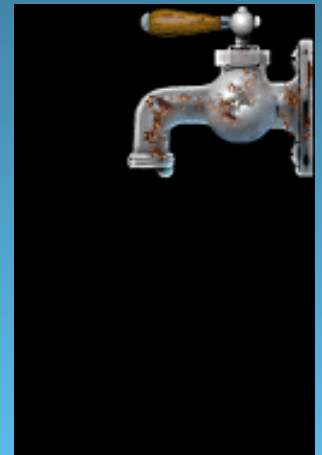


GROUNDWATER DEVELOPMENT AND PROTECTION NEWFOUNDLAND AND LABRADOR

by:

G. Keith Guzzwell, P. Geo.
Groundwater Resources Manager



Groundwater Resources in Newfoundland & Labrador

- ~29% of the province use groundwater as source of potable drinking water, higher % in rural areas.
- Number of separate groundwater and surface water systems about 300 each.
- Most groundwater systems are small serving 5-40 houses.
- ~ 170 communities use a public groundwater supply
- another 200 communities have only private water supplies which are for the most part dug and drilled wells. ~20% of the population have private wells.



Groundwater Resources (con't)

- Larger towns on groundwater are:
- Happy Valley – Goose Bay, Stephenville, Wabana
- Stephenville Crossing, St. Alban's, Kippens, Badger
- Variability of groundwater systems great.
- Norman's Cove-Long Cove has 9 separate well systems while Stephenville has 9 wells feeding into one system.
- Other uses of groundwater are water bottling, fish farms, heating and cooling using heat pumps.



Categories of Groundwater Contamination

Microbiological

Bacteria and Viruses

Human and Animal Waste
Naturally Occuring Bacteria

Tend to be absorbed onto clay particles or filtered out through sand, and naturally die off.

Organic

Petroleum Products
Chlorinated Solvents
Pesticides & Preservatives

Fuel Oil, Kerosene, etc.
Dry Cleaning Fluids
Degreasers
Paint and Vamish Removers
Aldicarb and Creosote

Petroleum products can take up to five years to decompose. Chlorinated solvents are persistent. Pesticides degrade more quickly. Preservatives migrate short distances

Inorganic

Nitrates
Salt
Other Chemicals

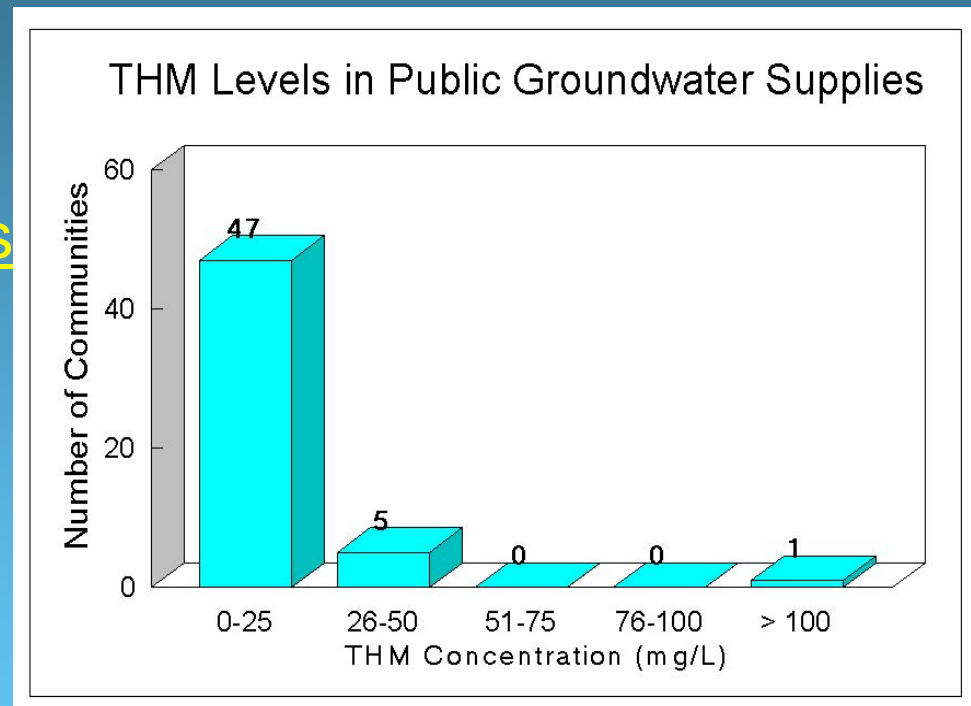
Fertilizers
Road Salt

Nitrates and Salts are highly soluble and mobile in groundwater.



THM'S IN GROUNDWATER

- To date, 53 groundwater samples have been taken in 37 communities. Only one had a concentration greater than the Guidelines for Canadian Drinking Water Quality limit of 100 micrograms/L.
- Predominantly a surface water problem.



WHY DO WE NEED WELLHEAD PROTECTION?

- Safeguard our drinking water supplies
- Manage our water resources for quality and quantity
- Integrate land and water use planning
- Use a preventative approach to water quality management
- Provide enforcement
- Be compatible with other legislation



Early Wellhead Protection

“There shall be no man or woman dare to wash any unclean linen, wash clothes ... nor rinse or make clean any kettle, pot, or pan, or any suchlike vessel within twenty feet of the old well or new pump. Nor shall anyone aforesaid, within less than a quarter mile of the forte, dare to do the necessities of nature, since by these unmanly, slothful, and loathsome immodesties, the whole forte may be choked and poisoned.”

*Governor Gates of Virginia
Proclamation for Jamestown, Virginia 1610*



WELLHEAD PROTECTION STRATEGY

- A number of ways to do this.
- Larger towns with budgets hire consultants and do a wellfield protection strategy. Usually 3 zone system
- Zone 1 – 50m radius from a well
- Zone 2 – an area based on travel time or boundaries
- Zone 3 – the perceived recharge area of the well/wellfield



WELLHEAD PROTECTED AREA DESIGNATION PROCESS

- Identify prospective community
- Send letter offering wellhead protection and benefits
- If positive feedback, arrange meeting and discuss
- Draw up inhouse proposed area based on available data, or if community is “large”, suggest they hire a consultant.
- Send map of area to Interdepartmental Land Use Committee (ILUC) for comments.
- If no major problems with comments, do up Notice of Wellhead Protection with distances and bearing of area
- When signed by the Minister, provide a list of do's and don'ts to community, supply signs, advertise in local paper, gazette

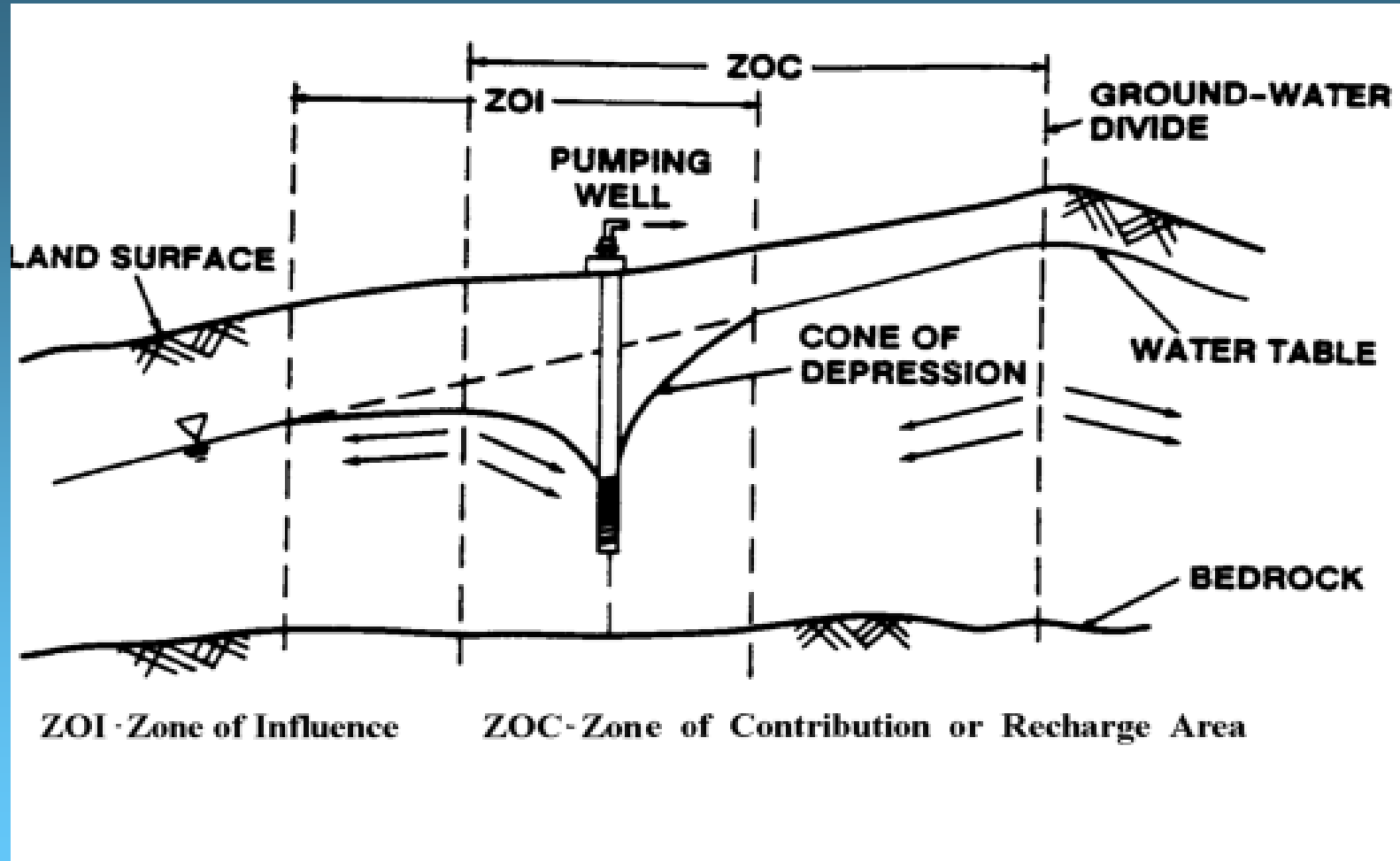


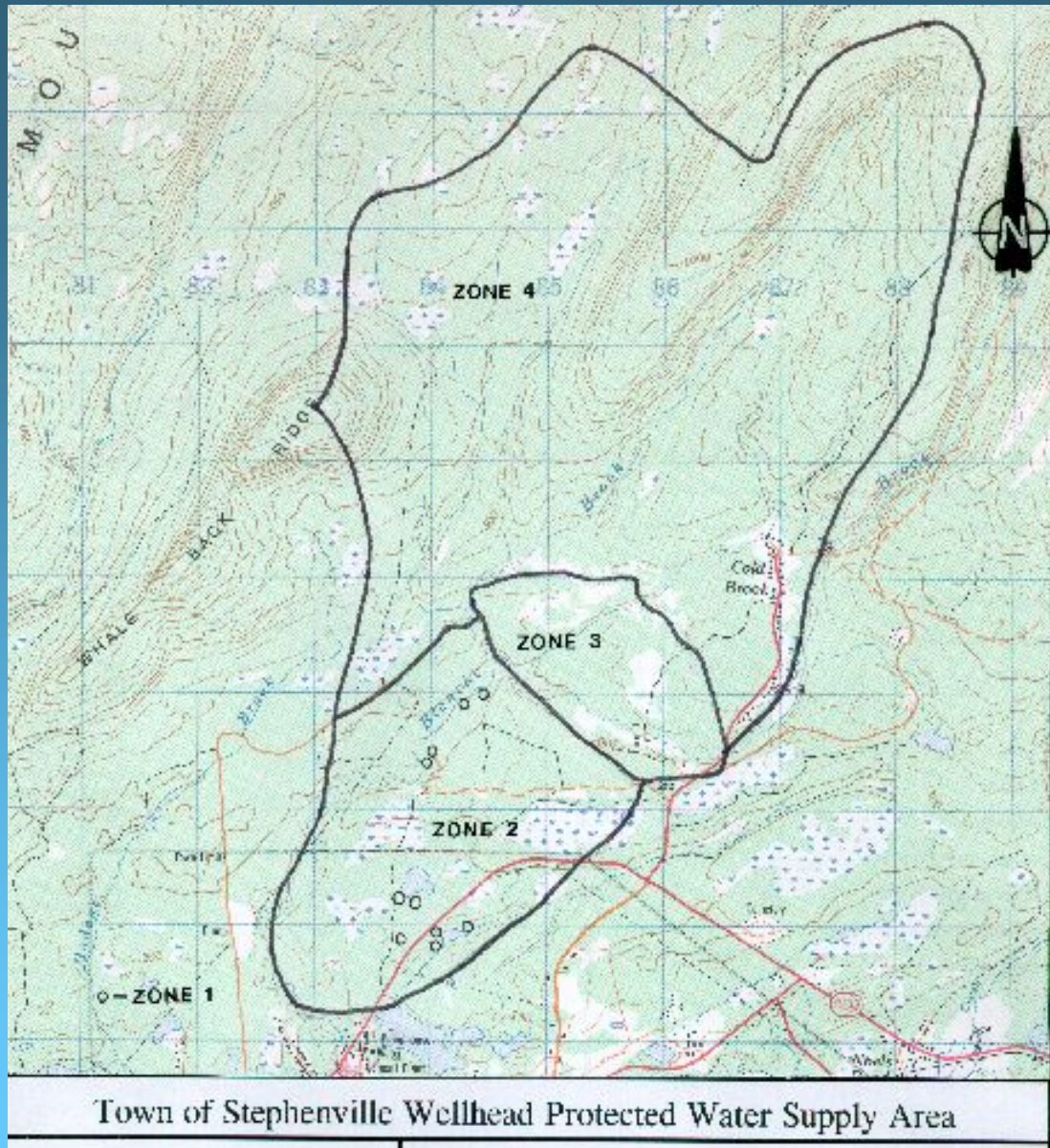
LARGE TOWN-SMALL COMMUNITY/LSD DIFFERENCES

- Larger towns
- Have the budget necessary to hire consultants and evaluate aquifer system
- Define a zoning system based on hydrogeology of aquifer, natural boundaries, and well recharge area
- Usually 3 zone system with less restrictions further from well
- Small communities/LSD
- No funds to hire any consultants, little information available on aquifer characteristics
- May have had a pump test done with some information
- Simplest and cheapest is to designate an area around a well and minimize water endangering undertaking within area.



Well Recharge Area






Town of Stephenville Wellhead Protected Water Supply Area



**NO TRESPASSING
TOWN OF STEPHENVILLE
PROTECTED WELLFIELD AREA**



ALL SNOWMOBILES, ATVS, MOTORCYCLES, CARS, TRUCKS, OR ANY OTHER TYPE OF
VEHICLE FOUND ON TOWN WELLFIELD PROPERTY WILL BE CONFISCATED AND
OWNERS PROSECUTED

NO TREE CUTTING PERMITTED





ALARM







Activities Inside a WHPA

- The Notice of Wellhead Protection is prepared under Section 10(1) of the Environment Act
- Approval requested to carry out a development activity within a protected water supply area
- Policy for Land and Water Related Developments in Protected Public Water Supply Areas on our web site.
- Examples of undertakings which would not be approved in any zones are cemeteries, landfills, salt storage sheds, service stations, tank farms, intensive farming activities, water bottling operations, ground sourced heat pumps



THE END

“When the well’s dry,
we know the worth of water”

Benjamin Franklin

