Recommendations from the Sierra Club, Eastern Canada Chapter
For the Walkerton Inquiry
On the Protection of Drinking Water Sources

On May 3, and 4, 2001 an expert meeting was conducted to discuss the protection of drinking water sources. This meeting focussed on the comparison of preemptive actions and reactionary actions in terms of cost, effectiveness and public opinion. This document addresses the various issues raised at that meeting and puts forth recommendations for the improvement of source protection in Ontario. The questions included in this document are those raised at the meeting. In addition to the actual concerns put forth at the expert meeting, all papers submitted to the inquiry regarding the topic were reviewed and addressed where and if appropriate.

In summary, the Sierra Club, Eastern Canada Chapter believes that the protection of drinking water sources is paramount. Ontario presently does not have an appropriate system of ensuring groundwater quality protection and this needs to be remedied. Once the source is contaminated, technological fixes are costly and are not always available. The relative cost of appropriate planning and public education is low compared to the cost of clean up. Groundwater is a valuable environmental resource as well as a drinking water resource. Good quality and quantity of groundwater baseflow to streams needs to be protected to ensure the integrity of the ecosystem. The value of public confidence in a safe and adequate drinking water supply should not be underestimated.

1. Importance of Source Protection

1.1.1 Do we treat current and future sources the same?

Traditional source protection has only been applied to existing municipal wellhead areas, even these measures are sporadically applied in Ontario. Many existing municipal sources are not protected, certainly domestic sources are not protected and future water sources are not protected.

In the case of some specific point sources of contamination, future and existing sources are treated equally. Under the Reasonable Use Policy (Guideline B-7 under the Water Resources Act) the current groundwater use is projected into the future and therefore no activity that would degrade the groundwater quality, preventing ongoing groundwater usage both on the site in question and on neighbouring sites, is prohibited. Unfortunately, this policy is only aimed at subsurface disposal systems and landfills. There is no similar policy to address non-point sources and specifically impacts from agriculture on groundwater quality.

1.1.2 What are the implications of not protecting the source?

The implications of not protecting the source are the potential for widespread contamination of our groundwater resources. This would result in the heavy reliance on water treatment. If those systems should fail then the distribution of unpotable water

could result. The Walkerton tragedy is an example of a community relying on the adequate treatment of a contaminated source water.

It has been discovered in many locations worldwide that once contaminated, groundwater is very difficult if not impossible to clean up. In the 1994 Statistics Canada "Human Activity and the Environment" report it states "It can be quite costly or even impossible to clean up or find an alternative water supply when a groundwater source becomes contaminated". In 1993 Harold Sussman, the Deputy Administrator of the U.S.E.P.A. testified to the U. S. House of Representatives that "Cleanup of contaminated ground water is one of the most difficult problems facing the Superfund program. Approximately 85% of hazardous waste sites on the NPL have some degree of ground Water contamination." The U.S. E.P.A. also recognized in 1994 that "…experience over the past decade has shown that achieving the required final cleanup standards may not be practicable at some sites due to the limitations of remediation technology" (U.S. E.P.A., 1994).

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

Prevention of groundwater contamination is more effective and less expensive than the cost of remediation (U. S. E.P.A., 1992, Goderich et al., 1991). "Superfund" or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) was implemented in the United States in 1980 to clean up the large numbers of abandoned contaminated sites and is a prime example of the high costs of groundwater remediation. In 1986, when it was reauthorized the "fund" rose to $8.5 billion, 1991 estimates suggested that $133 billion would be required to clean up the 2,000 sites targeted.

In addition to the financial costs of remediation, as discussed above, technical difficulties sometimes make clean up of the source very difficult and perhaps impossible.

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

Important considerations around the cost of source protection are:

- Political will to actually do something significant
- Empowering local jurisdictions to control new land uses
- Conducting the studies necessary to appropriately delineate important source areas
- Educating the public to change our ways and recognize that the same substances that keep our lawns green and weed free are also potential groundwater and surface water contaminants
- Applying the incentives necessary to assist in altering existing land uses without undue financial stress on existing land owners
- We do not understand the complex behaviour of some contaminants in the environment. Evidence from studies such as Sjrogen (1995) indicates that pathogens do not readily die off once released to the environment.

Society must recognize that while treating drinking water for nutrient contamination may not be costly, the ecological impacts of not managing nutrients will be. Groundwater and surface water resources cannot be separated. Most shallow groundwater discharges into streams, rivers and lakes. Once this groundwater is contaminated with nutrients it could lead to the eutrophication of the surface water bodies into which it discharges. Tile drainage from agricultural land already adversely impacts surface water quality. Once the contamination has occurred, there will not be a quick fix; the pollution could be present for decades or centuries.

Is society ready to neglect and write-off an entire resource? A local, good quality, inexpensive water supply is very valuable to rural residents and industry. Losing an entire groundwater resource even over small areas will result in an economic and social loss.

Water Pricing

Water should continue to be a common, shared resource available to everyone. Source protection, for quality and quantity should be inherent in the delivery of the resource. Industrial use of water should continue to be charged. Municipal water supplies levee water charges based on supply and demand.

Water pricing and consumption analysis should be based on environmental pressures and mitigative measures, not politics and economics.

Other Cost Issues

The cost of failing to protect water sources includes the long-term loss of confidence in the security of water supply. In the Regional Municipality of Waterloo, each threat to the drinking water supply is met with a small fraction of the population requesting that the source of water for the community be piped in from the Great Lakes, rather than relying on the excellent source of groundwater. This will lead to widespread loss of confidence in groundwater as a water supply, instead of relying on a reliable, manageable cost effective resource.

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?

We should never accept that treatment is preferable to source protection. The fate and behaviour of many contaminants in groundwater is still relatively unknown. Simply disregarding an entire resource out of convenience without understanding the ramifications is not acceptable.

New chemical analyses are constantly being added to standard laboratory protocols. Researchers know that there are many compounds that our present analytical equipment cannot measure. In accepting that treatment is the solution to our problems, we may be

consuming many undesirable compounds that we presently cannot measure and therefore do not treat. In the communities of Elmira, Angus and Manotick groundwater contamination was detected the first time the water was tested for a new chemical parameter. In Elmira this occurred after a more comprehensive list of parameters was added to an ongoing monitoring program. It is unknown how long residents had been consuming contaminated water. It is far more desirable to attempt to keep source waters clean, for our long term health not just to avoid disasters like Walkerton.

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, it is important to take an ecosystem approach, considering water not just as a resource but also 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.

Part 1 Consensus: We agree with the consensus that the protection of drinking water sources is a key first step in a multi-barrier approach. That the protection of water sources should include current and future sources and that protecting the water sources is more cost effective that treating the pollution.

2. Responsibility for source protection

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

The MOE should draft appropriate legislation to require watershed wide groundwater data collection in conjunction with aquifer vulnerability mapping. This work could be undertaken by the province, Conservation Authorities or contracted. The municipalities would be responsible for environmentally sound planning (including land use restrictions) and the MOE responsible for overseeing monitoring, auditing and enforcement of legislation. Resources should be made available for mapping groundwater resources and wellhead protection areas.

Legislation should outline requirements for new operations that would provide a much greater degree of safety that groundwater quality would not be impacted by the operation.

Existing land uses are more difficult to address. Prudent land uses could be sanctioned for the most vulnerable recharge areas through methods such as ensuring environmentally friendly practices, “grand fathering” responsible land uses, land acquisition or with incentives to change deleterious practices.

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

No, Ontario should move ahead with development of a comprehensive water source protection strategy. The strategy should be integrated, including source protection, mechanisms for ecosystem management, resource monitoring, administrative structures, auditing and an expansion of legal power given to the appropriate agency or level of government.

3. Appropriate Scale for Management of Drinking Water

3.1.1 Is the watershed the appropriate management scale?

The most appropriate scale for management of drinking water sources is the aquifer scale, however this would require some extensive work to actually map Ontario's aquifers, therefore the watershed scale is acceptable. Local knowledge of water issues, land use issues and community values are best integrated at this level. From an environmental point of view, cumulative impacts on a watershed would be better illustrated if data collection and analysis was performed as a whole, rather than fragmented.

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 over arching objectives and let the smaller units figure out implementation to meet the objectives?

Minimum standards should be set, and local jurisdictions can increase the standards if that is appropriate for their area. Examples of minimum standards are 365 days of manure storage, zero discharge of manure to surface water bodies, monitoring of tiles during and after manure spreading, testing of manure for renewal of nutrient management plans etc. Different watersheds may require different methods to achieve these standards. Individual watersheds will have different demographics making implementation very costly. Incentives should be available to assist with meeting the minimum standards.

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

Given the uncertainty of the boundaries of groundwater flow systems, groundwater and surface water could be managed on the same scale, even though groundwater and surface water divides do not necessarily share the same boundaries. If aquifers and surface water are managed together then the management scale does not need to be different.

4. Water Quantity in Ontario

4.1 Is source quantity a drinking water issue in Ontario?

Quantity and quality are both issues for Ontario drinking water. The effect of regional groundwater takings is not well understood. Municipal water extractions, aggregate extraction, water bottling, and tiling of agricultural fields all remove groundwater, with infiltration as the only recharge to the aquifer. As urban areas increase, the infiltration decreases. Locally, less infiltration will decrease the essential groundwater input to Ontario's streams and rivers. There is a lack of knowledge regarding groundwater/surface water interactions and the cumulative impact of water takings.

Groundwater and surface water monitoring should be increased as a basis for regional mapping and modeling of cumulative water takings. The regulations on groundwater takings should also be expanded with the intention to protect stream baseflow.

5. Drinking Water Sources

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

Just as in many areas groundwater is a critical contributor to the baseflow of a stream, in some areas the groundwater regime is dependant on contributions from surface water bodies. On a short time scale, groundwater under the influence of surface water is a different source of water with respect to quality (inorganic, organic and biological) and the flow dynamics. Source water protection, therefore needs to include both groundwater and surface water components.

The environmental effects of pumping groundwater under the influence of surface water could be costly. For example, cold water fisheries depend on the constant groundwater temperature for cool water during spawning and warming water to prevent freezing in the winter.

There is a need to recognize these systems for both the safety of the drinking water and for the impacts to the environment from these water takings.

6. Threats to Water Sources

6.1.2 What are the socio-economic threats to water sources?

Ontario's response to water management is indicative of a system that is reactive, rather than proactive. Groundwater and surface water resources have not been adequately protected, which has resulted in grave consequences as in Walkerton and the *Cryptosporidium* outbreak in Kitchener. Legislation must correct this problem so that water quality is protected.

Water resources are not highly valued and therefore the public does not generally recognize its vulnerability. Education and appropriate pricing should be implemented to increase public awareness of this valuable resource.
The current regulatory regime is not designed to protect groundwater quality and quantity and has allowed for the contamination of aquifers. A coordinated effort by the MOE, OMAFRA, CAs, municipalities, industry and the public is required to achieve source water protection. This effort must focus on reporting, monitoring and auditing to ensure that measures are being implemented and that environmental benefit is being achieved.

Agricultural practices have been largely unregulated, this must also be rectified. The guidance surrounding practices in the agricultural industry (BMPs, NMP, EFP, MDS), are inadequate for protecting groundwater and surface water resources.

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

The cut back in provincial data collection, research and trend analysis can be regarded as a threat to water source protection. Regional and provincial trends are key components to outlining and monitoring a protection strategy. Intensive analysis of provincial data bases would improve water quantity and water quality assessment if local trends could be compared to regional or provincial trends.

The province needs to increase monitoring and reporting, improve the database and improve the availability of the data.

7. Source Protection Planning I

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

The first step is to record the location and type of existing pollution sources. If an existing pollution source is a risk to human safety or severely threatens a drinking water source, then phasing in a new strategy is not appropriate. High risk pollution sources should be dealt with promptly and effectively. Changes to the land use practices, or

improving the infrastructure of the pollution source should be undertaken to ensure public and source water safety. For lower risk pollution sources phasing in a new protection regime appears to be appropriate.

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

Water quantity is not a right, however, if proper checks and balances are in place, then appropriate water allocation is possible. Applications for Permits to Take Water should include monitoring of streams (hydraulic head data and stream flow data), wetlands, local and regional water levels during pumping tests and require the applicant to prove that there will not be any adverse environmental impacts. If there are not any adverse environmental impacts, or impacts to neighbouring wells, water takings should be approved with a thought to "drought" years. Consideration of drier years will hopefully protect groundwater resources when they are stressed the most.

9. Available tools for protection of drinking water sources

9.1 Voluntary versus regulated approaches.

In the agricultural industry, the voluntary approach has not been successful. Ontario does not specifically have legislation, or regulations to govern water quality impacts from agriculture. Ontario has not yet seen the kinds of specialized regulations and targeted guidelines that focus on manure management practices and water quality impairment that have been documented in other jurisdictions (Goss, 2000). There are several guideline documents available to assist farmers in making environmentally friendly decisions on their farms.

- Best Management Practices Documents (BMP) prepared by Agriculture and Agri-food Canada
- Guide to Agricultural Land Use prepared by Ontario Ministry of Agriculture, Food and Rural Affairs (MDS)
- Environmental Farm Plan (EFP) prepared by Ontario Farm Environment Coalition through Agriculture and Agri-food Canada
- Nutrient Management Planning (NMP) support materials (NMAN, NM Factsheet) prepared by Ontario Ministry of Agriculture, Food and Rural Affairs

Each of these documents provides constructive advice to reduce the impact of farming on the environment. However, they were neither designed as nor can be regarded as groundwater protection manuals. The inadequacy of these guidelines to protect groundwater is two-fold. First, they are generally not written with impacts to groundwater quality in mind. Second, except in cases where municipalities have adopted guidelines as prerequisites for obtaining building permits, these guidelines do not "require" anything. Most of these guidelines were intended as educational tools and as such have great value, however they do not guarantee any degree of groundwater protection.

In order to protect groundwater resources BMPs need to recommend more wide-ranging protective measures, for example barn siting. Potential sources of pollution should be located on land with excellent groundwater protection.

In order to minimize the contribution of nitrate to groundwater, samples need to be taken to assess if nitrate is being over applied. If nitrate contaminated groundwater is found then practices should be altered, and less nitrogen fertilizer should be used. Perhaps different cropping rotations should be implemented, or perhaps nutrient management plans need to be revised to account for the surplus. New large operations need to conduct groundwater monitoring.

Tile drain monitoring and the impacts of tile drains on surface water and groundwater, needs to be included more strongly as a key component to protecting water quality. Farmers need to inspect the drains, and mechanisms need to be in place to prevent the flow of contaminated water to surface water bodies.

MDS calculations were designed to reduce odour impacts and have no value in source protection. In some jurisdictions it appears that these calculations are being used as an indication of the distance separation that prevents any impacts from a farming operation. The MDS documents make it very clear that they apply to odour issues only.

In addressing the potential for odour impacts the distance from the barn to a neighbouring land use is calculated. In estimating groundwater impacts, the full extent of manure spreading would also have to be addressed as impacts to the resource could occur anywhere where manure is spread. The barn may have a much greater loading rate if storages are leaking but geologic conditions may dictate that other locations on the farm are at greater risk. Therefore the calculation of minimum distance separation as laid out in the Guide to Agricultural Practice is not applicable to protection of groundwater.

Problems with the way that groundwater is addressed by the EFP include:

- Groundwater is not treated as a resource to be protected other than in the context of the owners' well.

- The locations of neighbouring wells are not specifically dealt with.

- The only way to have a "poor" ranking in any of the categories addressing the potential for groundwater contamination is if the conditions violate provincial legislation or guidelines in terms of separation of any activity from the farm well. For example, if the activity in question (e.g., pesticide transfer, septic system, manure storage) is within 15 metres of a drilled well or 30 metres from a dug or bored well, a poor rating results. Having a high risk of groundwater contamination (i.e. permeable soil and shallow water table) combined with other high risk activities like fuel storage on a permeable pad does not result in a poor rating unless the pad is too close to the

well. Since it is the poor rating that is the primary focus of the action plan a high level of protection is not encouraged.

- The EFP does not encourage a sufficient appreciation for the relationship between actions on the ground surface and how a local groundwater resource can become contaminated. Sections such as pesticide storage would give a farm a "fair" rating if a cracked concrete or wood floor were present in the storage area. Consideration of the potential for groundwater contamination is not included in reaching this assessment.

- With respect to manure storage it is considered "fair" to have 90 to 180 days of storage with some applications during wet or frozen periods. Less than 90 days of storage is considered poor. The "best" category is achieved with 250 day of storage. Best should be no less than 365 days, there is evidence presented that the most appropriate time for manure spreading is in the spring or during active crop growth (Goss, 2001).

There are three central problems with the premise of nutrient management planning as a source protection. The first relates specifically to the inability of a simple agronomic balance to account for the complexities of the nitrogen cycle. Unlike phosphorus, which can be fairly accurately partitioned between the soil and the crop only, nitrogen must be partitioned between the atmosphere, the soil, surface water, groundwater, and the crop. It occurs in several different chemical and organic forms, which is determined by variables such as temperature, pH, soil organic matter, groundwater oxygen concentration, and soil moisture.

The second problem relates to the non-nutrient constituents. Those of primary concern are living microbes (bacteria, protozoa, viruses) and inorganic salts such as sodium and chloride. Uncontrolled loading of these constituents to either surface or groundwater represents a threat to drinking water, recreational water use, and aquatic habitat.

The third problem relates back to the difficulty in accounting for all the variables in the nutrient balance. This has translated into an uncertainly about nutrient availability and a lack of confidence in manure as a reliable fertilizer source. This lack of confidence, in turn, runs the risk of promoting the over-application of nutrients from commercial fertilizer.

9.1.2 Are voluntary, cost share, subsidy based instruments based on BMPs the most effective policy regimes to dealt with non-point sources?

BMPs need to be developed to specifically address groundwater protection if they are to be used effectively. An approach that integrates voluntary and educational initiatives together with land use planning, regulation, monitoring and fiscal tools is required to deal with non-point pollution sources. Subsidies should be made available to adopt appropriate practices that will diminish environmental impacts.

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? Are point sources easier to deal with?

The relative proportions of point and non-point pollutants in Ontario will vary from region to region. Proportions of the two will likely fall within the ranges discussed at the meetings.

Point sources of pollution are easier to deal with, once located. The source, plume and groundwater flow direction are easier to determine than non-point sources. The relative contribution of non-point pollution sources is difficult to ascertain. Detailed hydrogeological investigations will be required to target individual farms or pollution sources. The variability of regional geology, flow directions and geochemistry will control the distribution of pollution (Heagle, 2000).

The decrease in provincial monitoring and absence of a systematic program for locating and remediating point and non-point pollution is a product of the present, reactionary environmental system.

9.3 Planning tools

Increasing the strength of the Planning Act and the power of the Municipalities to use the Act would be a useful tool for protecting drinking water sources. An example is allowing municipalities to scale and site large livestock operations according to environmental and social considerations.

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