mr. Scott Stewart  
(800) 823-6500  
(802) 241-3400
  - Vermont Department of Health, Environmental Health Division  
(802) 863-7220

- Waitsfield Town Administrator:  
Ms. Valerie Capels  
(802) 496-2218
  
- Waitsfield Health Officer:  
Dr. Francis Cook  
(802) 496-3838
  
- Waitsfield Fire Department and Emergency Services  
(802) 496-2400  
911
  
- DEC Hazardous Materials Spills Hotline  
(800) 641-5005
  
- EPA National Response Center  
(800) 424-8802
  
- Vermont State Police – Head Quarters (Dispatch)  
(802) 244-8727

- Water System Hydrogeologists:  
Pioneer Environmental Associates, LLC.  
(802) 877-1380
  
- Water System Engineers:  
Phelps Engineering  
(802) 388-7829

2. If a well source is threatened: Immediately deactivate well. Continued use of uncontaminated storage tank volumes may occur under this scenario; collect sample of storage tank water for laboratory analysis to determine if contamination has reached the well/storage tank. The WSD will be promptly notified (1-800-823-6500).

3. If the well has been contaminated (that is, if contaminant is present in water pumped from the well to the storage tank): deactivate the well, close the main valve to distribution system, and drain the storage tank. Sample water from taps in distribution system: if contaminated water has entered distribution system, notify users to consume bottled water until further notice and drain distribution system. Refill storage tank using bulk delivery water (bulk water haulers are listed on page 10 of the Appendix). Sample the storage tank for known contaminants; repeat draining and refilling of storage tank until water is uncontaminated. Re-open main valve to distribution

system and reactivate booster pumps only when water in reservoir is determined to be uncontaminated, and the WSD has authorized this in writing. Obtain tap samples from locations in distribution system until contaminant is not present, and for longer if required by the WSD. Continue to operate reservoir using trucked-in water until the hazardous spill has been remediated, the well decontaminated, and re-use of the well has been specifically authorized in writing by the WSD. (Note that a Boil Water Notification shall be sent to all users as long as trucked-in water is being used).

4. When adequate hazardous spill containment/remediation is achieved, pump contaminated well to waste for several hours in order to purge well and obtain a confirmatory water sample prior to putting well back on-line. Reactivate well only after authorized by WSD.

## REFERENCES

Pioneer 2007. Phelps Engineering, Inc., Town of Waitsfield, Source Evaluation Report: Well R-1, March 22, 2007. Pioneer Environmental Associates, LLC., Vergennes, VT. 30 pp. plus appendices.