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Update on the NCCPH Small Drinking Water System Project

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CIPHI Saskatchewan Branch Seminar
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Outline

- NCCPH Overview
- Small Drinking Water Systems Project
- Project Update
- Questions/Discussion

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National Collaborating Centres for Public Health (NCCPH)

Who are we?

- Six Centres created by the Federal government to strengthen public health in Canada
- Each Centre focuses on a specific area of public health

Mission:

Develop, translate, promote and support the use of existing and new evidence in public heath to inform best practices nationally – and beyond

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National Collaborating Centres for Public Health (NCCPH)

NATIONAL COLLABORATING CENTRE FOR ABORIGINAL HEALTH

CENTRE DE COLLABORATION NATIONALE DE LA SANTÉ AUTOCHTONE

Centre de collaboration nationale sur les politiques publiques et la santé

National Collaborating Centre for Healthy Public Policy

National Collaborating Centre for Determinants of Health

Centre de collaboration nationale des déterminants de la santé

National Collaborating Centre for Infectious Diseases

Centre de collaboration nationale des maladies infectieuses

National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

National Collaborating Centre for Methods and Tools

Centre de collaboration nationale des méthodes et outils

National Collaborating Centres for Public Health

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NCCPH

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NCC Leads & Host Institutions

NCCAH – Margo Greenwood, PhD
University of Northern British Columbia, Prince George, BC

NCCDH – Keith De'Bell, PhD
St. Francis Xavier University, Antigonish, NS

NCCEH – Tom Kosatsky, MD, MPH
British Columbia Centre for Disease Control, Vancouver, BC

NCCHPP – François Benoit, MSc
Institut national de santé publique du Québec, Montreal, QC

NCCID – Margaret Fast, MD
International Centre for Infectious Disease Inc., Winnipeg, MB

NCCMT – Donna Ciliska, RN, PhD
McMaster University, Hamilton, ON

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National Collaborating Centres for Public Health (NCCPH)

Goals

- Synthesize, translate, and exchange evidence-based knowledge to support front-line public health practitioners and policy-makers in Canada
- Identify gaps in the use of evidence in public health practice and policy making
- Strengthen national profile with significant contacts and networking across Canada
- Consult with front-line public health practitioners to identify promising practices, policy options and research gaps

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Small Drinking Water Systems Project

- Environmental Scan conducted 2005-6
- Drinking water was the highest priority for the majority of interviewees
- Seen as a cross-cutting issue amongst NCCs
- NCCEH commissioned a Retrospective Surveillance of Waterborne Disease Outbreaks/Events

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Background

- Lack of systematic information on characteristics and causes of waterborne disease events (WBE)
- Outbreaks provide opportunity to look into sources, health impacts and contributing factors to waterborne illness
- No national surveillance system in Canada for WBE; approaches to collection of information on outbreaks are not standardized
- Information collected is often not published distributed and often incomplete

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Retrospective Investigation of Drinking Waterborne Illness Events

- Objectives of Study
  - Determine the characteristics of WBEs
  - Water source characteristics
  - Water Treatment and distribution
  - Demographic information and health outcomes
- Obtain information of direct relevance to prevention policies and programs

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Study

- In-depth interviews of relevant front-line environmental health professionals
- 47 WBE were identified
- Most outbreaks happened in small systems (< 5,000 population)
- Most WBEs began in summer
- Most associated with surface water or combination

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Study cont.

- About half WBEs were caused by protozoa- giardia and cryptosporidium
- 46% had disinfection only, 40% had no treatment
- Attributed factors to WBE
  - Inadequate treatment
  - Precipitation
  - Lack of source protection
  - Animals in watershed

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Study cont.

- Response to WBE
  - Changed water source
  - Upgraded or changed treatment
  - Changed or improved policy, reporting or combination
- Study currently being re-analyzed for SDWS only

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Consultations for SDWS Project

Consulted policymakers & practitioners, Aboriginal organizations and communities, and other experts

- CIPHI conference (May 2009)
- CPHA conference (June 2009)
- Toronto forum (June 2009)
- Montreal forum (September 2009)
- Online Survey (ended October 2009)

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Results of Consultations

Identified gaps were prioritized within each of these six areas:

- Testing
- Treatment
- Surveillance
- Interventions
- Policy
- Education

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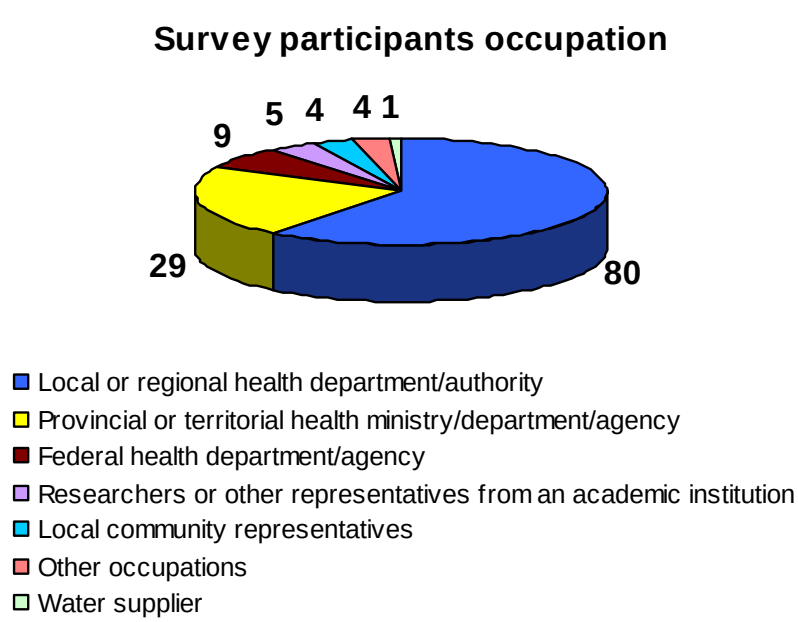
Online Survey

Developed using SurveyMonkey™, a web-based survey tool, and was linked from the NCCPH website (www.nccph.ca).

- Invitations sent via e-mail
- 132 participants representing all provinces and the Northwest Territories



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Small Drinking Water Projects

1. Description of roles and responsibilities
2. Production of a user guide to home water testing
3. Review of applicability of treatment technologies
4. Creation of a database of notifiable waterborne diseases
5. Review of effective strategies for risk communication
6. Review of drinking water and its impact on pregnancy and children's health
7. Inventory and summary of Canadian and international projects in SDWS
8. First Nations SDWS

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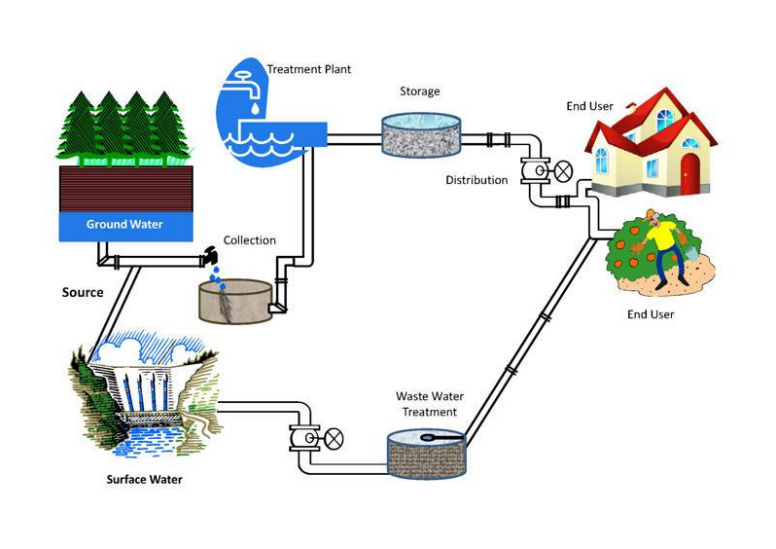
1. Roles and Responsibities

Components:

- Source water protection
- Water treatment and distribution
- Drinking water quality and monitoring
- Waste management
- Surveillance
- Role of community in provision of safe drinking water



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Roles and Responsibilities
(partial sample only)

1. Source Water Protection:

- Who has stewardship role related to water source protection?
- Who overseas liquid waste?
- Who is responsible for land use planning activities?
- Who is responsible for ensuring activities such as construction, infrastructure, mining, etc do not degrade source water?
- Who delivers permits to draw water?
- Who has control over watershed?
- Who is responsible for watershed management plan?
- Any source vulnerability assessment?

Example Gaps

British Columbia

Source Water Protection:

- Source vulnerability assessment & ranking (in progress) Min. of Health Services currently revising

Water Treatment & Distribution:

- Fee for water distribution

Drinking Water Quality & Monitoring:

- Chemical testing (not required but DWO can order)

Surveillance:

- No overall policy; guided regionally

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Roles and Responsibilities
(partial sample only)

Location	Organization/Personnel	Source	Treatment	Quality	Waste	Surveillance	Community
BC	Lieutenant Governor in Council	√		√			
	Ministry of Healthy Living & Sport	√		√			
	Minister - Healthy Living & Sport	√		√			
	Provincial Health Officer/Authority	√	√	√		√	√
	Regional Health Authorities	√		√		√	√
	Medical Health Officer	√	√	√		√	√
	Provincial Drinking Water Officer	√	√	√		√	√
	Regional Drinking Water Officers	√	√	√		√	√
	Water System Owner	√	√	√			
	Water Supplier	√	√	√		√	√
	PH Engineer	√	√	√			

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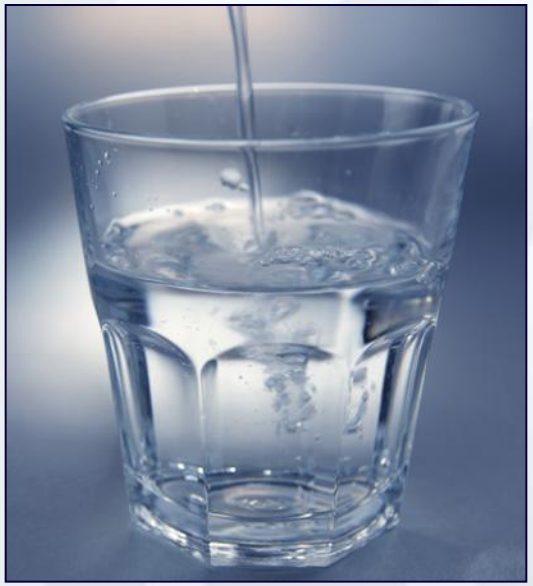
2. Home Water Testing

- Extensive search for home test kits
- Contact with producers

Findings:

- 12 kits reviewed
- Only 2 had independent EPA testing
  - *Nitrate*: false positives 0-14%
    false negative 32-38%
- *Atrazine, Simazien*: false positive 14%
  false negative 0%

Fact Sheet up on website



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3. Treatment Technologies

Treatment Preferences:

- Low construction & operating costs
- Simple operation
- Low maintenance & low labour requirements
- No serious residual disposal
- Specific to the water characteristics
- Pilot plant testing is essential, even for packaged plants!

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Treatment	Level of operational skills	Level of maintenance	Comments
Coagulation-filtration package plants	•Coagulation chemistry must be managed properly	•Cleaning or backwash required	•Ready to operate •Little flexibility •Alternative to large scale coagulation-filtration which is complicated
Slow sand filtration	•Basic	•2 to 5 hours per month	•No access to electrical power needed •Low turbidity water •Does not remove all microorganisms
Diatomaceous earth filtration	•Basic	•Cleaning filter every 1-4 days	•Removes *Giardia* and *Cryptosporidium* (oo)cysts •Fine grade can remove bacteria, however use of coagulant chemical required for virus removal •If no chemical used, residue can be discarded to landfill •Does not remove all microorganisms
Precipitative softening	•Can require advanced operator skills • Knowledge in water chemistry needed	•Require regular attention	• Due to complexity of fluctuation of water characteristics, used only for well water •Removes a wide range of contaminants including nitrate and arsenic •Lime sludge can usually be suitable for application to farmland

Treatment	Level of operational skills	Level of maintenance	Comments
Reverse Osmosis	•Low level	•Low level	•Expensive waste removal •Potential issue with fouling, may require pH reduction to 5-6 •Expensive technology when compared to other systems •More appropriate for treatment of groundwater than surface water •Very effective removal of microbial, inorganic chemicals, metals, radium, minerals and some organic chemicals
Granulated activated carbon	•Low level	•Backwash required •Replacement of exhausted GAC •If used for radon removal, lasts for many years	•Organic chemicals •For groundwater or filtered surface water •Absorbs aromatic compounds, chlorinated aliphatics, pesticides and herbicides •Disposal of radioactive decay product of radon may be a problem
Ceramic membrane filtration without chemical pre-treatment	•Low level		•Eliminating the use of coagulants reduces complexity and cost of treatment operation •Work best for low turbidity waters

Water Treatment Database

- Types of treatment applicable to SDWS
- Advantages, Disadvantages, Issues where known
- Level of skill, ease of operation, maintenance
- Other, feedback on how information should be presented

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Example Database

Treatment	Use	Advantages	Disadvantages	Comments
Disinfection Chlorine Gas	Appropriate as primary or secondary disinfectant for microbial pathogens	Effective….	Dangerous….	Adequate mixing and contact time must be provided to ensure complete disinfection of pathogens
UV	Effective bacteria and virus	No known toxic residual, easy to operate and maintain….	Not suitable for water with high suspended solids, turbidity….	Use for GW not directly influenced by SW where no risk of protozoan cysts
….				
Filtration Slow Sand Filtration				
….				

4. Waterborne Disease Outbreaks

Review of surveillance systems for waterborne disease outbreaks in Canada and internationally

- No formal surveillance conducted nationally
- Scattered informal surveillance conducted at provincial, local, and university levels
- Reporting only done through journal articles, case studies, etc.

GAP: National Surveillance system for waterborne disease outbreaks

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Notifiable Disease Database

Reporting of notifiable diseases is conducted at the provincial level

- Different requirements in each jurisdiction
- Includes various diseases/conditions (both waterborne and other)

Reporting at the federal level is voluntary

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Notifiable Disease Database

STEP 1: Compile and compare *notifiable disease reporting requirements* in all Canadian jurisdictions

- What is reported: pathogen, disease, case definition
- Who reports: physician, laboratory, veterinarian
- Classifications: *waterborne*, foodborne, STBBI, zoonotic, respiratory
- Stored online and accessible to PH practitioners
- Includes search and comparison capabilities

STEP 2: Use results from database to inform NCC SDWS projects and further work, make recommendation on reporting of waterborne disease outbreaks

5. Risk Communication – Systematic Review

Environmental Health Risk Communication incl. Boil Water Advisories

Questions:

- Which strategies are most effective for communicating environmental health risks?
- Which factors relate to environmental risk communication uptake?

Risk Communication – Systematic Review

Literature suggests:

- From a trusted source
- Tailored to the audience
- Multi-media approach is more effective than any single
- Incorporate text with visuals (pictures, diagrams) with qualitative and quantitative data for print materials
- Disseminate through multiple sources and channels

Risk Communication

- Deliver warning system notices on a regular and on-going basis.
- Develop communication strategies with the awareness that people make choices based on personal past experience
- Ensure the public have an opportunity to address questions and concerns

Fact Sheet available on website

6. Drinking Water and Impact on Pregnancy and Children's Health

- Trihalomethanes—possible increase in reproductive and developmental effects
- Nitrate—health risk for infants under 6 months, blue baby syndrome
- Arsenic –need more data to confirm neg. effects, reproductive outcomes
- Lead exposure—may lead to physical and mental developmental delays
- Microbial—GI problems

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Drinking Water and Impact on Pregnancy and Children's Health

Recommendations identified by the Canadian Partnership for Children's Health and Environment:

- Support research, monitoring and publications of health impact of contaminants on foetuses and children
- Evaluate Government policies in terms of foetal and childhood exposures to drinking water contaminants
- Publish performance measures of children's environmental health including water quality indicators

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7. Links to Other Small Drinking Water Projects

Summarized and linked to information on water related projects across Canada and internationally

- Walkerton Clean Water Centre
- Canadian Network for Public Health Intelligence (CNPHI) drinking water modules
- Environmental Operators' Certification Program (BC)
- Small Community Water Supplies Task Group
- RES'EAU Water Network
- C-EnterNet
- Small Water Users Association of British Columbia
- Circuit Rider programs

http://www.nccph.ca/182/Other_Initiatives_and_Projects_in_Canada.ccnsp

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External Resources Link

http://www.nccph.ca/en/index.aspx?sortcode=2.0.11.12.17.29

- Definitions
- Background
- Aboriginal Issues
- Education
- Directories
- Interventions
  - Boil water advisories
  - General
- Monitoring
  - Risk Assessment
- Procedural Manuals or Guidelines
- Testing
- Treatment
- Waterborne Illness (Surveillance)
- Websites

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Circuit Rider Training Programs (CRTP)

- National training program began in Canada mid-1990s
- Customized training program for water and wastewater operators in remote locations
- CRTP takes into consideration:
  - Educational background of trainees
  - Remote location of the communities
  - Unique culture of First Nations peoples
- Circuit riders (trainers) are experts in the field with years of experience; personally oversee training of operators in several communities (the circuit)

CRTP continued

- One-on-one hands-on training on-site:
  - water and sewage treatment
  - health and safety guidelines
  - community awareness promotion
  - water testing
- Pass on important skills, answer questions, aid in licensing certifications, and offer troubleshooting and problem-solving for typical water treatment problems
- Now in every province and territory (except Nunavut) with plans for more expansion over the next 5 years

8. First Nations SDWS

- Collaborative project with Assembly of First Nations (AFN)
- Evidence Reviews
  - State of Knowledge on SDWS in First Nations communities across Canada
  - Regulatory Issues

    On-Reserve

http://www.flickr.com/photos/peupleloup/2626448826/

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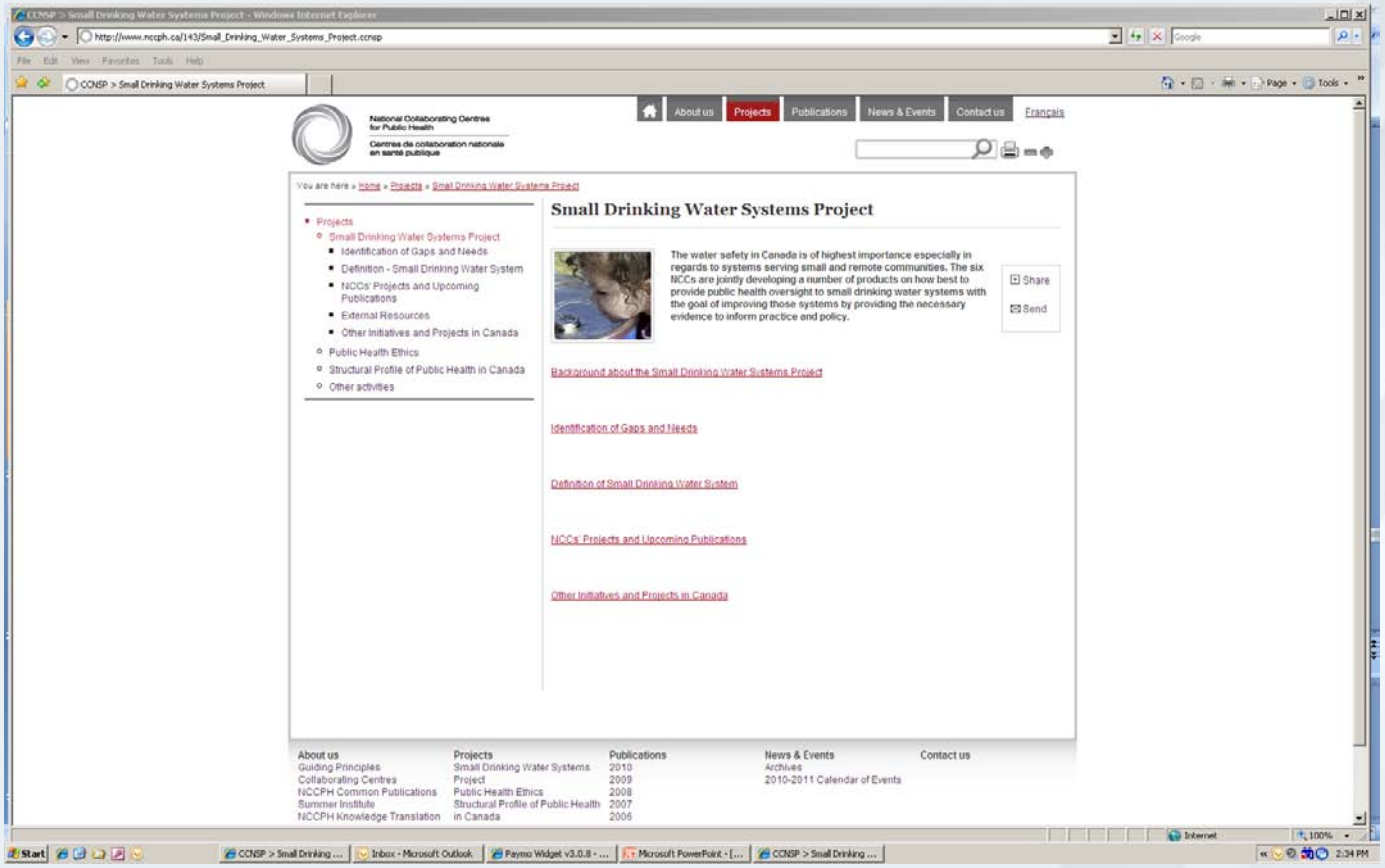
NCCPH link to SDWS Project

http://www.nccph.ca/en/Index.aspx?sortcode=2.0.11&id_article=9



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Next Steps

- Develop a quarterly e-magazine describing current and promising practices
  http://www.nccph.ca/205/Latest_Small_Drinking_Water_Systems_Project_E-Newsletter.ccnsp
- Put together a repository of SDWS information
  http://www.nccph.ca/en/index.aspx?sortcode=2.0.11.12.17.29
- Continuing consulting with users of this information and experts

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Questions for You/ Discussion

- What do valuable tools and products look like?
- What types of informational material are necessary to fill the gaps?

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Thank you!

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