Drinking Water, Source Protection and Public Health

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Multi-Barrier Principle

- Prevent contamination of source waters:
  - Surface Water (Watershed Protection)
  - Ground Water (Aquifer Protection)
- Adequate Water Treatment
- Distribution System Integrity
- Testing/Monitoring Water Quality
- Response Plan for adverse water quality results
Source Water Protection

- Maintain source water quality from potential degradation through industrial, agricultural, recreational activities, land development
- Complex: relies on federal, provincial, local government agencies; political leaders; NGOs; special interest groups; general public.
Source Water Protection

- Necessary, but may not be sufficient.
- Banning all human activity in a watershed does not guarantee safe water.
- Inevitable presence of pathogens in surface water such as *Cryptosporidium* and Giardia, and Turbidity events during high rainfall and spring snowmelt.
- GVWD and CRD watershed control.
- 1995 Victoria outbreak of Toxoplasmosis attributed to feral cats or cougars.
Sources of Drinking Water

- 75% from Surface Water.
- 25% from Ground Water.
Potential Sources of Contaminants:

Surface Water:
- Agricultural runoff
- Pesticides and Fertilizers
- Livestock Grazing
- Forestry Activities
- Recreation
- Roads
- Urban development
- Discharge of municipal / industrial waste water
- Resident Wildlife Population
Potential Sources of Contaminants

Ground Water:

- Improperly functioning Septic Systems
- Improper well construction, abandoned wells
- Chemical spills
- Pesticide / Herbicide over-use.
- Natural mineral contaminants: Arsenic
- Uncovered Manure pile leachate
- Over-fertilization of crops
These days, we just spray with contaminated groundwater... it's cheaper than farm chemicals.
Some Steps to reduce potential for contamination:

- Land Acquisition; reservoir use restrictions; stream and reservoir buffers.
- Soil Conservation practices; grazing restrictions; animal waste management facilities.
- Forest activity buffer strips; proper design, construction, maintenance and inactivation of roads and skid trails.
- Storm water diversions; retention basins; restrictions on density and location of urban developments near surface water supplies; repair of malfunctioning septic systems.
Ministry of FLNRO / Environment activities:
- monitoring and assessment of water quality data (surface and ground water);
- Water Quality Guidelines and Objectives
- designation of community watersheds under the Forest and Range Practices Act;
- Ground Water Protection Regulation
- Aquifer Mapping
- Environmental Assessments
- Water Management Plans (Twp of Langley)
Source Water Protection Strategies

Agriculture:

- Nutrient management studies
- Manure loading advisories
- Environmental Farm Plan program
- Water Supply Expansion program
- Farm Practices Protection (Right to Farm) Act
- Sustainable Poultry Farming Activities
Microbiological pathogens are considered the most significant threat to public health related to drinking water because the effects are acute;

Surface water is vulnerable to microbiological contamination from wildlife and a variety of human activities.
• Land use activities will affect to some degree the types of pathogens present.
• Pathogenic bacteria and protozoa will occur in watersheds containing livestock and wild animals and birds.
• Watersheds containing human populations will also contain pathogenic viruses.
Health Perspective

• In general, the microbiological quality of groundwater sources is better than that of surface waters because most microorganisms are removed as the water seeps through the soil. The soil acts as a natural filter.

• Understanding the physical characteristics of a groundwater recharge area is necessary to assess the vulnerability of the aquifer to contamination.

• The land use within the watershed/aquifer can also affect the chemical quality of groundwater sources.
• Chemicals and radiological compounds can threaten the quality of groundwater supplies.

• Groundwater sources may also have naturally elevated levels of elements such as fluoride, arsenic, or uranium that can pose a chronic health risk.
Health Perspective

- Surface water is also vulnerable to chemical contamination from natural sources and human activities (anthropogenic sources).
- Mining activities can cause elevated heavy metal concentrations and depressed pH; livestock or wastewater discharges can cause elevated nitrate-nitrite levels, and industrial operations can be a source of synthetic organic compounds.
Health Strategies

- Source Protection must be a critical part of Drinking Water Protection.
- Drinking Water Protection Act Part 4 deals with source water protection, for example:
  - Section 23: Prohibition against contaminating drinking water or tampering with system
  - Section 24: Requirement to report threats to drinking water
  - Section 25: Hazard Abatement and Prevention Orders
  - Section 29: Request for Investigation
Health Strategies

• Drinking Water Protection Act Part 5 deals with drinking water protection plans, for example:
  • Section 31: (Ministerial) Order designating area for planning purpose
  • Section 32: Plan development process
  • Section 35: Implementing the Plan
In 2002 – Province adopted Action Plan for Safe Drinking Water in BC

Government’s commitment to an integrated approach for drinking water protection

In 2006 – MOU establishing Inter-Agency Regional Drinking Water Teams:
Health Strategies

- Ministry of Agriculture
- Ministry of Energy, Mines and Natural Gas
- Ministry of Health
- Ministry of Environment / FLNRO
- Ministry of Community, Sport and Cultural Development
- Ministry of Health
- Ministry of Transportation and Infrastructure
- The Office of the Provincial Health Officer
- Land and Water British Columbia Inc.
- Fraser Health Authority
- Various Municipal / Regional District
Watershed and Aquifer Protection are vital to Drinking Water