

The Walkerton Inquiry

Notes from Expert Meeting on:

Protection of Drinking Water Sources
May 3 & 4, 2001

Ryerson University
Jorgenson Hall, Room A250
380 Victoria Street
Toronto, Ontario

Chair: James Van Loon
Co-Chair: Ronald Foerster

Topics of Discussion:

Importance of Source Protection
Responsibility for Source Protection
Appropriate Scale for Management of Drinking Water Sources
Water Quantity in Ontario
Drinking Water Sources: Groundwater Under the Influence of Surface Water
Threats to Water Sources
Source Protection Planning I: Results of a workshop on municipal groundwater protection
Source Protection Planning II
Available Tools for Protection of Drinking Water Sources

The detailed notes for this expert meeting have been prepared to brief the Commissioner and to facilitate participation in Part 2 by those who were not present at the meeting. The notes are intended to represent the major items of discussion and positions put forward by participants. They are based on notes taken by Rapporteurs and are not intended to be an official report or transcript of the meeting. They do not represent the views of the Commissioner.

Meeting Participants and Affiliations

Chair	James Van Loon
Co-Chair	Ron Foerster
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Issue Paper Author, University of Guelph	Len Ritter
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Ontario Ministry of the Environment (MOE)	Jim Maclean Doug Barnes
Ontario Ministry of Natural Resources (MNR)	David de Launay
Government of Ontario (Smith Lyons)	John Callaghan Jim Ayres
Ontario Ministry of Agriculture, Food and Rural Affairs	Jim Wheeler
Ontario Ministry of Municipal Affairs & Housing	Scott Thompson Audrey Bennett
Ontario Federation of Agriculture (OFA)/ Ontario Farm Environmental Coalition (OFEC) Ontario Federation of Agriculture (OFA)	Paul Verkley Tina Schankula David Armitage
Pollution Probe	Rick Findlay
Health Canada	Adel Shalaby
Canadian Environmental Defense Fund (CEDF)	David Donnelly Bryan Davies
Ontario Society for Professional Engineers (OSPE)	Bob Goodings
Christian Farmers Federation	Bob Bedggood
University of Waterloo (workshop facilitators)	Dave Rudolph Emil Frind
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Ontario Pork	Sam Bradshaw Dannis Zekveld
Dairy Farmers of Ontario	Debbie Brander
Ontario Cattle Feeders Association (OCFA)	Jim Clark
Conservation Ontario	Richard Hunter Bonnie Fox
Conservation Ontario/ Grand River Conservation Authority	Tony Smith Barbara Veale Tracey Ryan
Conservation Ontario/ Credit Valley Conservation	Charley Worte Nicki Barra
Conservation Ontario/ Toronto Region Conservation Authority	Gary Bowen Sonya Meek
Ducks Unlimited	Jim Anderson Shane Gabor
Concerned Walkerton Citizens (CWC)/ Canadian Environmental Law Association (CELA)	Theresa McClenaghan Rick Lindgren
Concerned Walkerton Citizens (CWC)/ Worthington Groundwater	Steve Worthington
Association of Municipalities of Ontario (AMO)/ Region of Waterloo	Eric Hodgins
Ontario Public Servants Employees Union (OPSEU)	Bill Armstrong Greg Powers Tim Hadwen
OWWA/OMWA	Joe Castrilli Brian Pett (May 4, 2001)
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MEETING SUMMARY

The agenda, prepared for the meeting by the Chair, provided the framework for the meeting notes. The meeting notes summarize the main points of contention and agreement between the parties under the nine themes and related questions on the agenda.

1. Importance of Source Protection

The protection of drinking water sources, as a key first step in a multi-barrier approach, should encompass both current and potential future drinking water sources. In most cases, the costs of prevention are outweighed by the costs of failing to protect water sources. As well as pollution remediation and water treatment, the cost of failing to protect water supply includes reduced public confidence in water safety, and in government in general, as well as the possibility of incurring contamination that cannot be remediated at any price. In the discussion of source protection costs, water pricing emerges as a point of contention.

1. Responsibility for Source Protection

The constitutional responsibility for the protection of Ontario's drinking water sources is with the Provincial government. This does not negate a potential Federal role in setting national drinking water standards, a framework for interaction or research initiatives. Provincial jurisdiction should not invalidate the implicit responsibility that all municipalities, non-governmental organizations and citizens have for source protection. Consensus was that the province could not and should not wait for Federal leadership in the implementation of a comprehensive source water protection strategy.

2. Appropriate Scale for Management of Drinking Water Sources

Appropriate scale depends on the management decisions under consideration. The scale appropriate to policy-making or planning may be larger than the scale for implementation. Watersheds emerge as one of the most appropriate geographic units for drinking water source management. However, some decisions need to be made or implemented on a site-specific basis, while others must be made at the provincial level. Provincial standards are necessary, but should offer flexibility at the watershed level or local implementation level. Information should be stored and accessible in a way that can be useful at every relevant scale.

3. Water Quantity in Ontario

Although several quantity issues do exist in the Great Lakes and Ontario, there are no imminent threats of drinking water shortages. However, climate change and other significant threats to water quality were vehemently cited for their implications on quantity. Related socio-economic considerations such as policy implementation, responsible agency fragmentation and impending continental water demands (i.e United States) were highlighted. The economic component of water demand management (appropriate water pricing) was cited as one method of rectifying excessive consumer, industrial and institutional demand. A right of access to water was agreed upon but not an unlimited supply of water.

5. Drinking Water Sources

The concept of “groundwater under the influence of surface water” must be applied with caution, since all groundwater is to some extent influenced by surface water. There is nevertheless scope to evaluate water sources and determine that for certain groundwater sources, well-insulated from short-term surface water influence, massive investments in filtering

are not necessary. The tools exist for making that determination. The burden of proof should fall on demonstrating that a groundwater source is *not* affected by potential surface contamination.

6. Threats to Water Sources

Source protection must include both drinking water quantity and quality. Existing groundwater models are adequate for first cut protection and management plans although improvements can be realized through monitoring and flexibility in planning. Currently, the required data for modeling is difficult to access for primarily institutional reasons. Drinking water source protection will not be effective in the absence of an overarching policy incorporating all other water uses.

7. Source Protection Planning I

The results of a workshop, “Towards a Strategy for Groundwater Source Protection and Management,” were presented. Groundwater management strategies for the Region of Waterloo were also presented, and highlighted the difficulties faced by innovative municipalities because of the lack of a comprehensive provincial policy, coupled with a lack of powers at the municipal level. Discussion focussed on wellhead protection strategies, including a multi-jurisdiction comparison of policies, a discussion of the utility of proceeding with water quality protection in the absence of an overarching water policy framework, and consideration of the robustness of available data and of scientific modelling to define capture zones. Consensus was that a provincial framework is essential, and that policy, rather than science, is the limiting factor. Source protection cannot be accomplished in the absence of an overarching policy addressing other water uses as well.

8. Source Protection Planning II

The level of specificity in listing players depends on the level or scale at which source protection is being addressed, but key players include: provincial government; municipalities; conservation authorities; regional government (in some cases distinguished from local or municipal government); the public (as consumer); farmers= organisations; landowners more generally; industry, (as regulated entities and as consumers); federal government; advocacy groups and NGOs; local health authorities; and universities. Because of time constraints as well as overlap with other sections of the agenda, the issues of mechanisms for coordinating players and critical informational needs were not addressed.

9. Available Tools for Protection of Drinking Water Sources

The right combination of tools – voluntary, command-and-control, and incentive-based tools somewhere between the two – depends on the combination of problems and actors in a situation. This may imply a need to push selection of these tools down to a lower level than province-wide. Watersheds may be the appropriate scale, in part because land-use planning is a key issue, but also because the effectiveness and appropriateness of measures can best be evaluated in local situations. There is a need to search systematically for the “low-hanging fruit” (easily addressed problems based on current technical and financial constraints and opportunities given a supportive political and social environment) which again can be done best at the watershed level. However, an overriding message is the need for provincial standards. Voluntary programs and economic incentives appear cost-effective, but must be backed up by the “whip” of regulation and enforcement. Discussion focused on non-point sources, which according to consensus are a larger and more intractable problem than point sources.

Discussion of Substantive Issues

1. IMPORTANCE OF SOURCE PROTECTION

1.1 What is the importance of source protection? As part of a multi-barrier approach?

- Definition of source protection - the protection of both existing and potential future sources of drinking water, both for municipal and for private or rural water takings (CO-CVC)
- It is useful to think more broadly than only drinking water. In the long term, protecting water impacts many stakeholders or users. There is a value in long-term protection through proactive rather than reactive barriers (Rudolph)

1.1.1 *Do we treat current and future sources the same?*

- Traditional wellhead protection is generally only applied to existing public municipal water takings. Given growing needs, it is important to consider the future. If private wells all over the province were protected, perhaps by default that blanket of protection for rural takings could protect future sources as well. (CO-CVC)

1.1.2 *What are the implications of not protecting the source?* (Rudolph)

- Implications of not protecting are enormous. The first layer of protection, source protection, is a key factor (the second layer is treatment, and the third is a clean distribution system and good monitoring). (CO-GRCA)
- Citing the Elmira example: the town lost its drinking water aquifer through contamination because of poor land-use planning in locating industry where it should not have been. Decontamination is extremely costly, and in this case may be impossible. (CO-GRCA)
- Citing the Walkerton example. CO-GRCA attributes the costs suffered there to a failure to provide a physical barrier, failure to protect the catchment areas.

1.1.3 *Are there examples of the cost of managing water protection as a source issue rather than later on?*

- The New York City example was discussed to demonstrate several points:
 - In New York, literally billions of dollars in treatment costs were saved by source protection. Uniformity of the source water that needs treatment means savings in treatment and maintenance costs (AMO/Waterloo)
 - It is often much cheaper to avoid contamination than to clean it up. Everyone had to think of their locality as a potential source of drinking water. (OFA/OFEC)
 - It is important to plan land use and to protect land from urbanization which leads to various environmental impacts including urban runoff. (CEDF)
- The example of the Elmira aquifer was also discussed: A multi-barrier approach is important, and requires proper planning and Best Management Practices (BMPs). The problem in Elmira was not siting, but failure to prevent contaminants from getting into the water (OFA/OFEC). The problem involved 50 years of bad management and a failure to regulate (AMO/Waterloo).

- Superfund experiences in the U.S. show how difficult, expensive and time-consuming groundwater cleanup is. (AMO/Waterloo);

1.1.4 *What are the important considerations around the cost of source protection?*

Relative costs of protection vs. remediation:

- It is not a foregone conclusion that source protection is always less costly. It depends on the cost functions: underlying structures, technologies, and types of pathogens can make one treatment more expensive than another. Example: persistent toxins will have long-term effects on future uses of the resource, while nutrients and pathogens break down and mitigation/abatement can be less expensive. (Rollins)
- ALERT/Sierra later added that treatment is not cheaper than prevention. The cost of treatment must include the cost of failure and the cost of illness and lost lives in the case of Walkerton. There are also the bona fide costs of emergency response. (ALERT/Sierra)
- Cost also depends on social institutions and on the situation. For example, campers expect to treat their water with a portable system, not to have source protection. This is one extreme in a continuum of different kinds of cost structures. (Rollins)

Water pricing:

- Current water problems are partially attributable to a failure to charge adequately for water supplies. Under-pricing is endemic to Canada and around the world (Tate). Source water must be seen and protected as an asset (Pollution Probe)¹. Prices or user fees act as signals of the value of a resource. Water is used as a commodity; using it imposes opportunity costs on others (and the environment) now and in the future. (Rollins)
- Water allocation cannot be considered a zero sum game, as there are not clear property rights or divisibility for water. One body of water could provide multiple and simultaneous benefits to many different kinds of users. Straight economic analysis does not deal with broader issues of how water meets all the different needs (MNR, MOE)
- Caution should be used when discussing water as a commodity in an attempt to not to lose the concept of water as a common, shared resource for everyone. (OFA/OFEC) Water is part of our relationship with nature. Environmental values question the idea of making decisions about a part of nature purely on the basis of cost or risk. Debates about water exporting demonstrate our relationship to water, its connection to the Canadian identity, and feelings that we can not discuss water only in terms of prices and externalities. (Macdonald).

Cost allocation:

- Cost allocation is always a central political question. In the New York City example we are discussing total net costs, but in the example of campers treating their water we are discussing a transfer of some costs between users and polluters. (Macdonald)
- Nations without widespread contamination by Giardia try very hard to avoid the situation we are in. It may be too late for us, with the parasite introduced into the ecosystem. No camper prefers to treat their water, had source protection been an option. (ALERT/Sierra)

¹ *The Management and Financing of Drinking Water Systems: Sustainable Asset Management*. A Submission to the Walkerton Inquiry by Pollution Probe. April 2, 2001.

- If more attention is paid to source management, the costs can be planned and allocated better than they can be in emergency contamination situations. Example, costs born by OCWA [Ontario Clean Waters Agency] in the Walkerton case. (OPSEU)

Other cost issues:

- Costs of failing to protect water sources also include: loss of political capital when a source is affected; long-term loss of confidence in the security of water supply; potential public health impacts of consuming contaminated water; and costs for enforcing remediation, often a legal-intensive process. (AMO/Waterloo)
- The growth of the bottled water industry indicates how important the perceived safety of water supply is to people. (Rudolph)
- An added benefit is that consistency in the quality of source water, the prevention of fluxes or pulses of contaminants, reduces the costs for water treatment plants.

1.1.5 *As a practical issue, at what point do we accept that water purification is necessary and that protection opportunities may be limited?*

The “technological fix” of purifying water:

- Not all contaminants have technological fixes. A value of source protection is preventing such contamination (CO-CVC, Prévost).
- We should never accept that purification is preferable to source protection. There are likely a multitude of contaminants, either breakdown products of known substances, or yet unknown substances, that we cannot currently detect, so we therefore need to protect drinking water from all anthropogenic substances. (subsequent comment by ALERT/Sierra)
- Some contaminants are for practical purposes untreatable, depending on the timescale (Frind)
- In some cases it is not a question of cost, even if we have technological solutions, but of risk management and reliability, e.g., we can go from toilet to tap but the public will not accept it because of the perceived risk (Prévost). In some cases, such as human excreta, such contaminants in drinking water sources are not socially accepted even if effective treatment is available.

1.1.6 *In water allocation, is there a hierarchy to priority of access?* (Goss)

- Has the MOE attempted to value water and identify who gets first cut at water? (Goss)
- Consensus on water allocation: that drinking water is, if not at the top, then certainly near the top in a hierarchy of uses (Foerster).
- Caveats: that flexibility in allocation is important (OFA/OFEC); that we cannot compromise ecological functions, cannot withdraw water for human use if it will have a deleterious impact on ecosystem function for sustainability of the resource base (CELA).

Consensus:

The protection of drinking water sources is a key first step in a multi-barrier approach. Protection should encompass not only current sources, but should consider all waters that might be used as future drinking water sources. In most cases, prevention will also be cost-effective compared to the costs of pollution remediation and water treatment.

The benefits of protecting drinking water sources are not only monetary, and it is important to take an ecosystem approach, considering water not just as a resource for drinking but as part of an ecosystem.

The failure to protect drinking water sources has many costs, including reduced public confidence in water safety, and in government more generally.

2. RESPONSIBILITY FOR SOURCE PROTECTION

2.1 How should responsibility for the protection of drinking water sources be apportioned among the governments (Foerster)?

- The core responsibility is with the provincial government, Ministry of Environment, OMAFRA, Natural Resources, so this is the foundation; the Federal government would potentially provide supplemental support for a groundwater and surface water management strategy; possibly the federal government could play an oversight role and the provinces implement a coherent national strategy. The Province must set standards, regulations and policy with implementation responsibilities assigned to the municipalities and conservation authorities (OPSEU, Foerster, Rudolph, AMO, ALERT/Sierra).
- The municipalities also have an important role in the provision of safe drinking water. However, municipal tools for water quality protection are limited. Municipalities can assume roles in areas which the province is unable/unwilling to assume. The roles and responsibilities would vary depending on the capacity of individual municipalities (AMO).
- Currently, municipal authorities are limited to those under the Planning Act and the Municipal Act. Upper tier municipalities have even less authority than local or area municipalities, in regard to safe drinking water. Prior to Walkerton, the Ontario Drinking Water Objectives (ODWO) were just objectives, it was assumed that municipalities would do their job and meet these voluntary standards. After Walkerton, they were legislated as standards.(ALERT/Sierra)
- Provinces have the primary constitutional jurisdiction over resources and if the federal government attempts “to move into provincial territory” on water then substantial political discourse would result with provinces. Until we get address our "constitutional disability" we won't accomplish much. There needs to be a commitment on part of provincial government to implement because of the deep tradition that any suggestion of federal involvement in drinking water is not welcomed by provinces (Tate, MacDonald)
- Other protection and management responsibilities should be given to the end user relative to their usage patterns (OFA). Landowners should also have responsibilities for action. Utilizing the fiscal relationship governments have with landowners, strategies can be developed for landowners to take action in source water protection (Ducks Unlimited)
- A lot of confusion exists over what level of government carries specific responsibilities; a public understanding of jurisdictional issues is critical. Also, there is a critical shortage of public education on water quality issues as illustrated by public practices that indicate a low valuation of clean water (Blundell).

2.2 What is the role of the federal government?

- The federal government has historically provided strong research initiatives and base for hydrological exploration in Canada until the 1980s when its reputation as a leader in hydrogeological research declined. Gradual downsizing and shunting of responsibility has hindered research progress. By 1999, the Task Forces on Groundwater Resources Research=s report documented that “the ability of the government and industry in Canada to manage and protect groundwater resources is limited by deficiencies in information and that Canada needs to make major advances in areas such as groundwater inventory, protection and research to achieve responsible and effective management of the resource” (Blundell:7). Blundell made recommendations (in his paper and at the meeting) to the Federal government including a push from researchers for a situation of greater involvement by the federal government.
- An additional potential role for the federal government would be through the Geological Survey of Canada. The specific goal to move towards a coordinated protocol for information collection and sharing among agencies; discrepancy between provincial information collection/sharing is evident; Nova Scotia and Alberta have a much greater capacity than Ontario (Rudolph).
- The federal Fisheries Act that contains strong habitat protection measures but has a history of passing back and forth between levels to enforce (Swain, MNR)
- Existing federal heads of power under criminal law, fisheries, First Nations etc. would provide the Federal government sufficient constitutional authority to enact and enforce provisions designed to protect human and ecosystem health including source water protection. However, it is unlikely that the federal government will develop safe drinking water standards (CELA)
- Aboriginal lands are a federal responsibility and their water source management record is abysmal; immediate action is required to remedy the situation (CEDF)

2.2.1 *What examples do we have of other water source protection strategies shared between different levels of government?*

- There is an example of the water source protection strategy that is implemented by the United States. The Federal government provides the overarching guidelines and states must operate within compliance levels (OPSEU). The Conservation Reserve Program - primarily to put marginal lands out of production, saved costs etc. (Ducks Unlimited).²
- To clarify the differences between the Canadian and U.S. systems of water management. In the U.S, the national government has the regulatory authority and states have responsibility to implement. The national government also has the capacity to penalize states in non-compliance which is what encouraged New York state to be compliant. In Canada, the federal government does not have same level of authority so different incentive mechanisms are required (Rollins, Findlay)

2 See P. Feather et.al. 1999. *Economic Valuation of Environmental Benefits and the Targeting of Conservation Programs: The Case of the Conservation Reserve Program*, US Department of Agriculture, Resource Economics Division, Economic Research Service, Report No.778. See also Ribaud, M.O. 1989. *Water Quality Benefits from the Conservation Reserve Program*, US Department of Agriculture, Resources and Technology Division, Economic Research Service, Report No.606 and Ribaud, M.O. et.al. 1990. *Natural Resources and User Benefit from the Conservation Reserve Program*, US Department of Agriculture, Resources and Technology Division, Economic Research Service, Report No.627

2.2.2 *Can Ontario wait for a federal government initiative to implement a water source protection strategy?*

Consensus:

No, Ontario should move ahead with development of a comprehensive water source protection strategy in some form (MacDonald, AMO).

It is critical that the province move beyond the federal chequebook and the province must take the leadership on topics such as the fragmentation of responsibilities. An integrated water policy is required with components based on the principle of source protection, mechanisms for ecosystem management, administrative structures (capitalizing on municipal agencies, conservation authorities etc). The framework must move away from departmentalized system (CO-CVC).

3. APPROPRIATE SCALE FOR MANAGEMENT OF DRINKING WATER

3.1 What is the appropriate geographic scale for the management of drinking water sources?

3.1.1 *Is the watershed the appropriate management scale?*

- Planning and protection have to occur at the watershed scale and in the watershed system because most human impacts occur on the surface. (CO-GRCA); If we want to move “beyond the pipe” in terms of management and protection, we need to look at these surface systems (Ducks Unlimited). The utility of a watershed approach is demonstrated when we consider a river into which one community dumps, upstream of another community’s water intake. (Prévost)
- Most drinking water in Ontario is used by municipalities, and units of management should therefore be functional, oriented towards the municipality rather than the river basin. Human activity is not organized on the scale or according to the boundaries of watersheds, but is largely concentrated in cities. Data should therefore be organized such that they can be retrieved at the scale at which they are useful, using GIS information technologies. (Tate)
- Watersheds are useful boundaries because they remain constant over time. Municipal boundaries could gradually be brought more into line with watershed boundaries (Martin)

3.1.2 *Are the appropriate scales for decision-making and implementation the same?*

- Actions occur at the site level, but the decisions of what actions to take have to be made at the watershed scale to understand the system and the impact you will have on the system. Watersheds are nested and therefore occur at several different scales. The scale at which you operate must be appropriate to the decision you are trying to make, and that will vary. Plans, however, do not necessarily have to be implemented on the watershed scale. The municipal scale might be appropriate. (CO-CVC)
- Collection of data on a watershed scale makes sense, but management policies sometimes have to be more local, allowing local buy-in. (AMO)

3.1.3 *If the watershed is the management scale, should provincial standards be set to apply equally in all watersheds? How much local decision-making power should be held at the watershed level?*

The discussion focused on the balance between letting communities determine what policies are locally appropriate, and protecting against inconsistencies between one local authority and the next.

- Watersheds differ, and so it is appropriate that their conservation authorities= policies might differ depending on local circumstances. (CO-CVC) Different watersheds are different in terms of biophysical aspects and demographics, and leaving management at the watershed level is a good way of letting those differences be taken into account while meeting provincial standards. (Rollins)
- A watershed approach does not necessarily mean that the conservation authorities are the best vehicle for protection of drinking water. That task is somewhat different from their historical mandate, and that leaves protection very fragmented. A province-wide standard is needed (OFA/OFEC)
- Operating only on a watershed basis, there could be a “race to the bottom” to attract economic activity. (Macdonald) Provincial standards are necessary (CWC/CELA), together with flexibility on a municipal or local level (AMO).
- In different watersheds, the conservation authority might take different stances towards agricultural policy depending on how urbanized or agricultural the watershed is. Some might take the stance of trying to exclude agriculture from their watershed altogether. How could farmers compete given such variation and inconsistency? (OFA/OFEC)
- How this affects farmers is a concern. However, do not ascribe more power to conservation authorities than they actually have. Also, it is similar to the situation in which different municipalities implement provincial regulations differently, depending on the local community=s decisions. (CO-CVC) If some rivers are more polluted and need more stringent pollution policies, it might be appropriate that farmers there face tighter restrictions. An incentive system for farmers could help. (CO-GRCA)
- Rather than restricting different watersheds or prescribing what an outcome should look like, better to focus on setting performance standards that have to be met, and letting local communities find innovative and locally appropriate ways of meeting the standards. (Martin, Rollins). At the watershed level, the interested parties within the geographic area can be well represented in decision-making. (OFA/OFEC)

3.1.4 *Is there any reason why standards should be different in different watersheds? If not, should the province=s role be to set overarching objectives and let the smaller units figure out implementation to meet the objectives?*

- A province-wide standard is needed. (OFA/OFEC) However, recognizing that different management approaches are appropriate to different scales and that watersheds themselves are at different scales (Van Loon), not all protection can be done with uniform regulation at a single scale. (OFA/OFEC)
- The problem with a provincial role of setting “performance standards” is an offloading of provincial responsibility without guidelines for how local agencies can meet those standards. (CWC/CELA) The perfect example of this is the contrast of ODWO versus what is in place today, and why that was necessary. (ALERT/Sierra). The province needs to set enforceable standards, not just objectives or guidelines. For example, we need provincial minimal separation distances to protect wells (CWC/CELA), although these can allow for a range of different options depending on the circumstances (Foerster). The province should develop/impose provincial source protection standards (“top-down”), with input from municipalities and other stakeholders (“bottom up”), and municipalities/water suppliers are primarily responsible for implementing these standards at a local level.(CWC/CELA)

- Flexibility also allows different watersheds to work with the information that is available; this varies greatly across watersheds. Not every area has the resources of Waterloo, for example. (Rudolph)

3.2 Do groundwater and surface water sources require different management scales?

- There are differences in the scale of surface water and groundwater catchments. However, whether the two are on the same scale is to some extent immaterial as long as one understands the relationship between the two (CO-GRCA)
- In terms of flexibility, it is important to be able to manage on the aquifer basis when necessary, in situations where there may be several basins overlying one aquifer. Aquifers can cross watersheds or not be adequately accounted for in watershed planning. Watershed planning is necessary but not sufficient (OPSEU).

Consensus:

Watersheds may or may not be the appropriate scale for watershed management, depending on the sorts of decisions that have to be made or implemented. Watersheds are useful as a geographic unit in terms of letting local people make decisions.

However, some decisions need to be made on a site-specific basis. Others must be made at the provincial level. Provincial standards are necessary, but should offer flexibility at the watershed level or local implementation level. Information should be stored and accessible in a way that can be useful at every relevant scale.

4. WATER QUANTITY IN ONTARIO

4.1 Is source quantity a drinking water issue in Ontario?

Water Supply & Quantity:

- Ontario has an abundant water supply overall, even under conditions of high consumption demands. Differences between province as a whole and sub-regions do exist in terms of total water availability and economic costs of access (Tate).
- There is a close tie between quantity and quality of water; quantity is not divisible from quality. Therefore, poor water quality ultimately affects the quantity available for use (CEDF).
- CELA later added that the drought situation in 1999 (and the same threat for 2001), leading the MOE to develop a drought policy for low water levels recently published on the Environmental Bill of Rights Registry; the IJC Consumptive Water Use Reference which discussed water quantity issues in the Great Lakes; the disputes between water taking permit holders and applicants; the lack of a cohesive understanding of water quantity in Ontario (in regards to surface water and ground water); ecosystem impacts of water takings and diversions between watersheds, including diversions between and away from the Great Lakes (presently forbidden under the Great Lakes Charter); the current negotiations among Ontario, Quebec and the Great Lakes states about an Annex to that Charter; all indicate serious water quantity issues. (CELA)

Water Pricing:

- must reflect the full cost of water servicing in order to moderate demand and prevent unwarranted expansion of water infrastructure. The under-pricing results in massive waste of water resources (Tate, Findlay, Rollins).

Climate Change:

- “appears to be a reality, and may have long-term adverse effects on water availability” but the impacts will be “upon drier areas of North America before being felt in Ontario” (Tate, 9).
- MacDonald noted that the problem of water scarcity and global climate change is not a provincial scale problem but needs to be thought of, at a minimum, at a full continental scale. He expressed concern that regardless of Ontario=s demand, the greater North American demand for water may influence provincial water supplies. Consideration of ecosystem viability in context of water stress was also mentioned (CO-CVC).
- In contrast to Tate, CO-CVC suggested that in reality, planning authorities do not have the information on water withdrawals and requirements to accurately gauge whether there is a supply problem. He cited the Credit River watershed where permits for water taking cannot be verified against actual withdrawal amounts [due to lack of monitoring].

Rollins presented an overview of theoretical water demand definitions:

- Water demand is not just the amount desired by the amount desired given a unit cost. With water, because it is treated as free, there is a fractured perception of water=s value. In planning for population demand of a resource, it is inaccurate to merely multiply the current per capita water use and by the new population estimates; the marginal cost must be incorporated. It is critical that a price mechanism, reflecting the real price of water, is put in place as an incentive and link to consumers.
- Concern was expressed that society has lost the relationship or understanding of actual price for a provision of service and a cost to society. The growing demographic pressure on medical systems and the social expectation/value judgement that the health of those individuals should be taken care of regardless of actual cost/benefit analysis was cited as an example (Ritter).
- Regardless of whether or not the demand for water is “reasonable”, if demand exceeds supply then a water problem exists (CO-CVC).
- Water quantity cannot be a right. The planning and decision makers should be considering water availability when siting industries and production (OFA)

4.2 What quantity issues may be encountered by local areas?

There was limited discussion of this issue. Majority of discussion focussed at a higher scale of water quantity supply.

- CFF noted that “quantity is purely in the eyes of the beholder”. Rural municipalities do not have the treatment of supply capacity that urban residents may expect but this is not a real scarcity of water supply. The vast majority of rural residents draw untreated water from a well.

4.3 Are meaningful responses needed or possible regarding concerns about global warming?

- Climate change/global warming: long term adverse effects will be felt over several decades in drier areas before they are felt in Ontario (Tate).
- The severity and impacts of climate change are greater than the general statement contributed by Tate; global warming affects the climate most in Ontario in terms of stream erosion through storm surge events. Storm surge episodes are accelerating and affecting water quantity/quality. In terms of water quality: temperature is a factor of water quality and climate change impact. Temperature should be an important consideration in treatment and ecological qualities for use (Pollution Probe)
- There was agreement that climate change will have significant future impact and transition effects but the absence of an immediate crisis does not negate the need a long-term approach for planning and costing. The impact of climate change must be recognized by planning authorities (CEDF, Pollution Probe).
- Only recently have the best global climate models incorporated interactions between oceans and atmosphere. They predict temperature but not precipitation (Swain). CEDF (in response to Swain) outlined that the overall quantity is correct but the surges are increasing in intensity.

4.4 What measures are available to ensure sufficient quantity in areas facing shortages?

- global circulation models that exist are attempting to predict the impact of climate change on environments but decision makers are limited by the large scale of these models. As a result, it is currently difficult to draw conclusions for local levels based on global modelling. These models are evolving and are now operating at a national level and improving for local impacts. Maps are produced by Environment Canada by global circulation models. These models anticipate that precipitation changes (quantity and frequency) will occur (Pollution Probe).

Consensus:

Although several quantity issues do exist in the Great Lakes and Ontario, there are no imminent threats of drinking water shortages. However, recent water quality concerns, climate change and other significant threats to water quality were vehemently cited for their implications on quantity. Related socio-economic considerations such as policy implementation, responsible agency fragmentation and impending continental water demands (i.e United States) were highlighted. The economic component of water demand management (appropriate water pricing) was cited as one method of rectifying excessive consumer, industrial and institutional demand. A right of access to water was agreed upon but not an unlimited supply of water.

5. DRINKING WATER SOURCES

5.1 The Ontario Water Resources Act recognizes two types of water sources - groundwater and surface water. Is there a need to recognize 'Groundwater Under the Influence of Surface Water' as in some other jurisdictions?

- All groundwater is affected by surface water. It all comes from surface water at some time-scale, whether ending up in shallow or deep systems. (CO-CVC). Substantial amounts of surface water also

comes from groundwater, and surface water quality is also dependent on ground water quality. (Rudolph). However, we do treat groundwater and surface water quite differently. There is a difference between the two. We have to be concerned with relatively short-term interactions between the two rather than simply acknowledging that there is an interaction. (Goss)

5.1.1 *How well are these dynamics understood?*

- The dynamics are not yet well understood, but a lot of people are working on the subject (Rudolph)
- There is a new phenomenon of rapid infiltration systems and stormwater ponds which increase the rate of infiltration of stormwater into groundwater. This water carries contaminants picked up during runoff across impermeable surfaces. The implications of these man-made, artificial interactions and system feedback implications are not well understood (CEDF)

5.2 How would we define groundwater under the influence of surface water?

5.2.1 *Are there situations in which we should be obliging people to filter their groundwater?*

- In Waterloo, there is a continuum of characteristics between shallower and deeper groundwater. To understand the interactions, input/output research is used to study groundwater-surface water interactions. (CO)
- The tools exist. Using some relatively unsophisticated tools, for example, isotopic tracers or even temperature, researchers can confidently estimate the hydraulic influences (Rudolph). The question was raised as to whether the tools are capable of extending beyond an artificial binary definition [under the influence/ not under the influence] (CO-CVC).

5.2.2 *If there is a continuum, is there a danger of creating a false sense of security by categorizing “ground” versus “surface-influenced” water at some cut-off point? If all water is potentially under the influence of surface water, then what about water that falls just on the other side of that cut-off point along the continuum?*

- The current regulations allow for the category of “groundwater under the influence of surface water” to be managed essentially as surface water in terms of a precautionary regime. If indicators suggested that there was an intensification of risk then changes in the standards or thresholds would be required. (MOE)
- Some at the meeting felt a definition of "groundwater under the influence of surface water" was not needed. CELA is of the view that a definition is very critical and later added that they understand this issue is causing a great deal of difficulty in carrying out engineering assessments under the new regulation in Ontario. Since there are major consequences to finding that groundwater is under the influence of surface water, CELA is of the opinion that the criteria need to be specific and explicit and that it must not be left to individual argument in individual communities, even though the site specific assessment must then be carried out to determine whether that source is under the influence of surface water for the sake of community protection.
- The burden of proof should rest on showing that the system is not “under the influence”. The U.S. E.P.A. has definitions and criteria for doing this. They are flawed but form a basis for judgement. The

benefit of a categorization is that it allows simplification of the treatment for those systems with a very low risk of contamination. (Prévost)

Consensus:

There was not a strong consensus about the definition of "groundwater under the influence of surface water". However, there was consensus that this is an issue, that groundwater and surface water interactions are not well understood and that there are criteria that could be used to address this issue.

6. THREATS TO WATER SOURCES

6.1 What are the threats to water sources?

6.1.1 What are the biophysical threats to water sources?

- **Microbiological contaminants** represent a greater threat than anything else (Goss). Results from a comprehensive study in 1991-92 (*reference?*) supported Ritter's well water contamination research findings and evidence at that time suggested that pesticides were not an issue.
- Ritter's research³ found very little evidence of significant contamination in Ontario water supply. He added the caveat that where contamination does occur, it was trihalomethanes and nitrates that showed consistent elevation above safe thresholds and could generally be estimated. However, a lack of an apparent hazard may reflect a lack of information rather than a true lack of hazard. The validity of conclusions should consider data limitations. (See section on data limitations below for further discussion).
- **Water treatment** through chlorination results in disinfection by-products.⁴ These may be the most valid contributing risk to bladder cancer. (Ritter)
- **Road salt** was suggested as a major source of water contamination in source water (CO-CVC, Ritter) as well as water softener salt discharge (Pollution Probe).
- **Estrogen** in both synthetic and natural forms represents a significant potential source of water contamination. Humans and animals are excreting natural estrogens into the natural environment and the implications need to be considered. (Prévost, Ritter)
- **Extreme weather** conditions which potentially affect regular functioning of systems (i.e. septic etc) was suggested by the OFA. Ritter disagreed and cited research that suggested that an extreme weather event is just one factor; statistical probability is low and requires a range of components which contribute to events [like Walkerton].
- **Nitrate in groundwater** should also be listed here. The RMOW has taken at least one major supply well out of service due to elevated nitrate. Woodstock PUC is grappling with the issue, the Township

³ A detailed description of Ritter's research on non-point pollution of pathogens and pesticides from agricultural sources can be found in Ritter et al (2001: 60-68). Also refer to Goss et al (2001: 131-135) for potential water contamination from manure sources.

⁴ Refer to Ritter et al (2001: 50-54)

of Srathroy-Caradoc has several wells with nitrate hovering around the limit and there are numerous studies of nitrate in farms and municipal wells. (ALERT/Sierra)

6.1.2. *What are the socio-economic threats to water sources? (Tate, Goss)*

Tate and Goss argued that a consideration of threats to water must incorporate not only physical threats (i.e. contaminants) but also a range of socio-economic factors.

- **Principles of Management:** Water management has been an "issue driven" exercise in Ontario which translates into reactive rather than proactive management largely based in the short term. As an issue arises [water pollution, ecological sustainability etc] a process is developed but the result is that responses are fragmented and separated by policy space; institutional structures and their policy is fragmented and the ecosystem suffers as a whole (CO-CVC, AMO).
- **Protection for the sake of protection:** Protection of water sources should be a fundamental goal and priority for water resource managers, regardless of demand for water use efficiency and conservation (CO-CVC).
- **Policy Approach:** The policy approach and objectives cannot be to supply as much water as demanded by consumers. The elasticity of water, the marginal costs of system development and water provision must be taken into account and this demands accurate pricing of the resource. Market mechanisms and incentives to alter demand will prevent over-capitalization of the system. Educational programs are insufficient to alter consumption patterns (Rollins). New growth in demand should be met through conservation rather than augmenting sources (CELA).
- **Agency Fragmentation:** The need for co-ordination between responsible agencies in water resource management [and protection] is acute (MacDonald, CO-CVC, CEDF); the province should take the lead in co-ordinating through a simple model based on data sharing and the establishment of formal mechanisms for interaction (CO-CVC, AMO)
- **Land Use Planning and Urbanization** was introduced as a threat to water sources (i.e. road salt, poor stormwater management systems and general urban pollution sources).
- The biggest socio-economic threats to drinking water are: (i) lack of protection policy, initiatives, standards and measures; (ii) lack of monitoring, surveillance, reporting and trend analysis; (iii) lack of inspection of human activities and enforcement of existing laws; (iv) lack of protection of natural protective features like wetlands, woodlands uplands recharge areas etc.; and (v) unregulated agricultural practices including the handling of manure and the use of fertilizer. (ALERT/Sierra)

6.1.3 *Does a lack of data, in terms of existence or availability, constitute a threat to water source protection?*

- There was a general consensus with Blundell's statement that the quantity of research being conducted to document the hydrological situation in Canada has declined in recent decades (Blundell, stating opinions of researchers he interviewed). The Ministry of Environment stated that numerous provincial initiatives are attempting to compile diverse data sources towards a goal of a common geo-referenced database for

water planning and decision making. A network of water resources information network is available. Land Information Ontario (LIO); Water Resources Info Project that MNR leads for a cluster of partners. These are large tasks, codifying data and making it available. (MOE)

- There was some consensus around CELA's statement that water resource data must be publicly accessible (CELA). OPSEU conceded that while some land information was more readily available, it expressed concern that information accessibility and creation of that data base was not a high priority nor provided enough resources.
- Goss articulated his frustration over a system that requires information access fees to universities who are often the primary collectors of raw data (soil examples); The Ontario Conservation Authority agreed and proposed that until public agencies can fully share data, it will be difficult to implement policy. They recommended that it is critical that the province utilize other stakeholders and build information partnerships. The provincial role would be in setting data standards and facilitating partners to develop and collect data in the required format.
- The problem of data ownership in public sector agencies and the public domain must be remedied and this may constitute more of a challenge than technical issues (AMO)

7. SOURCE PROTECTION PLANNING I

7.1 Presentation: Towards a Strategy for Groundwater Source Protection & Management A workshop commissioned by the Walkerton Inquiry, May 1, 2001 E.O. Frind, D.L. Rudolph and J.W. Molson, University of Waterloo

The slide presentation, including a full list of workshop participants, is available online at:

<http://darcy.uwaterloo.ca/~molson/inquiry7d.pdf>

Frind and Rudolph presented the results of a workshop on municipal groundwater protection strategies.

Cross-jurisdictional comparison of groundwater protection strategies (Frind)

The goal of the workshop was to develop a framework for a policy document on groundwater protection and management. Key issues (technical, planning and legal) were examined and steps proposed for implementation. Approaches taken in other jurisdictions (E.U. countries, the U.S., and British Columbia) to groundwater protection and wellhead protection zoning were described. The presentation also highlighted local initiatives by municipalities in Ontario, which have pioneered new approaches in the absence of provincial guidelines.

Key questions and recommendations (Frind)

Key questions addressed in the workshop paralleled many of those on the agenda for the Expert Meeting, with the following key conclusions:

- Groundwater is well enough understood to support protection plans, but flexibility to accommodate future information is essential

- In terms of availability of appropriate tools and expertise, technical tools are well-developed but legislative tools are lacking; Note that technical tools and expertise must not only exist, but must be available when/where needed. There is also variable competence of conservation authorities and municipalities to perform roles. Some areas like Kitchener-Waterloo are much more equipped than others. Conservation authorities need to be supported and monitored where they do exist. Where they don't exist, there needs to be an even more active provincial role (OPSEU).
- The geographic scale appropriate to urban areas tends to be a wellhead-protection approach, while watershed-scale planning is preferable in rural areas
- Most existing systems address risk to groundwater quality through land-use zoning based on distance from wellhead or travel time; potentially contaminating substances and activities are also identified
- The specific powers necessary to restrict or control potentially harmful discharges into the ground were not addressed. However, refer to CELA's "Safe Drinking Water Act" (*forthcoming on CELA's website*)
- The Province of Ontario should be responsible and accountable for groundwater protection, although implementation can be delegated to local/regional entities
- The costs of groundwater contamination are high, and include not only direct remediation costs but also replacement infrastructure, loss of public confidence, and impacts on the economy

Recommendations:

A "Groundwater Resource Protection Policy" document for Ontario be developed, which is:

- Effective and enforceable
- Flexible to adapt to future conditions
- Acceptable to all stakeholders: This should be a preference, rather than a criterion. The public or environmental interest is crucial too, and aspects of a policy that are not acceptable to some other stakeholder might still be desirable because they are necessary for environmental protection (OPSEU)
- A fourth criterion was suggested: Transparency and understandability, so that the public understands where responsibility is held (OPSEU)

Framework for a groundwater resource protection policy (Rudolph)

The framework detailed the steps that must be taken for the development of a water protection policy in Ontario, and concluded with a list of the initiatives starting up or currently underway to collect and manage information and protect groundwater. The presentation ended with a call for the establishment of a task force to draft a detailed policy statement.

7.2 Presentation: Groundwater management strategies in the Region of Waterloo (AMO/Waterloo)

This presentation highlighted the program for groundwater protection in Waterloo. The major roadblock to implementing this pioneering program was the lack of a comprehensive provincial policy. Tools at the municipal level are lacking. For example, the municipality lacks the legislative tools to apply its system of groundwater protection policies to existing businesses.

The presentations were followed by a lively and wide-ranging discussion of issues around source protection planning. There was general agreement on the workshop observation that we have no powers to implement such approaches now (Macdonald).

7.3 Discussion Points and Questions Raised by the Presentations

7.3.1 *How should existing pollution sources be handled under a new protection regime?*

- Are phase-ins, or grand-parenting exemptions strategies used? It is important to distinguish between existing and new pollution sources when implementing a new environmental regime as new sources are easier to incorporate protections rather than phasing them for existing sources. (Macdonald)
- An important step is to document existing sources, the regulatory requirements and the magnitude of changes expected of them, since they're the ones we are asking to pay a cost. (Macdonald) How do European models handle existing sources? (Macdonald)
- Frind was unsure of the German policy, but thinks that it hasn't forced anyone out of business.⁵

7.3.2 *How have other jurisdictions dealt with existing uses when implementing new protection policies? Does the workshop's outcome envision that existing pollution sources should be subject to zoning restrictions? (CEDF)*

- In the Region of Waterloo, historic sources of pollution now in the ground were mapped, and monitoring wells were installed in the vicinity. (Rudolph) It took 50 to 100 years for Waterloo's industry to develop, and instead of expecting overnight change, expect a 10-20 year framework. Identifying and going after existing sources in a regulatory way, as the EPA has done, is "reactive." Incentive programs and education are advocated for both industry and agriculture. (AMO/Waterloo) The model does not have to be *either* voluntary *or* regulatory (Goss).
- Example: Winnipeg's problems with pollution from the meat packing industry in the 1950's and 60's. Regulations and convictions had little impact. A basic policy change of levying charges on waste discharged into the municipal system acted as a powerful incentive for industries to change their technologies. They reacted quickly, and in 5 years the problem was solved. "Hit 'em in their pocketbooks; their hearts and minds will follow." (Tate)
- New developments can use better technologies for protection. (Rudolph)
- The workshop is really only a framework, but tools to deal with existing pollution sources are available: ISO1400, encouraging that any new developments by existing sources employ best practices (Rudolph)

Point of Contention:

Governments tend to react very quickly to industry demands, e.g., the Water Taking Permits that were instituted to grant statutory permission to pollute. "The prosecution record in Ontario doesn't give me a lot of comfort." (CEDF)

7.3.3 *The Waterloo policy seems to be to provide as much water as possible to anyone who wants it. Is this appropriate? (Goss)*⁶

- **Water pricing to prevent over-investment:** Establishing a policy is not the equivalent to setting a goal. A policy might have goals (e.g., "this much water available in 30 years' time") but it also has principles. It appears that the implicit policy in Waterloo is to provide as much water as possible.

⁵ For more information on some of the innovative techniques German water utilities are using, refer to "German Waterworks Py for the Switch to Organic" in *Alternatives Journal*, 27:2, Spring 2001.

⁶ Refer also to Section 4, Water Quantity in Ontario in this document

This might not serve society's needs in the most efficient way, because there is a cost to making water available. There is a tendency to overestimate future demand and to overcapitalise in investment, when projections of use don't take into account the possibility that costs over time will change, and that demand is elastic. (Rollins, Tate)

Point of contention:

Hodgins (AMO/Waterloo) replies that Waterloo is known for aggressive water education and conservation initiatives. Rollins argues that moral suasion isn't enough, and pricing is key.

- **Quantity not a right:** Water quantity cannot be a right. (OFA, with general agreement) Planning for the siting of industries and production should take water availability into consideration (OFA)
- **Is quantity the issue here?** Although it does bode well for source protection if water values [i.e. prices] rise, remember that the issue of water quantity, although important, is not on the agenda at the moment. The presentation focussed on the components of how individuals, municipalities, and smaller communities could have a set of tools for source protection (Rudolph)
- **Quantity issue important at every scale:** Quantity protection and conservation are important whether on the community scale or, for example, in the IJC [International Joint Commission on boundary waters] reference regarding the lack of water conservation measures by Canada and the U.S. The quantity issue is important for reasons that include ecosystem functioning and future population growth. New growth should be fuelled through conservation rather than new sources (CWC/CELA).
- **Know your goals before creating policy:** If proper conservation, allocation and protection of water are the goals, it is important to start with that broad statement of goals and objectives around water (surface and groundwater, in its totality, for all its uses), after which you can form policy that is comprehensive – surface water and groundwater components, quantity and quality components. (CO/CVC).

7.3.4 How robust are the models defining capture zones for wells? (Goss)

- Do we understand the details of water movement and pathogen transport through the unsaturated zone? Our engineering approach has been disappointing in the past (Goss)
- **Robust models:** A model is a representation of the real world based on the best data we have, and is as robust as the data we put in. There is a strict protocol for water testing to determine whether reality matches the expectations of the model. The equations for the mathematical models that have been developed over the last 30 years or so are good, both established ones used by consultants and emerging models being developed by researchers. The models are tested rigorously, and they work well. There's always some uncertainty in data; we get the data by drilling a hole, and what happens between the holes is interpolated. But methods have been developed (stochastic methods, monte carlo methods) to quantify the uncertainty. We have models that look at the unsaturated zone, couple it with the saturated groundwater zone and the surface water to define the capture zone. The weak link is not the science but the policy (Frind)
- **Research underway:** Federal agencies are supporting work looking at contaminants in the unsaturated zone; recharge is something people are looking at diligently. (Rudolph)
- **There is enough data to proceed:** we know that we have groundwater contamination as a result of surface contamination, which is enough knowledge to allow us to protect against things getting into the surface water and contaminating an aquifer. The consensus at the workshop was that there's

enough information to put in place a policy in Ontario that would be useful right now. Policies must be flexible enough to let us “update our toolbox” as things are developed (Rudolph). In the U.S. they use a combination of very technical modeling together with simply drawing circles on maps and implementing policy within. A note of caution: the more regulatory the policy, and the greater the potential impact, the more need there is for data to defend the policy in the face of challenges (AMO)

7.3.5 *Given that our mandate is water safety, can that mandate be met without a comprehensive approach to other issues such as quantity? Is an overarching framework necessary to successfully address the safety issue, or is it possible to tackle one issue at a time?*

Points of contention:

- If we tackle water problems issue-by-issue, as we have historically, then we develop institutional structures and policies to deal with a particular issue and not a resource. The current jurisdictional structure is fragmented, with no formal way to integrate aspects of water protection. A mechanism for integration is needed. Lack of an overarching policy leads to conflicts between competing uses or sectors, undermining attempts at water safety. Only given a provincial framework can we successfully focus on the water supply issue (CO, OPSEU). A sectoral approach has been problematic (OCA/OCFA)
- There are other jurisdictions that have chosen to deal with issues in a “put all the pieces together” fashion, e.g., B.C. legislation, U.S. Safe Drinking Water Act. (CELA/CWC) – refer to CELA’s “Safe Drinking Water Act” (forthcoming)
- The context of ecosystem protection and multi-barrier drinking water protection is required for setting policy(CELA/CWC).
- Given our structure of government, policy develops incrementally subject to political pressures. While an integrated big-picture approach would be optimal, years assessing how to coordinate every possible aspect of water policy would be wasteful (Macdonald)

Consensus:

- Source protection needs to include protection of quantity as well as quality
- In terms of adequacy of models, groundwater models are quite good, and certainly adequate for designing protection systems, while allowing room for improvement. Data for modeling is sometimes difficult to access
- The key conclusion was that source protection requires an overarching policy addressing other water uses.

8. SOURCE PROTECTION PLANNING II

8.1 Who are the key players in source protection planning? What are their roles and responsibilities?

The discussion of key players for source protection planning was inconclusive, in part because of the difficulty of determining the appropriate level of specificity when describing “the players”, and in part due to time constraints.

8.1.1 *Do the levels of drinking water protection, provincial, regional/watershed, local or project-by-project, require different sets of actors, and who would those be?*

The discussion focussed on generating a list of the players in source protection, with some discussion of the roles to be played by each.

Key actors identified were:

- **The public** (Van Loon) The greatest failure of the system is the failure to reflect and include the public in a meaningful way. The public has been shut out of planning instruments (e.g., the Ontario Municipal Board (OMB), environmental assessments) that are supposed to protect drinking water sources. Rights of access have been taken away: intervenor funding, changes to the planning act, making the OMB inaccessible, letting developers apply for permits even when the local governments are all against it. All other actors have channels for participation, but the public has to wait for Walkerton Inquiries or to see a notice in the newspaper about an OMB hearing. There is a de facto policy of staying rights of prosecution against private polluters. (CEDF)
- The public should be involved in planning, enforcement. The public needs funding to participate in official planning exercises. A meaningful public contribution requires funding, e.g., in the Rouge planning process a major complaint was that the public does not show up with experts such as hydrogeologists, but where does the public get the wherewithal to access such expertise? (CEDF) The public should be involved at three levels:
 1. Province-wide setting of standards, policies and procedures: the public role should have complete access to participation in the debate, including good access to the science and a voice that has meaningful result (CWC/CELA)
 2. Watershed or regional level: the public should have access to overall plans for the watershed or region, and should be able to initiate ideas for planning and also respond to the plans (CELA)
 3. Project-by-project: the public should have a voice on how that project will impact on the regional plan and province-wide standards (CWC/CELA)

8.1.2 *What are the other key actors?*

- **Government of Ontario** (Macdonald). It was agreed that the province needs to move ahead without waiting for action at the federal level, and from the presentation on Waterloo, the province needs to set standards. The province is the most significant player (Macdonald)
- Agencies and Ministries identified included: MOE, Health, OMFRA, MNR, Municipal Affairs and Housing, Ontario Realty Corporation, Crown corporations, Finance, Superbuild, OCWA [Ontario Clean Water Agency].
- **“Polluters”/ “the regulated”** (Macdonald) or “industry as user/polluter” (Van Loon). Request that we avoid the term “polluters” (Foerster) (also in reference to “landowners” below). These are the actors who are being asked to incur costs to meet these standards. (Macdonald)
- **Farmers:** (ALERT/Sierra). Notes that farmers in general take good care of land and should not be labeled Apolluters@. What Apollution@ is can depend on circumstances, and it may be the

changing circumstances (encroachment on farm land) rather than the land use that is the problem, e.g., if someone buys a single acre of land by a farm and punches a well there, then wants zones around that well that change the farming use. (CFF, CEDF). This implies that farm groups should have representation in planning (Foerster) and that private landowners need funding to allow them to have a voice (Blundell)

- **Advocacy groups** can provide support and information for policy-making and implementation, but are often excluded (Ducks Unlimited). Who speaks for “the public”? Which are the “right” public advocacy groups? (Ritter). An open and transparent process allows advocacy groups and NGOs to self-identify. The issue of getting the right groups at the table is more problematic when consultations are more closed, with a list of invitees. (CWC/CELA)
- **Public service:** They have a role in collecting, adjusting and forwarding the public interest (OPSEU)
- **Universities:** Have several roles including - participating in investigative processes (Inquiries), responding to requests for infrastructure, facilities and information, focussing on problems of public concern. Participating in outreach, sitting on committees, delivering the results coming out of universities to the public and ministries (Rudolph)
- **Federal Government:** Fisheries and Oceans, Health Canada, *Environment Canada*, *Natural Resources Canada*
- **Private land-owners** are a category of their own. They may be farmers or not; but by virtue of holding ownership of a large tract of land, they become “water managers” with extra responsibilities over the average city dweller. (ALERT/Sierra)

Consensus:

Recognizing that any list of players will involve some overlap and that the level of specificity or generalization depends on the level or scale of source protection being discussed, the following is an attempt at listing the key players:

Provincial government & Municipalities	Public (as consumer) & Landowners
Federal government	Farmers= organisations
Local health authorities	Advocacy groups and NGOs
Industry (as regulated entities and as consumers)	Conservation authorities
	Universities

Note: Due to time constraints, and considerable overlap with the agenda for section 9, the following questions on the agenda were not addressed at this stage of the discussion:

8.2 What mechanisms exist for inter-agency coordination?

8.3 What information needs exist for source protection planning?

- Nature and the state of water sources (Sustainable use levels, baseline quality and variability)
- Pollutant source inventories and locations
- Sensitive areas

8.4 What are the key source monitoring requirements?

8.5 What is the critical information which is currently unavailable? (Future research?)

9. AVAILABLE TOOLS FOR PROTECTION OF DRINKING WATER SOURCES

The discussion began with a restatement of our policy goals: to develop a system which provides maximum protection of drinking water sources as a first barrier for ensuring the safety of drinking water, where 'maximum protection' refers to the maximum that is socially and economically feasible. (Foerster, with general agreement)

9.1 Voluntary vs. regulated approaches

9.1.1 *What tools are available, and what are their advantages/disadvantages?*

Goss and Rollins outlined some of the conclusions from their issue paper on the management of manure for water quality protection.⁷ Others added to their points.

- **Understand interests and motivations** of public and private actors, in order to provide the incentives necessary to change behaviour
- **Tools fall along a regulatory continuum:** Strictly voluntary tools give individuals the most discretion, while command-and-control (C&C) approaches give the least. Between the two is a full toolbox of other measures which tend to work with individual incentives. These useful tools are conspicuously absent in Ontario water policy.
 - CO-CVC disagrees with the assertion that Ontario hasn't tried the range of tools. In the long history of using incentive tools in Ontario, some have worked and some haven't, but there has been a lack of long-term consistency.
- **Choosing the right regulatory tools:** In general, the more severe the problems, the higher the costs for prevention/abatement, and the less likely that individual decision-makers will voluntarily provide protection. Yet C&C, at the other extreme, tends to put the same standards/criteria on all, which may not be the most efficient level of abatement.
- **Individual discretion** is important, because it allows for innovation, and lets individuals feel that they are part of the solution
- **Performance-based and design-based instruments:** Performance-based tools are applied to target the ambient levels of the contaminants, to dictate the performance level but not the behaviour. Design-based instruments focus on process rather than measuring pollution outputs, and could include subsidies and charges targeted at inputs/outputs correlated with pollution, as well as taxes and quotas
- **Positive Incentives:** Users' rights must be respected, e.g., wellhead protection might mean purchasing the option right from the landowner respecting their underlying rights/expectations to use the resource; this is

⁷ Refer to Goss, Michael J., Kimberley S. Rollins, Kenneth McEwan, J. Ralph Shaw, Helen Lammers-Helps. *The Management of Manure in Ontario with Respect to Water Quality*. March 6, 2001, an issue paper commissioned by the Walkerton Inquiry.

different from labelling someone as “out of compliance” when new regulations are brought in, and using negative incentives like fines.

- **Examples:** In the EU, problems are more severe than in Ontario and costs are higher. The EU sets standards, which countries enforce in different ways. For example, the Netherlands uses quotas, with sales of quotas only allowed from nitrogen-rich to nitrogen-poor areas and a “tax” on each sale. The regulatory goal is to reduce total N. In Germany, strict standards and penalties are combined with lots of room for discretion. (*reference?*)
- **Policy goals should drive choice of tools:** Voluntary tools help people do the right thing; regulatory tools keep people from doing the wrong thing. But the first decisions should be about what the “right” or “wrong” thing is. Decide what we are trying to achieve before choosing what tools to use and how to use them (CO)

9.1.2 Foerster, quoting Johns (p. 24), asks whether it is agreed that of the strategies compared, “voluntary, cost-share, subsidy-based instruments based on BMPs are the most effective policy regimes” to deal with non-point sources?⁸ If we rely on voluntary and incentive-based tools, where is the accountability?

- If pollution-reduction goals aren’t met, we re-evaluate. Did we get the fees right? Do we need other mechanisms, which the fees can help pay for? Accountability is in the hands of the individuals making the decisions, and relies less on leaving responsibility with a government agency that doesn’t want that responsibility (Rollins)
- In the E.U., there are penalty mechanisms used in combination with voluntary mechanisms. We could leave ultimate authority with the province to set standards, and if a conservation authority is found to be out of compliance it might face fines, rather than court proceedings (Rollins).
- The lack of incentive-based instruments has to do with pressures on policy-makers to accede to voluntary initiatives instead (Macdonald).
- OWWA/OMWA, quoting Johns (p. 23), noted generally that Ontario does not have an explicit policy to address non-point source water pollution. Regarding the voluntary Ontario Environmental Farm Plan in particular, it is unclear whether this program contributes to the achievement of water quality objectives. What is needed is an approach that integrates voluntary and educational initiatives together with land use planning, regulation, and fiscal tools.

The role of regulation:

- It is insufficient for the province to set targets. Accountability mechanisms are critical. In the E.U. example, there was accountability through setting standards and levying fines if they were violated (CELA).
- The province must set standards and enforce them. Within a context where that is happening appropriately, additional tools can be usefully employed (OPSEU).
- Regulation has to back-stop various incentive-based and voluntary measures if the latter are to succeed (OPSEU, Ontario Pork, OWWA/OMWA).

⁸ See Johns, C. *Effective Policy Regimes for the Management of Non-Point Source Water Pollution: Ontario and the US in Comparative Perspective*, Walkerton Inquiry Issue Paper, February 2001. The paper outlines that these conclusions are based on a comparative analysis of three different policy instrument strategies and that in practice strategies are often used in combination.

- Either we rely on the power of government to at least threaten to reign in the free rider, or as the medical/legal professions do, we can give powers such as licensing power, mandated by government. That credible threat is necessary, as well as the internalisation of regulation, the voluntarism (Macdonald).
- Over-regulating is extremely expensive. It is important to differentiate between “incentives” i.e. throwing bits of money at the problem as incentive, and incentive-based regulation using market mechanisms. Problems of monitoring and free-riding have been discussed and explicitly incorporated in well-designed sets of tools (Rollins). Regulation should be the last resort, and has been relied on too much (Hodgins).
- Clark (OCA/OCFA) notes the need to discuss overall sources of contamination, rather than focussing only on agriculture. Donnelly (CEDF) concurs. This leads to a discussion of point and non-point sources of pollution in Ontario.

9.2 Point and non-point sources: appropriate tools and strategic approaches

9.2.1 *What are the relative proportions of point and non-point pollution in Ontario (OWWA/OMWA)? Are point sources easier to deal with? (Foerster)*

- According to the Johns paper (p.2), two-thirds of water pollution in the United States has been attributed to non-point sources (NPS). The Goss paper (pp.iii-iv) also confirms that surface water runoff is now the single most significant factor affecting water quality in the US and that agriculture is generally recognized as the largest contributor to water pollution caused by runoff in that country. Is the situation comparable to Ontario? An International Joint Committee (IJC) study in 1978 (International Reference Group on Great Lakes Pollution from Land Use Activities, *Environmental Management Strategy for the Great Lakes System*, July 1978) and the report of the IJC itself to the Canadian and US Governments in 1980 (*Pollution in the Great Lakes Basin from Land Use Activities*, March 1980) concluded that the Great Lakes were being polluted from land drainage sources by pollutants such as phosphorous, sediments and chemicals. The IJC identified agricultural activity such as nutrient runoff from feedlots and other livestock operations, inadequate soil conservation and drainage practices and improper or excessive fertilizer application including spreading manure in the winter as contributing significantly to total phosphorous loads in areas such as central and south western Ontario. (Urban activities such as stormwater and construction site runoff also were identified as significant land drainage pollution sources). Phosphorous was identified by the IJC as being of concern in the Great Lakes ecosystem because it is the principal controlling factor in eutrophication, which can cause severe water quality degradation (OWWA/OMWA).
- In Ontario’s watersheds, the non-point: point ratio contributions to nutrient pollution range from 50-50 to 80-10 (CO - *reference?*). This implies that tools need to be locally tailored. (CO)
- Macdonald inquired as to whether we should reduce livestock in Ontario by 25% as a pollution prevention measure.
- Manure is far superior to the chemical fertiliser that crop-growers would otherwise use. We need more cows in Ontario, not less, and better ways of using manure (Ontario Pork). Contrast farmers’ efficient, careful use of manure with the harms of municipal sewage dumping (CFF).
- We cannot pretend that manure does not contain bacteria that can kill. Children have died on farms from direct contact with manure-born micro-organisms. Manure may not present a worse source of nitrate, but it is a unique agri-chemical with respect to its microbial properties. (ALERT/Sierra).
- The purpose of the Environmental Farm Plan Program (EFPs) is not as an abatement tool, but as an educational tool, aimed at sensitising farmers to their impact. Nutrient Management Plans (NMPs) may be a better tool for abatement. (CFF)

Points of Contention - Point sources

- A strategy of water pollution control based only on control of point sources such as sewage treatment plant and industrial discharges will not succeed by itself if the water pollution problem is now largely driven by non-point sources.(OWWA/OMWA)
- Point sources are easy to deal with – set a standard and enforce (CEDF).
- Point sources are not necessarily easy to deal with, but easy to identify (Ritter); we can identify the location of certain potential sources at risk of polluting (electroplating, pulp mills, etc) (ALERT/Sierra)
- Most point sources are in fact unidentified. We tend to find them when we hit a problem, e.g., Elmira contamination. We don't have a systematic program for looking at them. Non-point sources, on the other hand, we do monitor for (CWC/CELA - *reference from S.Worthington to be submitted to the Inquiry*).

9.2.2 *Is Command-and-Control regulation the right approach for point sources?*

- Command and control regulation continues to be necessary for point sources, but there are now probably few low-hanging fruit left - in the sense of achieving major, overall water quality improvement at a reasonable cost - without also turning attention to non-point sources (OWWA/OMWA).

9.3 Planning tools

Land-use planning and the Planning Act: Land-use planning is a key aspect of source protection (CEDF, CELA), but the Act as it stands is not a broad enough tool. The provincial policy statement that guides the OMB under the Planning Act is inadequate to deal with water protection. Land-use planning, conceived more broadly than in the Act, must be integrated with province-wide, sector-by-sector plans for protection (CELA)

A strengthened planning act would be a useful tool for municipalities to deal with point sources, but many non-point sources originate outside municipal boundaries and require province-wide intervention (AMO).

Ecological tools: Watershed planning can help a community decide what to do around source protection, and bring various groups together in a process to make decisions about the region (CO)

9.4 Other tools and approaches discussed

- Long-term tools; understanding the capacity of the system (Ducks Unlimited);
- Voluntary vs. regulated approaches (education and use restrictions)
- Tools appropriate to different pollution sources, pollution types, and water sources

Consensus:

There are a variety of tools to consider, and selecting the right one requires knowing what the problem is. The combination of tools to use depends on the combination of problems and actors in a situation. This implies a need to push selection of these tools down to a lower level than province-wide (Rollins expressed reservations on this point). Watersheds may be the appropriate scale, in part because land-use planning is a key issue, but also because the effectiveness and appropriateness of measures can best be evaluated in local situations.

Voluntary programs and economic incentives appear cost-effective, but must be backed up by the "whip" of regulation and enforcement. The focus of the discussion has been on non-point sources, which according to consensus are a larger and more intractable problem than point sources.

There is a need to search systematically for the "low-hanging fruit" which again can be done best at the watershed rather than the provincial level. However, an overriding message is the need for provincial standards.