

**DRINKING WATER DISTRIBUTION,  
GROUND WATER ASSESSMENT  
AND TREATMENT GUIDANCE  
FINAL REPORT FROM CONSULTATION**

**MAY 2015**

**HEALTH PROTECTION BRANCH  
MINISTRY OF HEALTH**



## **PREFACE**

From January through April 2015, the Health Protection Branch of the Ministry of Health conducted a consultation process on three draft guidance documents that had been prepared with the support of the regional health authorities:

- *Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2*
- *Drinking Water Treatment Objectives (Microbiological) for Ground Water Supplies in British Columbia, Version 1*
- *British Columbia Guidelines (Microbiological) for Maintaining Water Quality within Distribution Systems (Secondary Disinfection), Version 1*

The goals of the consultation process were to:

- Communicate the purpose, development history and content of each guidance document.
- Gather comments from British Columbians who have an interest in drinking water distribution, ground water assessment and treatment.
- Communicate the ministry's planned next steps in refining and implementing the guidance documents.

As the result of a competitive bid process, C. Rankin & Associates of Victoria, B.C. were contracted from December 2014 to March 2015 to oversee the consultation and facilitation of four community meetings (held in Richmond, Kamloops, Cranbrook and Prince George).

The Ministry of Health would like acknowledge Colin Rankin, Cindy Bertram, Al Kohut and Mike Simpson for organizing, facilitating and making a record of these meetings. A fifth meeting was organized by the staff of the Health Protection Branch and held in Nanaimo in April 2015.

The bulk of this final report was prepared by C. Rankin & Associates as a deliverable of their contract with the province. However, the originally submitted document has been adjusted to make it consistent with provincial formatting and to include information on the fifth consultation session.

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## PART ONE: CONSULTATION PROCESS

### 1 GOALS

From January through April 2015, the Health Protection Branch of the Ministry of Health conducted a consultation process on three draft guidance documents that had been prepared with the support of the regional health authorities:

1. *Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2*
2. *Drinking Water Treatment Objectives (Microbiological) for Ground Water Supplies in British Columbia, Version 1*
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The goals of the consultation process were to:

- Communicate the purpose, development history and content of each guidance document.
- Gather comments from British Columbians who have an interest in drinking water distribution, ground water assessment and treatment.
- Communicate the ministry's planned next steps in refining and implementing the guidance documents.

### 2 CONSULTATION WEBSITE AND STAKEHOLDER NOTIFICATION

A website was developed by the Ministry of Health to serve as the basis for communicating information regarding the consultation meetings to various stakeholder groups and the broader public. An overview document describing the consultation process and the intent of the guidance documents was developed and posted to the website. Secure PDFs of the three draft documents, comment forms addressing each of the guidance documents, and a general comment form, were also posted to the website.

Provincial and regional organizations with an interest in drinking water and ground water assessment, treatment and distribution were notified by email of the consultation process. The Ministry of Health also utilized previous contact lists, and suggestions provided by the Drinking Water Leadership Council and regional health authorities, in order to notify more than 80 provincial contacts including professional associations and consultants, municipalities and regional districts, health authorities, provincial and federal government agencies, and nongovernmental organizations. More than 200 improvement districts with responsibility for providing drinking water were also notified by email, or letter if no email contact was available.

Information webinars on the consultation process with presentations by Ministry of Health staff and opportunities for questions from participants were held on January 27 and 28, 2015. About twenty-five individuals registered for each webinar.

### 3 CONSULTATION MEETING OVERVIEW

Four community consultation meetings were organized by the contractor C. Rankin & Associates. These were held in Richmond, Kamloops, Cranbrook and Prince George. A fifth community consultation meeting was held in

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Nanaimo, organized by the Ministry of Health. Each meeting included presentations by Ministry of Health staff on the draft guidance documents, followed by facilitated small group or full group discussions. Ministry staff were also available for additional meetings with individuals or representatives of organizations upon request following each community meeting.

The first consultation period closed March 15, 2015. Comments received before March 30, 2015 were received by the consultation contractor and passed to the Ministry of Health for review and consideration. Comment forms and emails sent after March 31, 2015 were received directly by ministry staff. A second deadline of May 15, 2015 was established to accommodate submissions being made before and after the Nanaimo consultation meeting. These submissions and emails were also received directly by ministry staff.

At each meeting ministry staff presented information on the provincial drinking water program, and each of the draft guidance documents. A short question-and-answer period occurred after each document presentation, followed by small group discussions where participants were free to contribute to facilitated discussions on the specific documents. Table 1 provides an example of the consultation meeting agenda.

**TABLE 1: EXAMPLE AGENDA FOR COMMUNITY MEETINGS**

<b>Time</b>	<b>Item</b>	<b>Notes</b>
8:30 a.m.	<b>Registration</b>	Coffee and ministry staff available.
9:00 a.m.	<b>Opening</b>	Welcome and introduction of ministry and support staff. Review of meeting objectives and agenda.
9:10 a.m.	<b>Ministry of Health Drinking Water Program Overview</b>	Overview of Health Protection Branch role and activities.
9:30 a.m.	<b><i>Guidance Document for Determining Ground Water at Risk of Containing Pathogens (GARP), Version 2</i></b>	Purpose, key content and development of the document. Opportunity for participant questions.
9:50 a.m.	<b><i>Drinking Water Treatment Objectives (Microbiological) for Ground Water Supplies in British Columbia, Version 1</i></b>	Purpose, key content and development of the document. Opportunity for participant questions.
10:15 a.m.	Refreshment break	
10:30 a.m.	<b><i>British Columbia Guidelines (Microbiological) for Maintaining Water Quality within Distribution Systems (Secondary Disinfection), Version 1</i></b>	Purpose, key content and development of the document. Opportunity for participant questions.
11:00 a.m.	<b>Round Table Questions and Discussion of each Guidance Document</b>	<b>Round Table Discussion Questions:</b> Do you have any questions about the content of the documents?

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Time	Item	Notes
	Participants will have an opportunity to ask questions of ministry staff or comment on each guidance document if desired.	Would use of this document change your current work? If so, how? Do you have any comments or suggestions for the ministry to consider as the document is refined?
Noon	<b>Final Plenary – Next Steps</b>	Additional comments or questions from participants. Submitting comments to the ministry. Next steps in refining the guidance documents.
12:30 p.m.	<b>Adjourn</b>	Note that ministry staff are available for further meetings through the afternoon, on request.

## PART TWO: SUMMARY OF COMMUNITY CONSULTATION MEETINGS

About 50 people registered for information webinars; more than 115 people participated in one or more of the five community consultation meetings; and 26 email submissions were received within the consultation period. Written submissions include notes taken during each consultation event (webinars and community meetings), and the individual response comments submitted by email. All submitted comments and notes from the meetings have become part of the material to be reviewed and considered in the continued development of the three guidance documents.

### 1 OVERVIEW OF COMMUNITY MEETINGS

Many participants in the five community meetings voiced their support for the effort made by the Ministry of Health to communicate the contents of the draft guidance documents. Some participants noted that they had short advance notice of the community meetings and/or that it may be difficult or too expensive for some interested stakeholders to travel long distances to a meeting. Participants at each of the community meetings encouraged the ministry to continue to support information dissemination and outreach to key partners, particularly small water suppliers who are challenged in providing affordable potable drinking water.

Common general themes highlighted in the community meetings included:

- The importance of relationships, communications and shared understandings among drinking water suppliers, drinking water officers (DWOs), qualified professionals (QPs) and the Ministry of Health, as well as other government agencies.
- The challenges facing many small water suppliers involving infrastructure upkeep and upgrades, limited financial resources and pressures for costly treatment measures.
- The degree of discretion available to DWOs and room for differing interpretation of guidance documents. Several participants noted the importance of training for DWOs who may not be experts in ground water or water treatment systems.
- The important role that QPs can play to inform parties involved in ground water and drinking water assessment and, where appropriate, treatment.

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- The need to educate and inform the general public (i.e., water users) and local politicians about risks to drinking supplies, health implications of treatment options and related costs and benefits.

**NOTE:** The summaries that follow for each of the community meetings include quotes from meeting participants as recorded by meeting note takers, appearing in quotations marks. Text included in square brackets [e.g., note] provides linking or contextual information.

## **2 RICHMOND COMMUNITY MEETING SUMMARY**

Twenty-eight stakeholders participated in the February 16, 2015 session. These included individuals from Vancouver Coastal Health Authority, Fraser Health Authority, Aboriginal Affairs and Northern Development Canada (AANDC), water suppliers (municipal and improvement districts), B.C. Ground Water Association (BCGWA) and B.C. Waste Water Association (BCWWA), and consultants.

Following the open consultation session, Ministry of Health staff met on request with representatives from the BCWWA and BCGWA to hear additional questions and comments regarding the consultation.

### **2.1 GENERAL COMMENTS**

Many of the comments and questions raised at the meeting involved points of clarification and questions regarding the intent of the guidance documents. Several discussions related to the role of DWOs in interpreting the guidance provided in the documents. Concern was expressed, for example, that “shoulds” in the documents may be interpreted by some DWOs as “musts” when specifying direction to water suppliers in permits. Tempering this concern were comments, for example, that “DWOs will err on the side of [requiring] treatment” when risk is involved and that this is appropriate. Another concern was consistency among DWOs in application of guidance. Suggestions to address this concern included shared training sessions for DWOs and communication of information to water suppliers.

### **2.2 GUIDANCE DOCUMENT FOR DETERMINING GROUND WATER AT RISK OF CONTAINING PATHOGENS (GARP)**

Many of the questions and discussion at the small table discussion for this document related to interpretation of risk and the information used in this and other documents to provide guidance for interpretation by DWOs. Consideration of risk of contamination from viruses in particular, was a topic of discussion. Some participants commented, for example, that “there is a lot of uncertainty with viruses in ground water” and that “there has not been enough science done regarding virus risks in groundwater.” Related comments included: “virus sampling is here [available in B.C.]; we should sample during recharge events” and “I will be testing for viruses.”

### **2.3 DRINKING WATER TREATMENT OBJECTIVES (MICROBIOLOGICAL) FOR GROUND WATER SUPPLIES IN B.C. (GWTO)**

Participants exchanged experiences with treatment options and technologies related to achieving drinking water treatment objectives. Some respondents commented, for example, that “all water systems should require



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disinfection.” Other participants noted challenges in treating with chlorine or chloramines including “iron and manganese [in some ground water supplies]... and red water issues.” Participants also discussed relative capital and operating costs of different disinfection methods (e.g., UV treatment and chlorination) and affordability for smaller water systems.

In addition to further discussion of GARP-viruses only, participants sought clarification of the “filtration credits” described in the guidance document. Participants pointed to the challenges and costs of obtaining data showing effective riverbank filtration of ground water, as well as the need for ongoing monitoring. One participant, for example, noted that their municipality undertakes continuous “flow monitoring” rather than monitoring tied to water levels or rainfall events. Participants briefly discussed well protection under Ministry of Environment legislation (i.e., the *B.C. Water Sustainability Act*), noting that detailed regulations under the *Water Sustainability Act* have yet to be introduced. Generally, participants who commented on this topic felt that the Ministry of Environment and the Ministry of Health regulatory provisions are complementary. One participant, for example, commented that there is “value in keeping [both] tool kits [for well protection and drinking water].”

## **2.4 BRITISH COLUMBIA GUIDELINES (MICROBIOLOGICAL) FOR MAINTAINING WATER QUALITY WITHIN DISTRIBUTION SYSTEMS (SECONDARY DISTRIBUTION)**

One participant noted that “this document won’t change present practice in the field... [it] is a matter of recognizing what exists already and making it more official.” Concerns or suggestions discussed by participants at the meeting included:

- Particular challenges faced by smaller water systems with “water distribution lines designed for [high volume] fire protection flows... that can stagnate because flow is [seldom] running at full capacity... leading to biological growth [in the distribution system].”
- Concern that the higher value target range for residual chlorine levels in the guidance document may be “too high” with resulting (chlorine) taste and smell complaints from water users.
- Recognition that costs may be a significant concern for smaller water systems. One participant, for example, commented that “while a chlorine pump is not that expensive, [ongoing] costs for operating can be substantial.”
- Suggested additional information for the guidance document to include, such as “specified alternatives to secondary disinfection”; “reference to... the BCWWA cross connection control program”; and “provisions for recognizing [emerging] technology and research.”

## **2.5 MEETING EVALUATION COMMENTS**

Most participants who provided evaluation comments found the meeting “informative,” “interesting” and/or “useful.” Positive comments included “good networking session,” “small group discussion was very informative” and “was great to... sit down with the MOH contacts directly.” Suggestions for improvement included “needed full day and case studies,” “very short notice,” “most participants from east Fraser Valley [but meeting held in Richmond],” “[some presentations were] overly simplistic,” and “more Q & A time for specific issues/concerns.”

### 3 KAMLOOPS COMMUNITY MEETING SUMMARY

Twenty-three stakeholders participated in the February 17, 2015 community meeting in Kamloops. Participants included individuals from the Interior Health Authority, First Nations Health Authority, water suppliers (municipal and improvement districts), industry, Thompson Rivers University and consultants.

#### 3.1 GENERAL COMMENTS

Much of the discussion through the meeting related to the challenges faced by small water systems, and in particular the costs involved in meeting guidance and requirements that may be set out by DWOs. One participant, for example, commented that “regional districts don’t want [jurisdiction over] water systems as they are a liability and expensive... [leaving many] improvement districts, without connections to municipalities, [with] no ability to pay.” Suggestions raised in subsequent discussion included: “[accessing] federal gas tax funding through Regional Districts”; and lobbying local and provincial politicians to provide additional incentives and resources to support infrastructure upgrades that may be needed to meet guidance and requirements.

Participants also pointed to the importance of well protection plans and the linkages among provincial ministries – Ministry of Health, Ministry of Environment and Ministry of Forests, Lands and Natural Resource Operations. One participant, for example, suggested a “link between the Ministry of Environment’s water resources atlas with well protection plans – identify where the well capture zones are.” Another participant pointed to the impact on drinking water sources of application of biosolids on agricultural lands (permitted by Ministry of Environment).

Several discussions and comments related to the importance of seasonal differences in climate and use patterns for interior water suppliers. One participant noted that their water system supplied mainly summer users (holiday homes and cottages) and this raised considerations that were not explicitly addressed in the guidance documents. Several participants pointed to the impacts of irrigation use on local water supplies – high volume, limited season use and concerns about chlorination for some agricultural uses – and noted associated challenges to water source and distribution systems.

Closing comments from meeting participants included: “[our health authority] understands that everyone wants to do the right thing – we’re here to help you get there”; “improvement districts need equal access to funding [for infrastructure upgrades to water systems]”; and “[the documents are] moving in the right direction – reasonable solutions – safe, reasonable and affordable is needed.”

#### 3.2 GUIDANCE DOCUMENT FOR DETERMINING GROUND WATER AT RISK OF CONTAINING PATHOGENS (GARP)

Much of the discussion in relation to this document involved the roles and relationships between water purveyors and DWOs. One participant commented, for example, that “[the utility of the guidance] comes down to the relationship [between the water purveyor and the] DWO... their judgment and expertise.” A representative from a health authority pointed to the importance of a “progressive enforcement system... [we] want to work with [water purveyors] to provide safe water... [before writing tickets, going to court and/or issuing water quality advisories].” Related comments and suggestions included: “well drillers need to be aware of these provisions”; and “the Source to Tap Assessment Tool [created by the Ministry of Health is] a collaborative resource [for use between] a DWO

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and water purveyor.” Other participants suggested that engagement of a qualified professional to address technical concerns and support planning can help relationships between water providers and DWOs.

**3.3 DRINKING WATER TREATMENT OBJECTIVES (MICROBIOLOGICAL) FOR GROUND WATER SUPPLIES IN B.C. (GWTO)**

Discussion of this guidance document often also related to the GARP document. Specific comments or suggestions included: “[additional] flow chart or graphs [to supplement or replace text]... to make it more clear where treatment options fit in with filtration and turbidity”; “[consider] a slow sand... engineered filter [as a potential alternative or supplement to chlorination]”; and “happy to see measuring turbidity for exemption as close to the source as possible – treating a system with iron creates colour and [other] problems.”

**3.4 BRITISH COLUMBIA GUIDELINES (MICROBIOLOGICAL) FOR MAINTAINING WATER QUALITY WITHIN DISTRIBUTION SYSTEMS (SECONDARY DISTRIBUTION)**

Several participants commented that this document would support education of key parties, noting, for example, that “my community would be opposed to chlorination... they would rather have microbiological risks than [perceived long term] risk of [chlorine] byproducts.” Participants commented, for example, that “[we will] probably need primary and secondary disinfection going forward” and that “defining secondary disinfection as a multi-barrier approach is good.”

**3.5 MEETING EVALUATION COMMENTS**

The most common words that participants highlighted to describe the meeting were “interesting,” “organized,” “useful” and “informative.” Suggestions and comments for the ministry included:

- “More education will [be] needed” and “all small water suppliers need to attend meetings [such as this one]”.
- “Provide presenters more time... and [time for] discussion after each presentation.”

**4 CRANBROOK COMMUNITY MEETING SUMMARY**

Eleven stakeholders participated in the February 19, 2015 session. Participants included individuals from the Interior Health Authority, water suppliers (municipal and improvement districts), industry and consultants.

**4.1 GENERAL COMMENTS**

One thread of discussion at the meeting related to lab tests. A second common theme involved turbidity and water quality. Participants asked Ministry of Health staff about the relationship between turbidity and potability, commenting, for example, that in the past the regional health authority had made an effort to require filtration systems for all water purveyors. If the primary health concern related to turbidity is organic content, one participant suggested that “a test for organic content can be used [at a cost of about \$30 while]... a ‘formation

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potential test' to... understand potential turbidity sources in a well [costs about \$600]." One participant (from a lab services company) noted that they had been asked to provide a "letter of potability... essentially... declaring a water source potable" and wondered if this was a common request. Participants suggested that if this is a desired direction, a checklist and additional guidance on a "comprehensive potability test" would be useful. One participant, for example, noted that "Aboriginal Affairs and Northern Development Canada (AANDC) instituted a documented broad and comprehensive testing [requirement] for all new wells and water systems."

Several participants commented that the guidance documents are "good" and/or "useful" and that face-to-face meetings such as this one are important in building shared understanding among water suppliers, users and DWOs. Participants pointed to the importance of understanding and good relationships among the parties (including qualified professionals). One participant expressed concern, however, that "logistics and resources [are] a challenge... [a water purveyor may only] meet with a DWO once in a year or two... [I am] concerned that meaningful discussions won't happen." Another participant (from a health authority) commented that "we need consistency – the same answers... from common beginnings... given across the province." In contrast, another participant cautioned that "[DWOs] may default to a checklist 'you must have all this' approach and make it mandatory if the officer does not have the experience and training to use discretion properly."

#### **4.2 GUIDANCE DOCUMENT FOR DETERMINING GROUND WATER AT RISK OF CONTAINING PATHOGENS (GARP)**

Several comments were made that testing for viruses would be difficult in this region (no nearby labs and logistical challenges getting samples to labs within time parameters), as well as expensive. Participants also discussed linkages between sewage and waste water collection systems, and drinking water quality. In discussion of the recommended "300 m zone of concern" for considering sewage and potential for viral contamination of ground water supplies, one participant commented, for example, that "[it] makes a lot of sense – you need to take a good look and see what is there... due diligence is important, not just the lowest standard."

#### **4.3 DRINKING WATER TREATMENT OBJECTIVES (MICROBIOLOGICAL) FOR GROUND WATER SUPPLIES IN B.C. (GWTO)**

In addition to the discussion about the importance of shared understandings and "reasonable" interpretation of guidelines by DWOs and water purveyors, participants provided several specific comments or suggestions for consideration, including:

- "[The guidance] documents are a good summary of leading science, but may be hard to implement. Operators will still find it difficult to convince holder of the purse strings that there is a problem without evidence of illness."
- "Where is the data that supports drinking water as a source of [gastro-intestinal] illness to justify expense of pursuing proposed objectives/guidelines?"
- "[I am] concerned about lack of appeals process for DWO decisions on terms and conditions on permits as well as other non-appealable decisions."
- "Water quality results give a qualitative view; what we need is to see the whole picture (e.g., land use around you)."

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#### 4.4 BRITISH COLUMBIA GUIDELINES (MICROBIOLOGICAL) FOR MAINTAINING WATER QUALITY WITHIN DISTRIBUTION SYSTEMS (SECONDARY DISTRIBUTION)

One participant noted that “[looking at the distribution system] is a fundamental shift for the ministry” and that “recognizing vulnerabilities [in distribution systems]... is a natural next stage of progress... in [the total system] of providing potable water.” Several participants commented on concerns in their communities about chlorination. One participant, for example, suggested that the ministry prepare “a short document on chlorine that outlines relevant literature, health risks, common uses, safe exposures, etc. [to help]... when faced with public opposition to the use of chlorine or chloramine in drinking water disinfection.” Another participant noted that “support [is needed] in applications for funding of secondary disinfection [with municipal and other politicians, as well as the public]” and that a “tie [of disinfection requirements] to legislation” could help to prove the need for funding.

#### 4.5 MEETING EVALUATION COMMENTS

The most common words that participants highlighted to describe the meeting were “interesting,” “informative,” “useful” and “organized.” Suggestions and comments from participants included:

- “Great comments from attendees.”
- “Get the word out to more industry folks.”
- “[The] chance to exchange views [was the most useful].”
- “More information to a larger audience [for future ministry effort].”
- “Well organized... the presentations on the three documents [was most useful].”

### 5 PRINCE GEORGE COMMUNITY MEETING SUMMARY

Thirteen stakeholders participated in the March 5, 2015 session in person, with another twelve participating by teleconference call. These represented individuals from the Northern Health Authority, water suppliers (municipal and Improvement Districts), industry, Ministry of Forests, Lands and Natural Resource Operations and consultants.

Following the open consultation session, ministry staff met on request with a representative from the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) to hear and address additional questions and comments regarding the consultation.

#### 5.1 GENERAL COMMENTS

Many of the comments and questions raised through the meeting related to particular characteristics and challenges associated with water systems in northern B.C. One participant, for example, noted that “the north has hundreds of one person connection systems,” and few “large” water systems (those serving over 500 people a day). Several participants commented that manganese build up is a common concern water for operators. Also, participants commented that sewage and draw down issues are less common in the north than in the south – i.e., there is generally less competition for water.

One discussion thread through the meeting was the role of qualified professionals (QP) in providing guidance and/or “professional opinion” to water suppliers and DWOs. One participant, for example, commented that “[we – the ministry and professional associations] need to come up with practical guidelines that a QP can sign off on [and

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provide assurance to water purveyors, as well as DWOs].” Another participant asked about the consequences if a “QP and DWO don’t agree on an assessment.” Related discussion highlighted that the legal costs and delays that would be involved in such a dispute reinforce the importance of communication and shared understanding.

**5.2 GUIDANCE DOCUMENT FOR DETERMINING GROUND WATER AT RISK OF CONTAINING PATHOGENS (GARP)**

Discussion of this document highlighted the challenges facing northern water operators, including: “lack of available training in home communities”; “a problem retaining... trained and experienced... staff”; “problems getting operators certified... they have multiple jobs and getting the necessary hours [of experience] is difficult”; and “[in]sufficient density of wells and well logs... to support aquifer mapping to assess conditions.” Specific suggestions and comments from participants included:

- “Seek places to include links to other information to... support guidance [for DWOs, QPs and water suppliers].”
- “Draw a stronger connection between the municipality’s [and the water provider’s] responsibilities... a municipality needs to see the water system as a core part of its business and resource it accordingly”
- “Can we improve... education and information to the general public as part of these documents?”

**5.3 DRINKING WATER TREATMENT OBJECTIVES (MICROBIOLOGICAL) FOR GROUND WATER SUPPLIES IN B.C. (GWTO)**

Much of the discussion related to technical questions and/or explicit guidance that might be included in the document. For example, one participant asked if “effective subsurface filtration... can be demonstrated by using particle counts” and another commented that “size of particles” is also a consideration and that “online particle counters [could be used to] demonstrate performance.”

In response to a question from a ministry staff member about whether the guidance document “strikes the right balance [between guidance and direction]” participant comments included: “there is enough here... it doesn’t fetter discretion... it is an education piece”; and “would like to see number cut offs for new inspectors [to] use... [our health authority] wants DWOs to exercise critical thinking... they need to grow into [their] decision making role... [within] a regional approach.”

**5.4 BRITISH COLUMBIA GUIDELINES (MICROBIOLOGICAL) FOR MAINTAINING WATER QUALITY WITHIN DISTRIBUTION SYSTEMS (SECONDARY DISTRIBUTION)**

Several participants noted that this document is of particular interest as aging infrastructure and political considerations are raising the profile of the costs and benefits of secondary disinfection. One participant commented that “[we] would like more operational detail [in the guidance document]... for example, dealing with pipe breaks... as accessing [external resources such as] AWWA documents and standards is expensive.”

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**5.5 MEETING EVALUATION COMMENTS**

The most common words that participants highlighted to describe the meeting were “interesting,” “useful,” “organized,” “informative” and “provocative.” Participants found “discussion with MOH [staff],” “chatting” and “the ability to discuss documents with [their] authors” as useful aspects of the meeting. Comments and suggestions for the ministry included: “coming up with some help for single users who don’t fall under this guidance” and “providing the power point slides [to meeting participants and others].”

**6 NANAIMO COMMUNITY MEETING SUMMARY**

Thirty stakeholders participated in the April 27, 2015 session. These included representatives from improvement and water districts, water suppliers, the Vancouver Island Health Authority, the Office of the Provincial Health Officer, the Ministry of Forests, Lands and Natural Resource Operations, and consultants. As the room was not amenable to small-group table discussions, a full-group discussion was held after the presentations on the ground water documents. A second full-group discussion occurred after the presentation on the secondary disinfection guidance document.

**6.1 COMMENTS ON GROUND WATER GUIDANCE DOCUMENTS**

Comments and questions ranged through topics that were unique to the smaller systems from Vancouver Island and the surrounding gulf islands. Concerns over saltwater intrusion were interspersed with the concerns over the role of DWOs, and also to do with infrastructure funding. One participant asked if there were “arbitration options” when a water supplier might disagree with a DWO’s decision, and what was their liability for going against a DWO recommendation? Cost considerations that were raised related to testing for Cryptosporidium, and the upfront considerations of water systems being built that are not sustainable by the users. A unique question regarding chemical considerations was raised related to the increased risk of THM formation when chlorine is added to salinated water. Participants were reminded that for chemical contaminants the province defers to the guidance provided in the Guidelines for Canadian Drinking Water Quality.

**6.2 BRITISH COLUMBIA GUIDELINES (MICROBIOLOGICAL) FOR MAINTAINING WATER QUALITY WITHIN DISTRIBUTION SYSTEMS (SECONDARY DISTRIBUTION)**

One participant expressed thanks for drafting the document, “it has now got me thinking about secondary disinfection” but felt there was a need for further practical guidance and information. Other concerns and suggestions discussed by participants at the meeting included:

- Comes across as pro-chlorination – it would be preferable if it didn’t push a particular solution. Would like to see other alternatives described beyond chlorine.
- What alternate processes could be done to achieve the same outcome?
- Should reflect operational considerations – increased requirements may run the risk of needing Level 2 rather than Level 1 operators, which may lead to lack of qualified operators, or increased operating costs for HR.

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- Where best to sample for residual levels – in main pipes or in houses? Document says that residual must be ‘detectable’ – but where in the system? Should be specified.
- Where households are using ‘tap’ or ‘under counter’ filters, samples drawn at their taps may show bacterial hits due to the poor maintenance of the filters and not indicate contamination in the distribution system.
- Concerned that [the Secondary Disinfection document] does not clearly describe a firm parameter for a chlorine residual in delivered water [out of the tap] – only states a ‘detectable’ level.
- Happy to know references to technical documents are in there.
- What are the parameters for dead ends? May never get adequate residual into some dead ends and so what length of dead end creates a risk from stagnation?

### 6.3 MEETING EVALUATION COMMENTS

Most participants who provided evaluation comments found the meeting “interesting,” “informative” and “organized.” Positive comments included “better than a webinar,” “guidance on secondary disinfection” was useful, and appreciated “an opportunity to have input into the documents.” Suggestions for improvement included “annual meetings like this,” “include actual case studies,” and “identify [strategies] for source protection.”

## PART THREE: RESPONSE FORM COMMENTS

A total of 26 responses (email messages, attached letters or comment forms) were received by May 15, 2015. Many of the responses included technical comments, as well as detailed edit suggestions related to the draft guidance documents. Several responses also represented collective responses from professional organizations involved with ground water and drinking water assessment and treatment.

All comments have been compiled by consultation question, as well as by respondent and sector, and documented by the consultation contractor. The comments have been received by the ministry and will be carefully considered by ministry staff in revising and implementing the guidance documents.

### 1 GENERAL COMMENTS

Respondents commenting on general questions did not see significant gaps in the current guidance for risk assessment and treatment of ground water, or for drinking water distribution systems. Commonly, respondents highlighted the importance of clean drinking water and protecting sources, whether ground water or surface water. While recognizing that protection of public health should always be the primary goal of water purveyors, some respondents expressed a concern that DWOs may consider guidance in the documents as “requirements” rather than “guidance.”

### 2 GUIDANCE DOCUMENT FOR DETERMINING GROUND WATER AT RISK OF CONTAINING PATHOGENS (GARP)

Response form comments regarding this guidance document generally focused on making the document more “user friendly” or clarifying or amplifying technical content. Many of the response comments addressed the role of



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a Qualified Professional (QP) relative to that of a Drinking Water Officer (DWO). One respondent, for example, commented that “the document does not clarify how the opinion of the DWO weighs against the opinion of a QP (e.g., a hydrogeologist).” Another respondent expressed concern that “the powers given to the DWO are absolute... a DWO is being given the authority to order a small water system to start testing its ground water for proof that it is not contaminated.” The respondent suggested that the guidance needs to “include a caveat that [a] risk assessment must contain a proviso of likelihood of contamination [prior to requiring costly assessment or treatment].” Several comments suggested further involvement of a QP, for example, early in the assessment.

Several comments recommended changes to the document to improve clarity or additions to support use of the guidance. For example: “include... a template or guideline for development of the [stage 2] response plan”; “some... items [in stage 2] seem redundant... could probably eliminate table 3-1 and start with table 4-1”; and “stage 1 hazards screening offers similar, yet different explanations of the same hazards described in stage 2.”

Comments related to ground water at risk of pathogens – viruses included suggested additional explanatory text and guidance for assessing risk and inclusion of a list of “more recent papers on virus sources and fate in ground water” in the document’s list of references.

Several respondents noted the cost challenges facing small water suppliers, commenting, for example, that “additional studies are very costly and would require a B.C. ministry to assist financially... small communities with limited resources.”

Suggested additions to the document’s glossary included:

- “Definition of a capture zone... for example, the one provided in the “Source to Tap” assessment guideline.”
- “Define possible sources of pathogens... to include [a comprehensive and specific list].”
- “Carefully define... the term ‘hydraulic connection’ in the glossary... as term may have different meanings to different readers.”

Additional comments included: “great in bringing to the forefront the importance of suppliers insuring their well source is well protected”; “suggest... stressing the importance of constructing a well in a manner to seal confining units and prevent migration of surface and/or shallow ground water... into a confined aquifer”; “we recommend that a purveyor’s asset management plan be examined to determine the potential for water and wastewater infrastructure as a possible source(s) of contamination”; “it should be recognized that smaller aquifers in more remote areas [of the province] may not be mapped [under the B.C. aquifer classification system]”; and “[add reference to] best practice tools... [addressing] asset management for sustainable service delivery... [and] methodology for setting a cross-connection control program.”

### **3 DRINKING WATER TREATMENT OBJECTIVES (MICROBIOLOGICAL) FOR GROUND WATER SUPPLIES IN B.C. (GWTO)**

With respect to the background section of the guidance document (pages 4-6), one respondent commented that “this section [appears to be an] amalgamation of the current framework from various sources... to aid supplier/DWO efforts in assessments – good.” Several comments requested additional information, for example: “information on level of treatment required to mitigate chemical contaminations”; “information on UV systems... membrane systems and the process of validating them”; and “information on how 4-log virus reduction can be done.”

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Several detailed comments relating to subsurface filtration were received. One respondent noted, for example, that “our main concern is testing for viruses [cost of testing that may be needed to demonstrate performance, e.g., for subsurface filtration treatment credits].” One commented that “we are excited to see the incorporation of subsurface filtration.” Another respondent provided detailed suggestions for additions or changes to this section of the guidance document, including: “a flowchart like that included in the GARP guidance document for determining what forms of treatment are required for GARP and GARP-viruses only sources”; “the definition of a normal high water mark is unclear”; “a supporting reference should be provided... for granting a 1-log credit to wells screened across finer grained formations”; and “the phrase ‘time of travel and distance from high water mark and 200 year floodplain to well under various... conditions’ is unclear.”

Additional comments included:

- “It would be helpful to reference the secondary disinfection document [early in the GWTO document]”
- “Suggest [stating] that the B.C. Government’s Well Protection Toolkit AND comprehensive Drinking Water Source-to-Tap Assessment Guideline provide guidance on well protection planning”

#### **4 BRITISH COLUMBIA GUIDELINES (MICROBIOLOGICAL) FOR MAINTAINING WATER QUALITY WITHIN DISTRIBUTION SYSTEMS (SECONDARY DISTRIBUTION)**

Common themes in the comments received on this draft guidance document included:

- The role of secondary disinfection as one element of water treatment and delivery from source to tap
- Treatment methods (e.g., chlorination relative to chloramination) and recommended residual levels
- Clarification of and/or additions to recommended best practices, including an effective cross connection control program and implementing an infrastructure asset management plan

One respondent commenting on the role of secondary disinfection, for example, stated that it is “our opinion that the document tends to over-emphasize secondary disinfection as a stand-alone water treatment barrier... for example, secondary disinfection may not be required at new facilities... if there is sufficient chlorine residual in the water carried over the primary disinfection process.” Another respondent commented that “many users of water systems that do not currently use secondary disinfection do not want their water altered by the addition of chlorine or ozone – the background information is heavily skewed towards the perception that secondary treatment is a necessity when many systems serve their users well without it... while secondary treatment can be a vital component to protecting public health it is not an absolute default... [the guidance document] needs to have its language edited to not imply a predetermined outcome.”

Several respondents recommended chloramine over chlorine as a treatment preference and felt that the document should note the benefits of chloramine (such as lower degradation rate when treated water has to travel long distances). A number of comments about concentration targets were also provided, including: “[we] suggest that the ministry set the operational range to 0.1-2.0 mg/L”; “in Alberta, there is a requirement to have 0.1 mg/L residual in all regulated systems”; “water systems should be individually assessed for risk when determining concentration targets”; and “[our region] recommends a more flexible approach... the accepted target concentration for free chlorine should be assessed in conjunction with routine monitoring of other bacteriological water quality parameters, with emphasis on the fact that a non-detectable chlorine residual sample, by itself, does not indicate poor water quality, if other water quality parameters are met and other BMPs are followed.”

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Additional comments included:

- “Define biostable water.”
- “Define contamination incident.”
- “The criteria are designed so that only very small systems can qualify [to not require secondary disinfection] – just say that upfront.”
- “Wording encouraging [DWO] consultation with a qualified professional in making informed decisions would be helpful.”
- “How do you define risk in existing systems to trigger secondary disinfection?... even if it not applied across the board, there should be a trigger (3 km of pipe or 15 service connections or something similar) for requiring maintaining disinfectant residuals.”
- “Information on typical monitoring and reporting frequency [would ] be helpful.”
- “Include a brief definition of primary and secondary disinfection [in the overview section].”
- “Having a good water main flushing system could also be considered as a BMP to maintain water quality in the distribution system.”
- “We suggest... listing the specific bacteriological parameters that the DWPR requires to be monitored,... Noting that on-site coliform-testing kits (e.g., Colilert) can indicate a presence/absence of total coliform and E.coli in less than 24 hours... [and whether] for smaller systems unable to implement “real time” monitoring of disinfectant concentrations [if] is there another sampling frequency that is recommended.”
- “Secondary disinfection systems should be designed to provide a detectable level of free chlorine at all end points in a distribution system.”
- “An increase of sample points at more frequent intervals would give a better overall scope of what your water distribution is doing and help operators mitigate risks with more accuracy.”
- “ ‘Water age’ may have different meanings to different professionals within the water resource sector... similarly, ‘retention time’ could be misinterpreted.”
- “The term ‘intrusion’ should be defined for this context [intrusion of potential contaminants into distribution pipes].”
- “[Ongoing evaluation is] absolutely necessary for all DWOs to ensure safety of the users – a push... to help create more funding to make this easier would be helpful.”
- [Suggestions for additional material on best management practices] “guidance documents on distribution tank location, maintenance and cleaning... guidance documents that deal with flushing [and] superchlorination.”
- “Suggest that this document include some graphics to help the reader visualize key concepts and how this document ties in with other documents.”

APPENDIX A: ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
AANDC	Aboriginal Affairs and Northern Development Canada
APEGBC	Association of Professional Engineers and Geoscientists of British Columbia
AWWA	American Water Works Association
B.C.	British Columbia
BCGWA	British Columbia Ground Water Association
BCWWA	British Columbia Water & Waste Association
BMP	Best Management Practices
DWO	Drinking Water Officer
DWPA	<i>Drinking Water Protection Act</i>
DWPR	Drinking Water Protection Regulation
DWS	Drinking Water System
GARP	Ground Water at Risk of Containing Pathogens
GWTO	Ground Water Treatment Objectives (used to reference the document <i>Drinking Water Treatment Objectives (Microbiological) for Ground Water Supplies in B.C.</i> )
MFLNRO	Ministry of Forests, Lands and Natural Resource Operations
MOE	Ministry of Environment
MOH	Ministry of Health
MPA	Microscopic Particulate Analysis
QP	Qualified Professional
UV	Ultraviolet