Massachusetts Department of Environmental Protection

Source Water Assessment and Protection (SWAP) Report

for

Belchertown Water District

What is SWAP?

The Source Water Assessment Program (SWAP), established under the federal Safe Drinking Water Act, requires every state to:

- inventory land uses within the recharge areas of all public water supply sources;
- assess the susceptibility of drinking water sources to contamination from these land uses; and
- publicize the results to provide support for improved protection.

Susceptibility and Water Quality

Susceptibility is a measure of a water supply's potential to become contaminated due to land uses and activities within its recharge area.

A source's susceptibility to contamination does *not* imply poor water quality.

Water suppliers protect drinking water by monitoring for more than 100 chemicals, disinfecting, filtering, or treating water supplies, and using source protection measures to ensure that safe water is delivered to the tap.

Actual water quality is best reflected by the results of regular water tests. To learn more about your water quality, refer to your water supplier's annual Consumer Confidence Reports.

Table 1: Public Water System Information

PWS Name	Belchertown Water District
PWS Address	206 Jabish St., PO Box 801
City/Town	Belchertown
PWS ID Number	1024000
Local Contact	Mr. Timothy Lofland
Phone Number	413-323-6987

Introduction

We are all concerned about the quality of the water we drink. Drinking water wells may be threatened by many potential contaminant sources, including storm runoff, road salting, and improper disposal of hazardous materials. Citizens and local officials can work together to better protect these drinking water sources.

Purpose of this report:
This report is a planning tool to support local and state efforts to improve water supply protection. By identifying land uses within water supply protection areas that may be potential sources of contamination, the assessment helps focus protection efforts on appropriate best management practices (BMPs) and drinking water source protection measures.

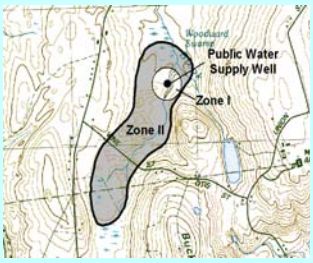
Refer to Table 3 for Recommendations to address potential sources of contamination. Department of Environmental Protection (DEP) staff are available to provide information about funding and other resources that may be available to your community.

This report includes the following sections:

1. Description of the Water System
2. Land Uses within Protection Areas
3. Source Water Protection Conclusions and Recommendations
4. Appendices

What is a Protection Area?

A well's water supply protection area is the land around the well where protection activities should be focused. Each well has a Zone I protective radius and a Zone II protection area.



Glossary

Aquifer: An underground water-bearing layer of permeable material that will yield water in a usable quantity to a well.

Hydrogeologic Barrier: An underground layer of impermeable material (i.e. clay) that resists penetration by water.

Recharge Area: The surface area that contributes water to a well.

Zone I: The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. This area should be owned or controlled by the water supplier and limited to water supply activities.

Zone II: The primary recharge area for the aquifer. This area is defined by hydrogeologic studies that must be approved by DEP. Refer to the attached map to determine the land within your Zone II.

Section 1: Description of the Water System

Groundwater Sources

Zone II #: 208	***Susceptibility: High***
Well Name	***Source ID***
Daigle Well	1024000-05G
Zone II #: 112	***Susceptibility: High***
Source Name:	***Source ID***
Jabish Brook Well #1	1024000-01G
Jabish Brook Well #2	1024000-02G
Jabish Brook Well #3	1024000-03G
Jabish Brook Well #4	1024000-04G

Belchertown Water District supply consists of by five groundwater sources: Jabish Brook wells #1, 2, 3, and 4 (1024000-01G, 02G, 03G, and 04G), and Daigle well (1024000-05G). Each well has a Zone I radius of 400 feet. The Jabish Brook wells are located off Johnson Road, east of the center of town. These wells are equipped with submersible pumps and are manifolded together to produce a cumulative yield of 324,000 gallons per day (gpd) with a pumping capacity of 355 gallons per minute (gpm). Well #1 is 16 x 24-inch gravel-packed, 38 foot deep well. Wells 2, 3, and 4 are all 8 x 12-inch gravel packed wells, with depths of 40, 39, and 38 feet respectively. The Daigle well is located off of Federal Street in the northwest section of town. It is a 12 x 18-inch, gravel-packed well with a well screen set to 89 feet to 104 feet below grade, and has an approved yield of 1.3 millions of gallons per day (mgd). The Jabish Brook Wellfield (1024000-06G) is an emergency source and is not addressed in this report, however 06G is proximal to wells 1, 2, 3 and 4.

The Daigle well utilizes water from a confined sand and gravel aquifer, upgradient and in the same formation as the Amherst water supply wells. The bedrock valley was deepened by advancing glaciers and later filled with sand and gravel overlain by silt and clay from glacial Lake Hitchcock and Lake Lawrence some 18,000 years before present. The confining clay layer is primarily contiguous through the center of the buried valley with the clay layer pinching out toward the edges of the aquifer allowing significant recharge along the basin boundaries. The Zone II for this well includes the perimeter of the basin where the silt and clay units are discontinuous and inter-fingered with sand and gravel deposits resulting in a semi-confined recharge area. The Zone II was delineated as required under the Department's New Source Approval Process and was based on conceptual, numerical and analytical modeling of the aquifer. Please refer to the attached map to view the boundaries of the Zone II.

The Jabish Brook wells utilize a different aquifer, and have a different Zone II. These wells are located in a complex depositional environment of outwash deposits and ice-channel sediments exhibiting distinct layers of sand and gravel. This aquifer is semi-confined, with only a partial confining layer of clay or silt.

Wells located in these geological conditions are considered to have a high vulnerability to contamination due to the absence of hydrogeologic barriers that can prevent contaminant migration from the surface.

The District is conducting a pilot study on corrosion control using sodium carbonate on the water pumped from the Daigle and Jabish Brook wells. The chemical is injected directly into the discharge line to the distribution system. For current information on monitoring results and treatment, please contact the Public Water System contact person listed above in Table 1 for a copy of the most recent Consumer Confidence Report. Drinking water monitoring reporting data are also available on the web at http://www.epa.gov/safewater/ccr1.html.

For More Information

Contact Catherine V. Skiba in DEP's Springfield Office at (413) 755-2119 for more information and assistance on improving current protection measures.

Copies of this report have been provided to the public water supplier, board of health, and the town.

Section 2: Land Uses in the Protection Areas

The Zone IIs for Belchertown's wells is a mixture of residential, agricultural,

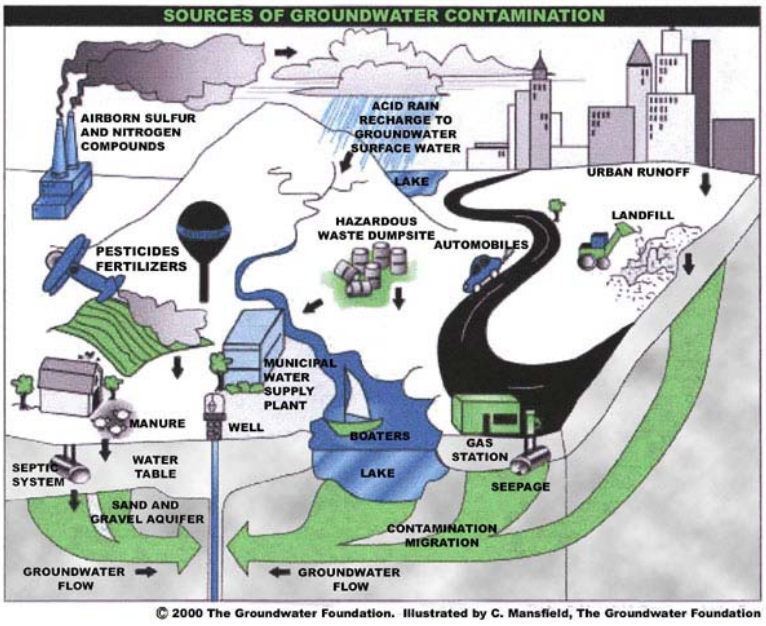
and some light commercial and industrial areas (refer to attached map for details). Land uses and activities that are potential sources of contamination are listed in Table 2, with further detail provided in the Table of Regulated Facilities and Table of Underground Storage Tanks in Appendix B.

Key Land Uses and Protection Issues include:

1. Residential land uses
2. Transportation corridors
3. Hazardous materials storage and use
4. Comprehensive wellhead protection planning
5. Agricultural activities

The overall ranking of susceptibility to contamination for the system is high, based on the presence of at least one high threat land use within the water supply protection areas, as seen in Table 2.

1. Residential Land Uses – Approximately 14% of the Zone II #208 consists of residential areas, and about 38% in the Zone II #112. From this perspective, residential land uses are more of a potential threat within the Zone II #112 than in #208. None of the areas have public sewers; all use septic systems. If managed improperly, activities associated with residential areas can contribute to drinking water contamination. Common potential sources of contamination include:



- **Septic Systems** – Improper disposal of household hazardous chemicals to septic systems is a potential source of contamination to the groundwater because septic systems lead to the ground. If septic systems fail or are not properly maintained they can be a potential source of microbial contamination.
- **Household Hazardous Materials** - Hazardous materials may include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. Improper use, storage, and disposal of chemical products used in homes are potential sources of contamination.
- **Heating Oil Storage** - If managed improperly, Underground and Aboveground Storage Tanks (UST and

AST) can be potential sources of contamination due to leaks or spills of the fuel oil they store.

- **Stormwater** – Catch basins transport stormwater from roadways and adjacent properties to the ground. As flowing stormwater travels, it picks up debris and contaminants from streets and lawns. Common potential contaminants include lawn chemicals, pet waste, and contaminants from automotive leaks, maintenance, washing, or accidents.

Residential Land Use Recommendations:

✓ Educate residents on best management practices (BMPs) for protecting water supplies. Distribute the fact sheet "Residents Protect Drinking Water" available in Appendix A and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMPs for common residential issues.

✓ Work with planners to control new residential developments in the water supply protection areas.

✓ Promote BMPs for stormwater management and pollution controls. Continue catch basin cleaning routines.

2. Transportation Corridors - Route 9 and local roads are common throughout the both of the Zone IIs. Roadway construction, maintenance, and typical highway use can all be potential sources of contamination. Accidents can lead to spills of gasoline and other potentially dangerous transported chemicals. Roadways are frequent sites for illegal dumping of hazardous or other potentially harmful wastes. De-icing salt, automotive chemicals and other debris on roads are picked up by stormwater and wash in to catchbasins.

Transportation Corridor Recommendations:

✓ Identify stormwater drains and the drainage system along transportation corridors. Wherever possible, ensure that drains discharge stormwater outside of the Zone II.

✓ Work with the Town and State to have catch basins inspected, maintained, and cleaned on a regular schedule. Street sweeping reduces the amount of potential contaminants in runoff.

✓ Work with local emergency response teams to ensure that any spills within the Zone II can be effectively contained.

✓ If storm drainage maps are available, review the maps with emergency response teams. If maps aren't yet available, work with town officials to investigate mapping options such as the upcoming Phase II Stormwater Rule requiring some communities to complete stormwater mapping.

3. Hazardous Materials Storage and Use – A very small percentage (<1%) of the land area within the Zone II #208 is commercial or industrial land uses, about 2% in the Zone II #112. Many small businesses and industries use hazardous materials, produce hazardous waste products, and/or store large quantities of hazardous materials in UST/AST. If hazardous materials are improperly stored, used, or disposed, they become potential sources of contamination. Hazardous materials should never be disposed of to a septic system or floor drain leading directly to the ground.

Benefits of Source Protection

Source Protection helps protect public health and is also good for fiscal fitness:

- Protects drinking water quality at the source
- Reduces monitoring costs through the DEP Waiver Program
- Treatment can be reduced or avoided entirely, saving treatment costs
- Prevents costly contamination clean-up
- Preventing contamination saves costs on water purchases, and expensive new source development

Contact your regional DEP office for more information on Source Protection and the Waiver

What are "BMPs?"

Best Management Practices (BMPs) are measures that are used to protect and improve surface water and groundwater quality. BMPs can be structural, such as oil & grease trap catch basins, nonstructural, such as hazardous waste collection days or managerial, such as employee training on proper disposal

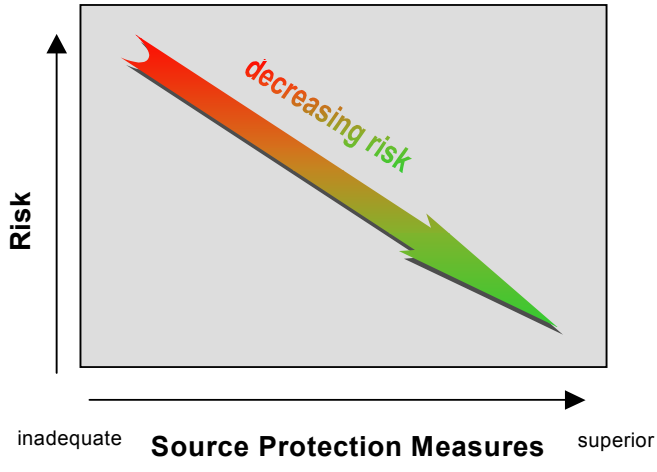


Figure 2: Risk of contamination decreases as source protection increases. This is true for public water systems of any susceptibility ranking, whether High, Moderate, or Low.

Table 2: Land Use in the Protection Areas (Zones I and II)

For more information, refer to Appendix B: Regulated Facilities within the Water Supply Protection Area

Land Uses	Quantity	Threat	Zone II Effected	Potential Contaminant Sources*
Agricultural				
Dairy Farms	1	Moderate	208	Manure (microbial contaminants): improper handling
Fertilizer Storage or Use	Numerous	Moderate	208	Fertilizers: leaks, spills, improper handling, or over-application
Livestock Operations	4	Moderate	208	Manure (microbial contaminants): improper handling [2 horse farms, 1 emu farm, 1 rabbit farm]
Nurseries	1	Moderate	208	Fertilizers, pesticides, and other chemicals: leaks, spills, improper handling, or over-application [1 Greenhouse]
Pesticide Storage or Use	Numerous	High	208	Pesticides: leaks, spills, improper handling, or over-application
Commercial				
Gas Stations	1	High	208	Automotive fluids and fuels: spills, leaks, or improper handling or storage
Service Stations/ Auto Repair Shops	2	High	208 & 112	Automotive fluids and solvents: spills, leaks, or improper handling
Railroad Tracks	1	High	208	Herbicides: over-application or improper handling; fuel storage, transported chemicals, and maintenance chemicals: leaks or spills
Sand And Gravel Mining/Washing	1	Moderate	208	Heavy equipment, fuel storage, clandestine dumping: spills or leaks (another operation very near but outside of Zone II #112)
Industrial				
Fuel Oil Distributors	1	High	208	Fuel oil: spills, leaks, or improper handling or storage
Hazardous Materials Storage and Waste Storage	Numerous	High	208	Hazardous materials: spills, leaks, or improper handling or storage
Miscellaneous				
Aboveground Storage Tanks	Numerous	Moderate	208 112	Materials stored in tanks: spills, leaks, or improper handling
Composting Facilities	1	Low	208	Organic material, animal waste, and runoff: storage and improper handling
Small quantity hazardous waste generators	2	Moderate	208 112	Hazardous materials and waste: spills, leaks, or improper handling or storage
Stormwater Drains/ Retention Basins	Numerous	Low	208	Debris, pet waste, and chemicals in stormwater from roads, parking lots, and lawns
Transportation Corridors	Numerous	Moderate	208	Fuels and other hazardous materials: accidental leaks or spills; pesticides: over-application or improper handling
Underground Storage Tanks	2	High	208 112	Stored materials: spills, leaks, or improper handling
Very Small Quantity Hazardous Waste Generator	5	Low	208 112	Hazardous materials and waste: spills, leaks, or improper handling or storage

Land Uses	Quantity	Threat	Locale	Potential Contaminant Sources*
Residential				
Fuel Oil Storage (at residences)	Numerous	Moderate	208	Fuel oil: spills, leaks, or improper handling (Most USTs have been removed)
Lawn Care / Gardening	Numerous	Moderate	208	Pesticides: over-application or improper storage and disposal
Septic Systems / Cesspools	Numerous	Moderate	208	Hazardous chemicals: microbial contaminants, and improper disposal

Notes:

1. When specific potential contaminants are not known, typical potential contaminants or activities for that type of land use are listed. Facilities within the watershed may not contain all of these potential contaminant sources, may contain other potential contaminant sources, or may use Best Management Practices to prevent contaminants from reaching drinking water supplies.
2. For more information on regulated facilities, refer to Appendix B: Regulated Facilities within the Water Supply Protection Area information about these potential sources of contamination.
3. For information about Oil or Hazardous Materials Sites in your protection areas, refer to Appendix C: Tier Classified Oil and/or Hazardous Material Sites.

*** THREAT RANKING** - The rankings (high, moderate or low) represent the relative threat of each land use compared to other PSCs. The ranking of a particular PSC is based on a number of factors, including: the type and quantity of chemicals typically used or generated by the PSC; the characteristics of the contaminants (such as toxicity, environmental fate and transport); and the behavior and mobility of the pollutants in soils and groundwater.

Potential Source of Contamination vs. Actual Contamination

The activities listed in Table 2 are those that typically use, produce, or store contaminants of concern, which, if managed improperly, are potential sources of contamination (PSC).

It is important to understand that a release may never occur from the potential source of contamination provided facilities are using best management practices (BMPs). If BMPs are in place, the actual risk may be lower than the threat ranking identified in Table 2. Many potential sources of contamination are regulated at the federal, state and/or local levels, to further reduce the risk.

Hazardous Materials Storage and Use Recommendations:

- ✓ Educate local businesses on best management practices for protecting water supplies. Distribute the fact sheet "Businesses Protect Drinking Water" available in Appendix A and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMP's for common business issues.
- ✓ Work with local businesses to register those facilities that are unregistered generators of hazardous waste or waste oil. Partnerships between businesses, water suppliers, and communities enhance successful public drinking water protection practices.
- ✓ Educate local businesses on Massachusetts floordrain requirements. See brochure "Industrial Floor Drains" for more information.

4. Protection Planning – Currently, the Town does not have water supply protection controls that meet DEP's Wellhead Protection regulations 310 CMR 22.21(2). Protection planning protects drinking water by managing the land area that supplies water to a well. A Wellhead Protection Plan coordinates community efforts, identifies protection strategies, establishes a timeframe for implementation, and provides a forum for public participation. There are resources available to help communities develop a plan for protecting drinking water supply wells. Amherst has approximately 90% of the Wellhead Protection Planning Components in place; the plan needs to be formalized and submitted to the Department, and public education and outreach needs to strengthened and continued.

Protection Planning Recommendations:

- ✓ Develop a Wellhead Protection Plan. Establish a protection team, and refer them to http://mass.gov/dep/brp/dws/protect.htm for a copy of DEP's guidance, "Developing a Local Wellhead Protection Plan".
- ✓ Coordinate efforts with local officials to review local wellhead protection controls with current MA Wellhead Protection Regulations 310 CMR 22.21 (2). There are no local controls for the Lawrence Swamp aquifer. Adopt controls that meet 310 CMR 22.21(2). For more information on DEP land use controls see http://mass.gov /dep/brp/dws/protect.htm.
- ✓ If local controls do not regulate floordrains, be sure to include floordrain controls that meet 310 CMR 22.21(2).

5. Agricultural Activites – There are several farms on the western edge of the Zone II. Crop and pasture lands make up about 16% of the land use in Zone II #208, 4% in the Zone II #112. Pesticides and fertilizers have the potential to contaminate a drinking water source if improperly stored, applied, or disposed. If not contained or applied properly, animal waste from barnyards, manure pits and field application are potential sources of contamination to ground and surface water.

Agricultural Activities Recommendation:

- ✓ Work with farmers in your protection areas to make them aware of your water supply and to encourage the use of a US Natural Resources Conservation Service farm plan to protect water supplies.

Other land uses and activities within the Zone IIs that have potential for contamination include auto repair shops, gas stations, large equipment storage, and a greenhouse. Refer to Table 2 and Appendix 2 for more information about these land uses.

Identifying potential sources of contamination is an important initial step in protecting your drinking water sources. Further local investigation will provide more in-depth information and may identify new land uses and activities that are potential sources of contamination. Once potential sources of contamination are identified, specific recommendations like those listed above and below should be used to better protect your water supply.

Top 5 Reasons to Develop a Local Wellhead Protection Plan

❶ Reduces Risk to Human Health

❷ Cost Effective! Reduces or Eliminates Costs Associated With:

- Increased groundwater monitoring and treatment
- Water supply clean up and remediation
- Replacing a water supply
- Purchasing water

❸ Supports municipal bylaws, making them less likely to be challenged

❹ Ensures clean drinking water supplies for future generations

❺ Enhances real estate values – clean drinking water is a local amenity. A community known for its great drinking water in a place people want to live and businesses want to locate.

Section 3: Source Water Protection Conclusions and Recommendations

Current Land Uses and Source Protection:

As with many water supply protection areas, the system Zone IIs contain potential sources of contamination. However, source protection measures reduce the risk of actual contamination, as illustrated in Figure 2. The water supplier is commended for taking an active role in promoting source protection measures in the Water Supply Protection Areas through:

- Implementation of protective bylaws for the Jabish Brook watershed. We encourage Belchertown to expand the protection district to the Lawrence Swamp aquifer and adopt floor drain regulations throughout the Town.

Source Protection Recommendations:

To better protect the sources for the future:

- ✓ Work with the planning board to propose protective bylaws for the Lawrence Swamp aquifer area.
- ✓ Inspect the Zone I regularly, and when feasible, remove any non-water supply activities.

- ✓ Educate residents on ways they can help you to protect drinking water sources.
- ✓ Conduct a survey of all USTs in the Zone IIs and encourage or fund as feasible the removal of those threats.
- ✓ Work with emergency response teams to ensure that they are aware of the stormwater drainage in your Zone II and to cooperate on responding to spills or accidents.
- ✓ Partner with local businesses to ensure the proper storage, handling, and disposal of hazardous materials.
- ✓ Monitor progress on any ongoing remedial action conducted for the known oil or contamination sites.
- ✓ Work with farmers in your protection areas to make them aware of your water supply and to encourage the use of a NRCS farm plan to protect water supplies.
- ✓ Develop and implement Wellhead Protection Plans.

Resources for Drinking Water Source Protection:
These recommendations are only part of your ongoing local drinking water source protection. Additional source protection recommendations are listed in Table 3, the Key Issues above and Appendix A.

DEP staff, informational documents, and resources are available to help you build on this SWAP report as you continue to improve drinking water protection in your community. The Department's Wellhead Protection Grant Program and Source Protection Grant Program provide funds to assist public water suppliers in addressing water supply source protection through local projects. Protection recommendations discussed in this document may be eligible for funding under the Grant Program. Please note: each spring DEP posts a new Request for Response for the grant program (RFR).

Other grants and loans are available through the Drinking Water State Revolving Loan Fund, the Clean Water State Revolving Fund, and other sources. For more information on grants and loans, visit the Bureau of Resource Protection's Municipal Services web site at: http://mass.gov/dep/brp/mf/mfpubs.htm.

What is a Zone III?

A Zone III (the secondary recharge area) is the land beyond the Zone II from which surface and ground water drain to the Zone II and is often coincident with the watershed boundary.

The Zone III is defined as a secondary recharge area for one or both of the following reasons:

1. The low permeability of underground water bearing materials in this area significantly reduces the rate of groundwater and potential contaminant flow to the Zone II .

2. The groundwater in this area probably discharges to surface water feature such as a river rather than discharging directly into the aquifer.

Land uses within the Zone III are not assessed for SWAP reports unless the source is under the direct influence of groundwater.

Additional Documents:

To help with source protection efforts, more information is available by request or online at mass.gov/dep/brp/dws including:

1. Water Supply Protection Guidance Materials such as model regulations, Best Management Practice information, and general water supply protection information.
2. MA DEP SWAP Strategy
3. Land Use Pollution Potential Matrix
4. Draft Land/Associated Contaminants Matrix

Conclusions:
The assessment and protection recommendations in this SWAP report are provided as a tool to encourage community discussion, support ongoing source protection efforts, and help set local drinking water protection priorities. Citizens and community officials should use this SWAP report to spur discussion of local drinking water protection measures. The water supplier should supplement this SWAP report with local information on potential sources of contamination and land uses. Local information should be maintained and updated periodically to reflect land use changes in the Zone II. Use this information to set priorities, target inspections, focus education efforts, and to develop a long-term drinking water source protection plan.

Section 4: Appendices

A. Protection Recommendations
B. Regulated Facilities within the Water Supply Protection Area
C. Additional Documents on Source Protection

Table 3: Current Protection and Recommendations

Protection Measures	Status	Recommendations
Zone I		
Does the Public Water Supplier (PWS) own or control the entire Zone I?	**NO**	Follow Best Management Practices (BMP's) that focus on good housekeeping, spill prevention, and operational practices to reduce the use and release of hazardous materials. Investigate purchasing the Zone I land.
Is the Zone I posted with "Public Drinking Water Supply" Signs?	**YES**	Additional economical signs are available from the Northeast Rural Water Association (802) 660-4988.
Is Zone I regularly inspected?	**YES**	Continue daily inspections of drinking water protection areas.
Are water supply-related activities the only activities within the Zone I?	**NO**	Continue monitoring non-water supply activities in Zone Is.
Municipal Controls (Zoning Bylaws, Health Regulations, and General Bylaws)		
Does the municipality have Wellhead Protection Controls that meet 310 CMR 22.21 (2)?	**NO**	The Town "Aquifer Protection District" has bylaws for wellhead protection in Jabish Brook. There is no protection for the Daigle Well. Refer to www.state.ma.us/dep/brp/dws/ for model bylaws and health regulations and current regulations.
Do neighboring communities protect the Zone II areas extending into their communities?	**YES**	Amherst has wellhead controls, however, Belchertown does not for the Daigle Well.
Planning		
Does the PWS have a Wellhead Protection Plan?	**NO**	Develop a wellhead protection plan. Follow "Developing a Local Wellhead Protection Plan" available at: www.state.ma.us/dep/brp/dws/.
Does the PWS have a formal "Emergency Response Plan" to deal with spills or other emergencies?	**NO**	Augment plan by developing a joint emergency response plan with fire department, Board of Health, DPW, and local and state emergency officials. Coordinate emergency response drills with local teams.
Does the municipality have a wellhead protection committee?	**NO**	Establish committee; include representatives from citizens' groups, neighboring communities, and the business community.
Does the Board of Health conduct inspections of commercial and industrial activities?	**NO**	For more guidance see "Hazardous Materials Management: A Community's Guide" at www.state.ma.us/dep/brp/dws/files/hazmat.doc
Does the PWS provide wellhead protection education?	**NO**	Aim education at schools and commercial, industrial and municipal uses within the Zone II.