# Step Five

## DEVELOP CONTINGENCY PLANS

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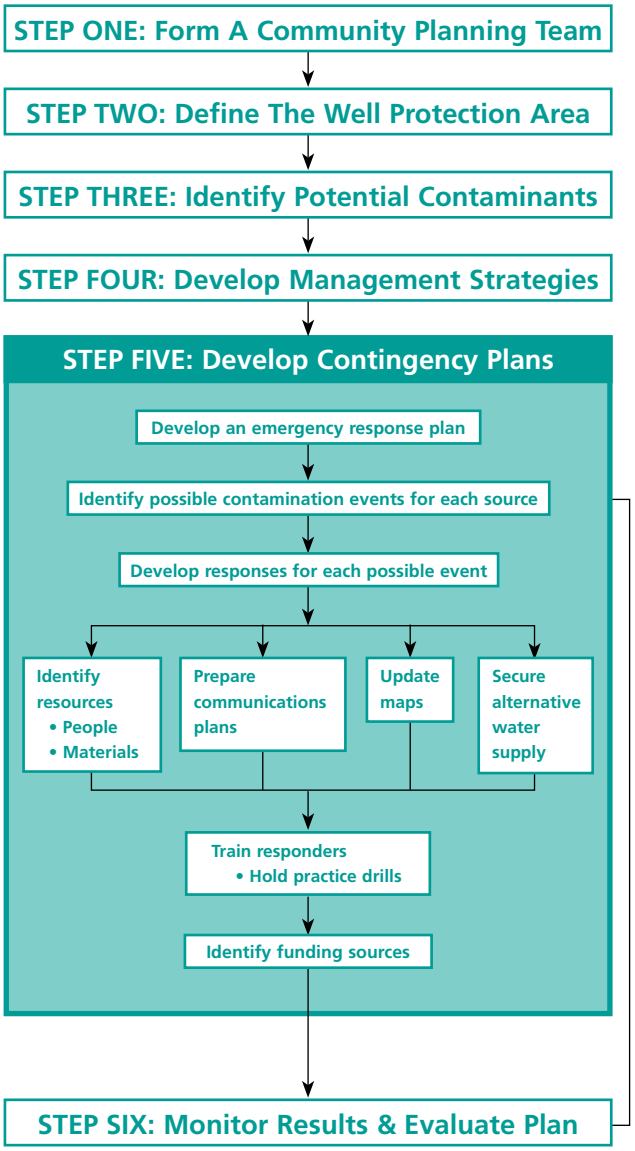


More than 1,000,000 British Columbians rely on groundwater as their source of drinking water, and there are thousands of community well systems in British Columbia. A well protection plan allows communities to identify land use activities that may threaten the quality of their well water, and to develop a strategy to avoid or minimize these threats.

There are six steps to follow in developing a well protection plan:

1. Form a community planning team
2. Define the well protection area
3. Identify potential contaminants
4. Develop and implement management strategies
5. Develop contingency plans
6. Monitor results and evaluate the plan

These steps are described in the six booklets that make up the *Well Protection Toolkit*. Each booklet describes activities that lead to the development and implementation of a well protection plan. In each step, a fictional case study of the town of Pumphandle shows how one community took on this challenge.

## Step Five: Develop Contingency Plans

The fifth step is the development of contingency plans that will allow the team to react quickly and appropriately to a contamination event. It involves preparing a plan of action to respond to all possibilities – from a major spill in the capture zone to minor spills close to the well. These contingency plans involve an emergency response and contingency component.

Emergency response procedures, which the *Drinking Water Protection Act* and Drinking Water Regulation requires each water purveyor to prepare, typically consist of a set of standard operating procedures for handling different emergencies specific to the waterworks system. Contingency planning involves identifying the range of possible contamination events for each of the potential sources listed in Step Three, and developing a set of appropriate responses. This includes finding out who can respond to events and what materials they will need, and providing training and simulation exercises so that the team is ready to put plans into action. The planning team should also be ready to issue public drinking water advisories on short notice and to update maps to include necessary information. The contingency plan will also identify alternative water supplies in case of contamination.

Figure 5.1 shows the stages of Step Five.

# Develop Contingency Plans

## OBJECTIVES

- To identify potential contamination events that could pollute the well supply
- To identify mitigation measures to minimize an event
- To identify appropriate responses to possible contamination events
- To identify and secure the resources, including funding available to respond to contingency needs
- To ensure information to support an emergency response is updated on maps and lists
- To identify and secure alternative sources of water in case of emergency
- To be prepared to issue public advisories at short notice

No matter how effectively you manage your well protection area, there is still a chance that an unforeseen event or accident may contaminate the water supply. Contamination can be very costly to clean up. In some cases, it may not be cost effective or even possible to clean up, and the well must be abandoned. Finding a new drinking water supply may not be an easy task.

Step Five includes dealing with emergency events that impact the water supply and contingency measures that ensure the community and the residents within the well protection area continue to receive potable water. Step Five includes both the emergency response procedures and contingency plans.

In many documents, the terms "emergency response plan" and "contingency plan" are used interchangeably. In British Columbia, water purveyors must prepare an emergency response plan as part of their regulatory responsibility under the *Drinking Water Protection Act* and Drinking Water Regulation. In Step Five the water purveyor's emergency response plan is used as the foundation for building the contingency plan for the well protection area.
The emergency response plans and the contingency plan are integrally related.

**Examples of Emergencies**

- Flood
- Earthquake
- Loss of source
- Spill or chemical contamination
- Sabotage
- Power outage
- Operator error
- Pump failure
- Broken water main
- Backflow conditions.

## 5.1 Prepare an Emergency Response Plan

The emergency response plan is a set of standard operating procedures that addresses a number of emergency situations that are specific to the waterworks systems. Each water purveyor has an emergency response plan, which covers situations that prevent them from supplying potable water to the community. This emergency response plan may already contain many of the necessary elements that could be in the contingency plan.

The Ministry of Health has prepared a booklet entitled *Emergency Response Planning for Small Water Systems*.[1] This booklet is designed to be used by smaller facilities, (e.g. trailer parks, campsites, motels, restaurants and mobile home facilities), however it is also a useful review document for operators of larger waterworks systems.

Find out about other emergency plans in your area. For example, does the chemical manufacturer have an emergency plan, or set of operating procedures

[1] Ministry of Health, 1994. *Emergency Planning for Small Water Systems*. Copies are available from your local health authority. Copies can also be downloaded electronically from www.healthservices.gov.bc.ca/protect/pdf/PHI061.PDF

## DISEASE OUTBREAK

During the winter of 1996/97, a sewer main broke approximately one hundred metres from two wells supplying drinking water to a small municipality in the southern interior of B.C.. Partially under snow cover, sewage travelled across the frozen ground to a point where it entered a gravel seam, which led directly to the aquifer from which the well was drawing its water.

The community water system became contaminated with an unidentified virus. A waterborne disease outbreak began on January 6th 1997. By January 19th, approximately 88% of the population became ill.

A well protection plan could have identified this potential emergency scenario and allowed for a more rapid response, and fewer health problems for the community.

in case of a fire? Many facilities will already have emergency response plans, which you may choose to include in your plan. The team should work with these facilities to review and update their emergency response plans, so that they include procedures that minimize the impact on the groundwater. During the contaminant survey in Step Three, ask commercial and industrial operators if they have developed emergency plans.

The planning team should be prepared to respond to all likely contamination events. In developing an emergency response plan consider the following questions:

- What are the most likely and significant threats to local water supplies?
- What specific steps should be taken to address existing and/or potential threats?
- Who is responsible for each step in responding to emergencies, and how will response actions be coordinated?

Develop contingency measures:

- Where can temporary and permanent replacement water supplies be obtained if needed?
- Where can technical, logistical and financial resources be obtained?

When the emergency plan is completed, you will be prepared to:

- Respond appropriately to a contamination event. (Too often when a spill or other form of contamination occurs, the response is inappropriate – not enough is done, or too much is done and money is wasted);
- Protect the community from exposure to possible hazardous conditions involving a water supply;
- Avoid possible confusion during an emergency; and
- Provide alternative sources of water in case of water supply disruption due to contamination.

In some cases, you may require professional assistance to develop your emergency response plan.

### 5.2 Identify all Unexpected Contamination Events

Start by listing all of the potential contaminants that were identified in Step Three. You can then develop a series of "what if..." scenarios for each one. For example, what if there is a spill from a chemical tanker within the one-year time of travel zone? What if you detect nitrates at your well, despite the protection measures implemented in Step Four?

Some events may be easy to predict (such as spills of known chemicals at a gas station), based on the information from Step Three. Other events will be less predictable, such as tanker trucks spilling an unknown chemical at any location in the capture zone.

The team should also consider natural disasters that could create an emergency within the well protection

**EXAMPLE SCENARIOS**

**Scenario 1 - Chemical Spill:** The community of Trafalgar has a flourishing industrial centre. Trafalgar's water supply is from three wells located within the city boundaries. The Trafalgar Well Protection Committee has listed hydrocarbons as the greatest potential threats to the drinking water supply. A release of these hydrocarbons into the groundwater could gradually lead to a contamination problem. Storage and transportation of these substances pose an additional risk to groundwater, including the possibility of a sudden, accidental release to the drinking water supply.

**Response:** In the case of a sudden release of hydrocarbons in the well protection area, the closest wells downhill from the spill will be isolated from the rest of the water supply system. Rationing will be imposed to limit the amount of water that is drawn toward the well field. The city will monitor water from the wells downhill from the spill. Water from the remaining wells will be used until contaminants appear in the monitored wells. If contaminants appear in the monitored wells at levels exceeding Canadian Guidelines for Drinking Water Quality, the remaining wells in the field will also be shut down. As soon as possible after the spill is detected, bottled water suppliers, neighbouring towns, owners of irrigation wells, and owners of water trucks will be contacted to confirm the availability of an alternative water supply. Arrangements were made as part of the contingency plan.
If abandonment of the well field becomes necessary, Trafalgar will drill a new water supply well at Parker's Corners; a site purchased by the city a number of years ago "just-in-case". It is also important to communicate and work with other agencies during the clean-up effort and after, to monitor the effectiveness of the clean-up.

**Scenario 2 - Traffic Accident & Spill:** Highway 123 passes within 60m of Parker's Corners Well No. 3. The transportation of hazardous substances along this major north-south route poses the risk of major spills, which could threaten the safety of the drinking water supply.

**Response:** In the case of a spill in the well protection area, pumping at the well would cease. Parker's Corners Well No. 3 is the source of drinking water for the city; however, older municipal wells, in a different aquifer, supply the high school (Well No. 2) and the R.C.M.P. station and Parker's Corners Memorial Hospital (Well No. 1). While no longer connected to the distribution system, these wells could be used to supply the town in an emergency situation. The city engineer estimates that the wells could be connected to the distribution grid within four working days. Until the wells are connected to the system, residents would have to haul water from Well No. 1 or Well No.2.

The key elements of planning scenarios can be seen in these examples: a brief description of the event triggering a supply disruption, perhaps a few facts or other events that complicate matters, and a summary of the immediate water supply implications.

area. Those threats with a high probability are more likely to occur, while those with high severity will likely have a greater harmful effect on the water system. These potential threats are focused on the water system, and should be addressed in the water purveyor's emergency response plan. The planning team should discuss them in the larger context of the well protection area.

## 5.3 Develop Specific Responses to Each Scenario

Plan a response for the most likely events. You don't have to plan for every event but only those that are most likely to happen. Ask yourself:

- What types of material are needed for containing the spill and for clean-up?
- How far is the source from the well?
- How serious is the potential impact on the water supply? Are alternative sources of water required?

For example, if a chemical storage facility located inside the well protection area of a highly vulnerable aquifer burns or explodes, dowsing it with water may not be the best response, unless there is a reliable way to prevent the water from infiltrating into the aquifer. Procedures should be in place to implement a specific response to such an event at that location.

**TABLE 5.1: ROLES AND RESPONSIBILITIES**

| CONTACT: | RESPONSIBLE FOR: |
|---|---|
| Water Purveyor | First responder<br>Supplying potable water<br>Providing names of all employees and their responsibilities<br>Emergency response plan<br>Issue public water advisories |
| Community Planning Team | Providing names of all members, with a list of their roles in emergency situations |
| Medical Health Officer | Dealing with threats to public health including:<br>Drinking water quality<br>Contamination of drinking water supplies<br>Chemical spills and effects on health<br>Issuing public health advisories |
| Environmental Health Officer /Drinking Water Officer | Undertaking most of the Medical Health Officer's duties with respect to drinking water supplies<br>Enforcing the *Drinking Water Protection Act* and Drinking Water Regulation and other regulations under the *Health Act*<br>Technical advice, drinking water quality and operation of septic systems |
| Public Health Engineer | Advising on water treatment<br>Approving changes to waterworks system<br>Providing assistance in responding to contamination events |
| Municipal Government Staff | First Responder<br>Coordinating community-wide emergency plan?<br>Issuing public water advisories |
| Police, RCMP and/or Fire Department | First Responder<br>Assist in coordinating community-wide emergency |
| Provincial Emergency Preparedness Program (PEP) | Could provide assistance in responding to major contamination events<br>First Responder |

The priorities set in Step Three will help determine the level of response necessary for a contamination event. Small spills, or spills of less toxic substances, may not jeopardize water quality and would not require a significant level of response. It is important that the nature of potential contaminants be identified before a spill occurs so that the response can be appropriate to the risk.

You should develop a full range of "what if?" scenarios, and standard operating procedures (SOPs), for events that are a high priority. However, if there are a large number of priority threats, it may not be necessary to list all of them in detail, as many emergencies will involve similar response procedures. If this is the case, make sure that you develop a variety of SOPs that would require use of different response, equipment, personnel, and procedures to allow development of different response approaches (see "Example Scenarios").

When the team defines potential "problem" scenarios, specific duties will be more clearly defined. It is important to assign responsibilities for each potential task to an individual during the planning process, rather than waiting until an emergency happens (Table 5.1).

Each specific response developed should include at least some of the following components:

- a designated response coordinator;
- a contact list (e.g. landowner, first responder, other agencies who should be involved);
- the equipment and materials needed for the response, including their location;
- procedures to lessen the impact of the spill;
- procedures to shut down the affected well, or to isolate a section of the distribution system;

- procedures to communicate with other agencies (environmental health officer, R.C.M.P., municipal works, etc.);
- procedures to let water users, in particular high risk individuals, know about the risks;
- sources of emergency water for drinking and other household uses;
- alternative sources of water supply (in case of long-term problems); and
- procedures to decontaminate the well or distribution system.

In developing responses, use the S*M*A*R*T method to identify responses that will work.[2] Appendix 5.1 provides an example of basic standard operating procedures for an emergency response plan.

## 5.4 Identify Available People and Materials

Who will respond to an emergency? What clean-up materials do you have? Who else can help?

To effectively respond to a spill or to a contamination event, you will need to have properly trained people, a set of response procedures and the proper equipment and materials. Who can provide the technical expertise to assess the seriousness of the threat? If your well does become contaminated, who will treat the water or provide an alternate water supply?[3] These resources may be available within your community or you may need to acquire them from elsewhere.

The contingency plan should include a list of people who can help (see Table 5.1).
This may include people who can:

- Respond to spills (e.g. police, fire-fighters, waterworks company);
- Detect chemical or bacteriological contaminants in the well water (laboratories);
- Provide a temporary supply of potable water (bottled water supplier);
- Repair and restore the water supply (plumbers, water purveyor, qualified pump installer); and
- Provide information to the public (purveyor, medical health officer).

Identify the "first responder," who has been trained in proper emergency response procedures. This person has the knowledge to identify the relative risks associated with various emergencies, and coordinate and fine-tune the response. First responders are responsible for ensuring that the action items outlined in the emergency response plan are carried out. Often, the first responder will be the local fire or police department. The first responder should be educated about the relative vulnerability of the groundwater resource, the location of the wellhead and other special considerations.

For situations involving potentially hazardous chemicals, work together with local agencies to identify the appropriate first responder. Identify someone who knows how to deal with dangerous goods spills and is available to coordinate the response, and if necessary consider training someone to do these tasks.

In some communities, businesses and industries are responsible for filing a list of hazardous chemicals with the fire department, so that fire-fighters can take the necessary precautions before starting to put out any fire at that location.

A second list should include all the materials and equipment needed to respond to contamination events, such as excavators, trucks, plumbing supplies, and sorbent materials.

## 5.5 Train Responders

Once a contingency plan has been developed, it is important that everyone who has a role knows about the plan, is clear on his or her roles and is trained. Everyone should know where the emergency equipment, materials, and copies of the plan and maps are located.

Training sessions should be held to ensure that responders are well prepared for their role in case of a spill, detection of contaminated water or other emergency scenarios. Emergency responders should

[2] See Step Four, section 4.3.

[3] Where a purveyor supplies the water, they will be responsible for ensuring the availability of potable water.

be trained in more than one role so that there are trained back-ups when people are on vacation or cannot be reached. It is also important to have an "Emergency Coordinator" who will be capable of contacting, mobilizing and coordinating the team's work during an emergency.

Designate an "Emergency Control Centre." The centre can be as simple as a desk drawer dedicated to emergency response; the idea is to make sure that all of the information needed to implement the contingency plan is organized and accessible, and that all team members are aware of where the contingency plan is located. The centre should be equipped with copies of the team list and the names and phone numbers of other important contacts, and all pertinent information regarding the water supply sources, distribution system, storage system, etc..
A list of contractors capable of repairing the various components of the system and of suppliers who carry power generators and any other equipment that might be necessary for repairs or emergency system operation should also be compiled and kept at the Emergency Control Centre. If available, a cellular phone or radio could be kept at this location to provide a means of communication in case of a phone service outage.

Hold practice emergency drills simulating spills or well contamination from time to time. You will probably identify some shortcomings in your plan and be able to make the necessary changes. Public meetings should also be held to inform the community of the contingency plan and process.

## 5.6 Develop a Communications Strategy

When water becomes contaminated, you will need to advise water users. Know how to contact those responsible for public water advisories, such as municipal staff, water purveyors and the medical health officer, at any time of the day or night (see Table 5.1). This information should already be part of the emergency response plan of the water purveyors.

The communications section of the contingency plan should state <u>when</u> it is necessary to alert the community, and <u>how</u> this will be done. The area medical health officer or environmental health officer/ drinking water officer may ask the purveyor to issue a public advisory. Discuss with them how this should be done.

When it is necessary to issue public warnings, do so as soon as possible by radio or television announcements, signs at public locations or even by distributing notices door-to-door in high risk areas such as seniors complexes, day-care centres and hospitals. Smaller communities may be able to use a telephone tree approach.[4] In the event of on-going water contamination, use radio, television and newspaper reports to inform customers about the situation and steps that are being taken to solve the problem, and to advise on ways to minimize the risk to consumers.

Prepare draft press releases and mail-outs in advance. Then when public warnings are required it is only necessary to fill in details and produce enough copies for mailing to affected areas, or provide local media with the prepared statement. Examples are included in Appendix 5.2. A list of media contacts should be prepared – the media can assist in broadcasting the information.

## 5.7 Update Existing Maps

The contingency plan should include maps and plans which contain information that will be useful should a contamination event occur, such as:

- The location of shut-off valves for the well pumps;
- An outline of the water and sewer distribution system, including the location of valves and other control points;
- The location of potential contaminant sources in the well protection area;
- Locations of emergency equipment and clean-up materials which can be used to respond to spills or other emergencies; and
- Diagrams of electrical systems in pump houses and the location of shut-off points for power supplies.

You may be able to add to the maps developed in Steps One and Three, and/or to develop new overlays.

[4] In a telephone tree, one person notifies everyone on their contact list (five - ten people), who in turn each contact everyone on their list, and so on.

It is useful to have maps at different scales, reflecting the level of detail that will be needed to aid in responding to different contamination events. For example, the overview map of potential contaminant sites in the well protection area may be mapped at a 1:20,000 scale. Another map showing the details within the one-year time of travel zone may be mapped at a 1:1,000 scale.

The plan of the distribution system should identify the type of construction material used. This is important because certain contaminants can affect parts of a distribution system. For example, acidic contaminants can increase corrosion of concrete pipes or reservoirs. Some organic compounds can adsorb onto the surface of plastic pipes and continue to contaminate water long after the source of contamination has been cleaned up.

## 5.8 Secure Alternative Water Supplies

Alternative water supplies may be required if your well becomes contaminated. Although access to an alternative water supply is part of the emergency response plan, making the necessary arrangements and ensuring any written agreements with alternate water suppliers are in place before any contamination event occurs is really contingency planning.

Outbreaks of waterborne disease, or contamination with bacteria, viruses or parasites can generally be dealt with through public advisories to boil water. However, alternate supplies may be required for institutions such as care facilities, schools and public buildings where some water users are susceptible to illness.

You will also need to identify emergency supplies that can be made available on very short notice. For example, bottled water suppliers and bulk water haulers could provide water to institutions such as schools and care facilities during boil advisories and possibly to private homes in the event of chemical contamination.

The planning team or purveyor should also have plans to secure an alternate source of water that can be connected to the distribution system to replace a contaminated well. If it is too expensive or impossible to clean-up the original well, you may want to identify an alternate well field site for drilling a back-up well, and/or secure the right to use an available surface water source.

If possible, set aside some land where a new well could be drilled. This may require purchasing property. As a precaution, this alternate well site should be outside of the one-year time of travel area for the existing well. At the same time, it needs to be close enough to allow it to be easily connected to the existing water system. This site may also be needed to meet future water needs as your community grows, and therefore, costs associated with obtaining and protecting it may eventually be recovered from homeowners in the new developments. The assistance of a professional hydrogeologist to locate and supervise drilling and testing is recommended.

Many water systems have more than one well. If any one well is contaminated, delivery of the supply can still be maintained at a minimum level by altering the pumping schedule of the remaining wells in the well field. The planning team should develop a contingency strategy to continue the operation of the well field in case of contamination to any one well.

## 5.9 Identify Funding to Implement the Contingency Plan

Think about how you will pay for an emergency clean-up or the provision of alternative water supplies. Consider establishing a reserve fund for emergency responses. Your local government or the Provincial Emergency Program may be able to help. The Ministry of Community Services may provide funding for upgrades in infrastructure, or planning grants. More information on these grant programs can be found at the Ministry's website at www.mcaws.gov.bc.ca/lgd/pol_research/grants.html

## CHECKLIST FOR STEP FIVE

The following is a basic checklist for action items to be completed during Step Five of the well protection planning process:

| ACTION ITEM | COMMENTS | COMPLETED |
|---|---|---|
| Decide who is responsible for this action | Enlist technical and volunteer assistance if required. | ☐ |
| Identify possible contamination events | Identify possible events for each of the potential contaminant sources. | ☐ |
| Develop responses | Use S*M*A*R*T method to identify appropriate responses. | ☐ |
| Identify people and materials | Know who to contact for each type of event, and how to reach them. | ☐ |
| Develop a communications plan | Be ready to issue a public water advisory at short notice. | ☐ |
| Be prepared | Train people if necessary. Carry out simulations to ensure the plans work well. | ☐ |
| Update maps | Ensure all relevant information is included on maps. | ☐ |
| Secure alternative water supplies | Be prepared for short- and long-term loss of water supply. | ☐ |
| Secure funding | Look at how you will pay for emergency responses. | ☐ |

## Appendix 5.1 Emergency Response Plan - Standard Operating Procedure Examples

These responses may be adequate for very small waterworks or where resources are limited.

EXAMPLE: TANKER TRUCK CHEMICAL SPILL WITHIN ONE YEAR TIME OF TRAVEL ZONE

**Actions:**

- Contact first responder John Doe – 555-4567 (work); 555-8901 (home);
- Determine what chemical has been spilled – check the placards on vehicle, contact truck owners for verification and information on how dangerous the chemical is, and find out what precautionary measures are recommended (such as evacuation of the area and protective clothing);
- Refer to 1996 *North American Emergency Response Guidebook* [5] for details;
- Contact Ministry of Environment – 555-5678;
- Contact Medical Health Officer – 555-2345;
- Contact Fire Department – 555-6789;
- Contact R.C.M.P. for crowd control and accident investigation – 555-0123;
- Contact Provincial Emergency Program 1-800-663-3456;
- Evacuate immediate vicinity of crash site.

First Responder must verify appropriateness of the following steps:

- If truck contents are explosive, or produce toxic fumes, expand evacuation area (Refer to 1996 *North American Emergency Response Guidebook*[5]);
- Contain spill if necessary (block drainage ditches or dig interceptor trench to minimize extent of area which will need to be cleaned up);
- Recover spilled chemical, pump to containers, and ensure pump and container are appropriate for the chemical (e.g. corrosive chemicals may dissolve regular drums).

[5] U.S. Department of Transporation and Transport Canada, 1996. *North American Emergency Response Guidebook* U.S. Department of Transportation, Research & Special Programs Administration; Transport Canada, Safety & Security, Dangerous Goods; Secreteriat of Transport and Communications.

## Appendix 5.2 Sample Press Releases and Mail-Outs

**Boil Advisory for Bacterial Contamination:**

The _____ (water utility, etc. name) has been advised by Dr. _____ (name), Medical Health Officer, _____ (Health Authority) that unacceptable levels of coliform bacteria have been detected in the drinking water system of the ____ _____area (entire waterworks or a specific area). Residents are advised to boil their drinking water for two minutes prior to consumption or prior to washing vegetables, brushing their teeth or using it in the preparation of foods that won't be cooked such as salad dressings, ice cubes or juices. Bottled water may also be used as an alternative to tap water.

Tap water is still acceptable for other household uses such as laundry or showering, but care should be taken not to swallow water when showering or bathing.

For further information contact _____ (name, phone number)

**Chemical Contamination Advisory:**

The _____ (water utility, etc. name) has been advised by Dr. _____ (name), Medical Health Officer for the _____ (Health Authority) that unacceptable levels of _____ (chemical name) have been detected in the drinking water system of the _____area (entire waterworks or a specific area). Residents are advised that _____ (chemical name) can result in _____ (information about possible health effects from MHO). Tap water should not be used for consumption or washing vegetables, brushing teeth or using in the preparation of foods, ice cubes or juices. Bottled water should be used as an alternative to tap water.

Tap water is still acceptable for other household uses such as laundry or showering (this must be verified by the Medical Health Officer - some chemicals may pose a risk if you breathe them in the shower stall), but care should be taken not to swallow water when showering or bathing.

For further information contact _____ (name, phone number)

# STEP FIVE: Contingency Planning

## Develop Scenarios

At this step, the Pumphandle team reviewed all the potential sources of contamination in the well protection area. The water purveyors – Andrew Aiken, Jenny Lowden and Eric Kowski – provided copies of their emergency response plans to the team. Jenny Lowden offered to lead the development of a set of standard operating procedures (SOPs) that could be used to respond to each type of emergency situation. The SOPs would be the basis of the responder training.

The existing emergency response plans already contained details on how to deal with such issues as the contamination of the distribution system through water main breaks or back flow of contaminated water, and the loss of supply either from pump breakdown or power failure.

After some discussions, Jenny's group decided that the overall contingency plan for the well protection area would include the separate emergency response plans from each water system. Jenny's group would develop a common set of training scenarios. This would ensure that the response to an emergency at Blackwater Well would be the same at the other two community wells.

Andrew, Jenny and Eric would continue to be responsible for updating and implementing their emergency response plan as required by the *Drinking Water Protection Act* and Drinking Water Regulation. They would pass on any revisions to the Pumphandle team so the contingency plan could be kept up to date.

Before Jenny and her group could start developing the SOPs they needed to identify the types of events that would trigger a response (Table CS 5.1). They listed the following two events:

1. Routine monitoring detected contaminants in the groundwater; or
2. The planning team received reports of chemical spills, discharge or bad practices within the well protection area or directly into a well.

## Inventory Resources

Jenny's neighbour, Dhrubo Osis, was a five-year veteran of the Pumphandle Volunteer Fire Department. When Jenny told him about her current project with the Pumphandle community planning team, Dhrubo offered to help her with the contingency plan. Through his work with the fire department, Dhrubo knew that Pumphandle Valley had several first responders within the community who were trained in handling chemical spills: the local R.C.M.P. detachment, the Ministry of Environment and, of course, the Pumphandle Volunteer Fire Department and the local health authority.

Dhrubo also suggested that they sign a rental agreement with AAA Excavation Services for the supply of equipment for excavation work. He included a clause that said the community planning team had priority over other customers during an emergency situation. The need to access heavy equipment on short notice could happen in an emergency. Planning ahead would help with a quick response to an emergency.

At the same time, Jenny and the other water purveyors put together a list of pumps, sump-pumps, piping and other waterworks supplies that essential in an emergency situation. Although each purveyor had some supplies on hand, they decided to combine their money to purchase more water system construction supplies in case of an emergency. Jenny offered to store the supplies at Blackwater Waterworks.

High on the list of priorities for the contingency plan is an alternate supply of water. Barney Buhler of Barney's Bulk Water Service in Valleyview was given a contract to supply bulk water to Pumphandle and its residents in case of an emergency. This contract also included a "priority" clause, where Barney would give first priority to Pumphandle. The volunteer fire department would help Barney to distribute the water to the residents. Barney also

**TABLE CS 5.1 CONTINGENCY RESPONSES TO POTENTIAL CONTAMINANTS**

| Most Likely Event | Trigger | Contaminant Source/ Activity | Contingency Activity | Contact |
|---|---|---|---|---|
| Nitrate contamination of Aiken's, Blackwater or Charlie's Wells | Water quality monitoring<br>Report of bad practices | Hay fields (A-1, 2, & 3)<br>Corn fields (A-5 & 6)<br>Golf course (C-3)<br>Subdivision (R-1), subdivision and campground (R-2) | Issue public advisory<br>Provide alternate source of drinking water<br>Expand monitoring to determine source | Environmental Health Officer (EHO)/ Drinking Water Officer (DWO) Water purveyor of affected well |
| Pesticide contamination | Water quality monitoring<br>Report of bad practices | Golf course (C-3) | Issue public advisory<br>Provide alternate source of drinking water<br>Expand monitoring to determine source | EHO/DWO<br>Water purveyor of affected well<br>Ministry of Environment, Lands and Parks (MOE) |
| Gasoline contamination | Complaint of odour in the water<br>Water quality monitoring<br>Spill reported | Gas station | Contact MOE<br>Issue public advisory<br>Provide alternate source of drinking water<br>Expand monitoring to determine source<br>Contain spill | EHO/DWO<br>Water purveyor of affected well<br>MOE |
| Dry cleaning liquid contamination | Water quality monitoring<br>Spill reported | Dry cleaner | Issue public advisory<br>Provide alternate source of drinking water<br>Expand monitoring to determine source<br>Contain spill | EHO/DWO<br>Water purveyor of affected well<br>MOE |
| Chemical spill or road salt contamination | Water quality monitoring<br>Spill reported | Main road | Clean up spill<br>Issue public advisory<br>Provide alternate drinking water<br>Expand monitoring to determine source<br>Contain spill | MOE<br>Fire department<br>EHO/DWO<br>Water purveyor of affected well |
| Contamination by household wastes | Water quality monitoring | Subdivision (R-1 and/or R-3)<br>Subdivision and campground (R-2) | Issue public advisory<br>Chlorinate affected well if bacteria present<br>Provide alternate drinking water<br>Expand monitoring | EHO/DWO<br>Water purveyor of affected well |

offered to coordinate and supply bottled water from his brother's bottling plant in Valleyview.

Fortunately, each of the water purveyors had on-site generators capable of powering their pumps in case of an electrical service failure.

## Modify Maps

Jenny, Andrew and Eric have large-scale maps (1:500) showing the entire distribution system as well as detailed plans of each valve and wellhead for each of their water systems. A new map overlay was developed for the TRIM map to show the distribution system mains (Figure CS 5.1).

## Develop Specific Responses to Each Event

With help from Dhrubo, Jenny's group listed the following for each emergency situation:

- Contingency responses to each potential contaminant source;
- The specific contaminants expected;
- The trigger that would initiate a contingency response;
- The most likely and most probable events resulting from the contaminant sources; and
- Contingency activities for each contaminant source.

# FIGURE CS 5.1 DISTRIBUTION SYSTEMS IN PUMPHANDLE

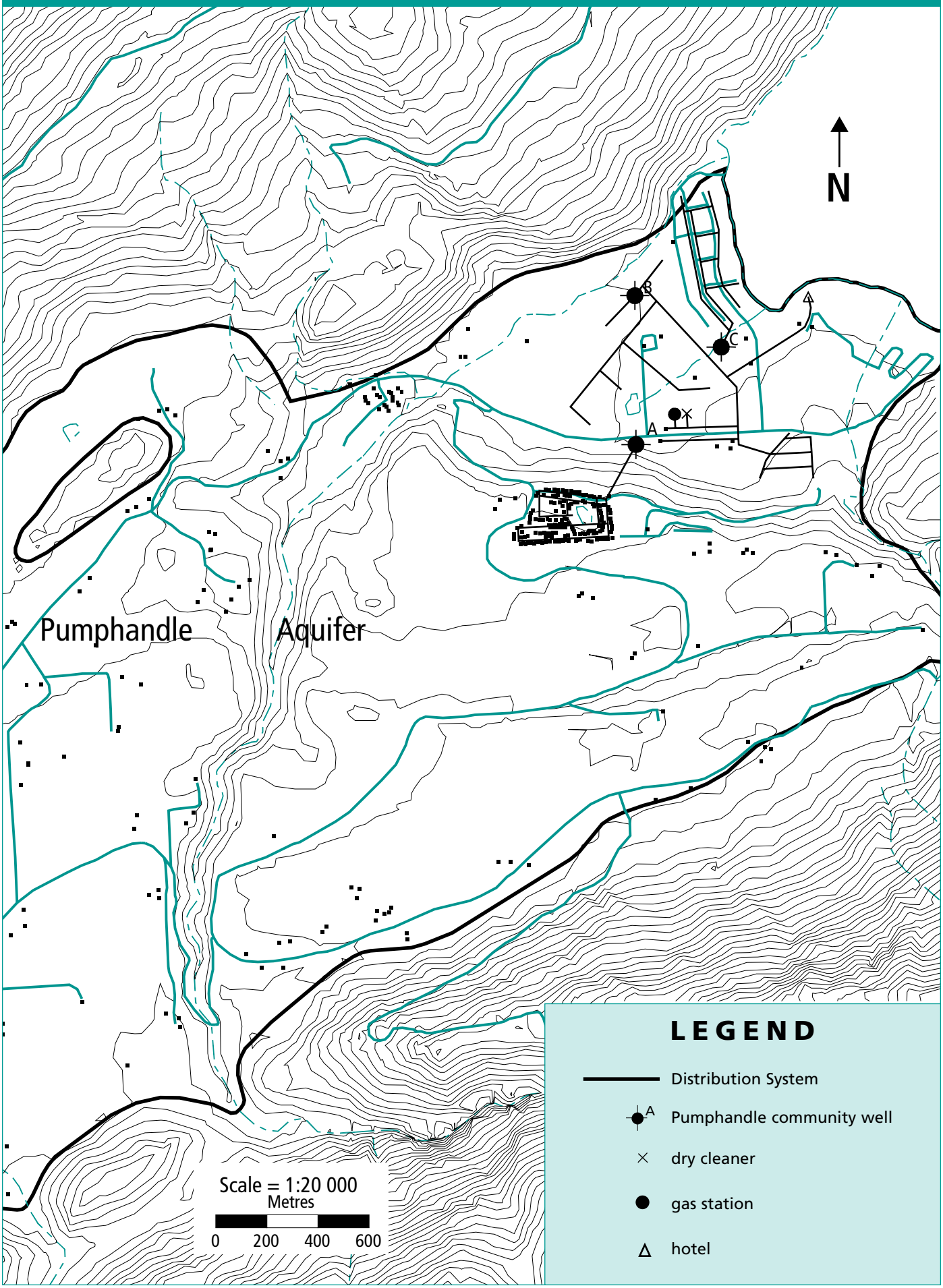

Table CS 5.1 summarizes the list the group developed.

They concluded that none of the sources was likely to result in significant levels of contamination. However, some of the potential contaminants could still pose a serious problem, either as a health threat (e.g. perchloroethylene or nitrates) or other problems that could render the water unfit for use (such as gasoline, which is unpalatable even at levels too low to pose a health threat).

The group identified six short-term contingency activities:

- Contain and/or clean spill and contaminated soil;
- Determine public health significance of contaminant;
- Issue public advisories;
- Provide alternative water supply;
- Expand monitoring program to determine if other contaminants are present and to identify the source and extent of contamination; and
- Chlorinate water supply.

For each contingency activity the group applied the S*M*A*R*T test. At this point, Jenny called a meeting of the full planning team to go over the progress her group had made towards developing a contingency plan. She wanted to make sure that she and her group had not overlooked anything obvious.

Routine monitoring for bacteria might not detect contamination with bacteria or viruses soon enough to protect consumers from a waterborne disease outbreak. The planning team asked local physicians and pharmacies to let them know if there was an increase in physician visits for diarrhoea, or in sales of anti-diarrhoea medicine.

Longer-term contingency activities include installing treatment facilities, linking the three waterworks and drilling a new back-up well.

The planning team concluded that the contaminant most likely to affect any of the community wells was nitrates from either fertilizer or septic wastes. All of the wells have potential contaminant sources within their capture zones, but Blackwater Well is slightly less vulnerable as it is located farther from most potential contaminant sources than Aiken's and Charlie's Wells. Since Blackwater Well is at least risk, and produces the greatest amount of water, one option suggested was to connect all three community water supplies so that Blackwater Well could supply water to all residents. This would be especially beneficial since the peak use demands on Aiken's Well already exceed supply. Some of the costs of connecting the three distribution systems could be offset by the cost saving of not drilling a new well to replace Aiken's. Finding the funds to connect the systems was identified as a priority.

## Develop a Communication Plan

The communication plan developed by the planning team included two main elements:

- Communication with people and agencies necessary to respond to a specific event; and,
- Communication with water users who may be affected by a contamination event or interruption in water supply.

The team developed a master list of phone numbers of agencies and individuals who would respond to the various scenarios, including emergency situations. These were listed in order of priority. The list included the name of the agency, the contact and phone numbers both at work and at home for those people.

Draft public advisories were developed. In the event that a public advisory is needed, a specific concern such as unsatisfactory bacteria tests or chemical contamination can be inserted into the draft. When a public advisory is needed, press releases will be sent to the Pumphandle community newspaper and the Valley radio station, and notices delivered directly to individual homes.

## Secure Additional Materials and Resources

Applying the S*M*A*R*T test to the contingency activities identified several resources which were not currently available in Pumphandle. The planning team made a list of materials and resources to acquire:

- Sorbent materials for dealing with spills;
- Alternate water supplies (short term supply);
- Emergency chlorinator and attachment sites;
- Protocols for fire fighting at the dry cleaners and gas station which would minimize spread of contaminants to the aquifer; and
- Access to monitoring wells (existing private wells located between community supplies and potential contaminant sites).

Discussions were held with private well owners, sorbent materials were purchased, arrangements were made for short-term alternate water supplies, and fire-fighting protocols were developed. The three water purveyors agreed to purchase a chlorinator and to install fittings at their well heads, which would allow the chlorinator to be attached in the event that their wells become contaminated with pathogens.

Other needs identified during contingency planning included a long-term alternate water supply (new well), and additional funding to purchase equipment and supplies for the contingency plan. These needs were beyond the ability of the planning team to arrange on a short-term basis, and the planning team decided to ask the local government for assistance.

## Implement the Plan and Acquire Additional Resources

The planning team developed an Implementation Plan, which involved preliminary training of those people with a responder role identified in specific responses. This included providing people with short lecture sessions to look over the plan, workshops to provide different "what if..." scenarios and running mock spill exercises for hands-on training.

The planning team discussed long-term needs with the Regional District. In particular assistance was needed to secure an alternate well site, and to connect the three existing waterworks systems. The long-term vision was to develop a single waterworks system with a series of back-up wells.

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