3.05–Groundwater Program

BACKGROUND

The Ministry of the Environment has a broad mandate to restore, protect, and enhance the environment to ensure public health, environmental quality, and economic vitality. This responsibility is to be carried out through activities that monitor, assess, and enforce compliance with legislation and ministry policies. The Ministry's specific responsibilities related to groundwater are to manage and protect the resource as well as to promote the sustainable use of groundwater. The Ministry estimated that, for the 2003/04 fiscal year, it spent approximately $18 million on groundwater-related activities.

Groundwater is defined as water located below the surface in soil, sand, and porous rock formations known as aquifers. Groundwater recharges watersheds, which are networks of rivers and streams that drain into larger bodies of water such as the Great Lakes. Groundwater is the primary source of drinking water for almost three million residents of Ontario. More than 200 municipalities have groundwater-based systems that provide water to residential users as well as for industrial, commercial, and institutional uses. In addition, approximately 500,000 private wells provide 90% of Ontario's rural population with water for drinking, irrigation, and other uses.

The Ministry is also responsible for acting on the recommendations made by Justice O'Connor from the Walkerton Inquiry. This inquiry, which reported in 2002, was prompted by the deaths and illnesses that resulted in May 2000 from the town of Walkerton's contaminated water supply. Justice O'Connor's recommendations included the development of drinking-water-source protection plans, the setting of water quality standards, the operation of water treatment and distribution systems, and ongoing monitoring.

The Ministry administers a number of acts associated with groundwater, including the *Ontario Water Resources Act*, the *Safe Drinking Water Act, 2002*, the *Environmental Assessment Act*, and the *Environmental Protection Act*. The Ministry also administers the *Nutrient Management Act, 2002* jointly with the Ministry of Agriculture and Food. Nutrients consist of chemical fertilizers as well as human and animal waste, which are often used to enhance crop growth but can have an adverse impact on groundwater if used improperly.

AUDIT OBJECTIVES AND SCOPE

The objectives of our audit of the groundwater program were to assess whether the Ministry had adequate procedures in place to:

- manage the resource for sustainability;
- ensure compliance with related legislation and ministry policies; and
- measure and report on the program's effectiveness in restoring, protecting, and enhancing the resource to ensure public health.

The scope of our audit fieldwork, which was substantially completed by March 2004, included discussions with relevant staff, as well as a review and analysis of documentation provided to us at the Ministry's head office and regional and district offices. We also held discussions with staff from conservation authorities and the Environmental Commissioner's Office, as well as from the ministries of Natural Resources, Northern Development and Mines, and Agriculture and Food. In addition, we reviewed practices and experiences in other jurisdictions with respect to groundwater protection. Our audit further included a review of the activities of the Ministry's Internal Audit Services Branch. However, we did not reduce the scope of our audit work because the Branch had not issued any recent reports on the Ministry's administration of the groundwater program.

The criteria used to conclude on our audit objectives were discussed with and agreed to by ministry management and related to systems, policies, and procedures that the Ministry should have in place.

Our audit was performed in accordance with the standards for assurance engagements, encompassing value for money and compliance, established by the Canadian Institute of Chartered Accountants, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

OVERALL AUDIT CONCLUSIONS

Although the Ministry had gathered information on groundwater resources from various areas of Ontario, it still lacked an overall understanding of groundwater resources in the province as a whole. Without such an understanding, the Ministry could not determine whether it had succeeded in achieving or failed to achieve the protection and long-term sustainability of Ontario's groundwater resources. Overall, the Ministry did not have adequate procedures in place to restore, protect, and enhance groundwater resources to ensure public health and the availability of the resource for future generations. Specifically, we noted the following:

- While the Ministry has been carrying out watershed studies since the 1940s, it did not yet have watershed management plans to ensure groundwater resources are

protected. The Ministry estimated that its latest attempt to have conservation authorities develop watershed-based source protection plans will result in six of 36 plans being put in place by the 2007/08 fiscal year. Current attempts to implement source protection plans will take several years, and, in the meantime, the quality of the groundwater resources in Ontario may continue to deteriorate.

- In May 2000, rains washed animal waste from a nearby farm into a municipal drinking-water well in Walkerton, claiming seven lives and causing thousands of water-related illnesses. The farmers of Ontario's 1,200 largest farms are now required to have plans in place for dealing with agricultural waste by July 1, 2005. For an additional 28,500 farms that produce enough waste to pose a potential problem, a process is to be developed by 2008 to phase in nutrient management planning.
- The Ministry has determined that, since the 1950s, well water in Ontario has shown a pattern of declining water quality. We noted examples of municipal well-water test samples that had unusually high concentrations of *E. coli* and other fecal coliform bacteria. The Ministry contends that treatment will remove these substances from the groundwater used for drinking purposes. However, and as noted by Justice O'Connor in his Walkerton Inquiry Report, given that "some contaminants are not effectively removed by using standard treatment methods" and some rural residents do not have access to treated water, it is extremely important that source water be protected to provide safe drinking water.
- We noted that the Ministry has had little assurance that drinking-water wells are properly installed and maintained since it discontinued its water well inspection program in 1997. Most problems associated with improperly installed and maintained wells are brought to the Ministry's attention through complaints. We noted several examples of improperly installed and maintained wells, including wells that were constructed by individuals without a valid well contractor's licence.
- The Ministry has issued more than 2,800 permits to take water for a total potential withdrawal of 9 billion litres of groundwater a day. The Ministry's assessment and evaluation of applications for groundwater-taking permits were inadequate. In addition, the Ministry did not monitor compliance with these permits and did not have sufficient information to evaluate the cumulative impact of water takings on the sustainability of groundwater.
- In its response to our 1996 audit of its Environmental Sciences and Standards Division, the Ministry committed to review groundwater management and protection in the province and develop a groundwater management strategy. However, a groundwater management strategy had still not been developed.

Overall Ministry Response

The report on the audit of the groundwater program offers many constructive comments and recommendations regarding the Ministry's role and responsibilities related to groundwater management and protection.

The Ministry is pleased to note that many of the recommendations in the report are being addressed through the development and implementation of a province-wide watershed-based source protection program, including the establishment of Ontario's first mandatory province-wide source protection legislation and improved management of water takings.

The Ministry will be developing a province-wide program that ensures source protection plans are developed and implemented locally in watersheds throughout Ontario.

The Ministry has established two multi-stakeholder advisory committees tasked with providing advice to the government on the implementation and technical aspects of source protection. The work of both of these committees is expected to be finished in fall 2004. Their recommendations will provide a basis for the development of the implementation provisions of source protection legislation.

The government is also proposing tough new rules for water takings that will protect the supply of drinking water. The proposed changes are part of the province's overall water strategy, one characterized by moving to a watershed-based approach to guide planning and use of Ontario's water resources.

Detailed responses to the specific findings can be found in the body of the report.

DETAILED AUDIT OBSERVATIONS

PLANNING FOR GROUNDWATER MANAGEMENT

As a result of the Walkerton Inquiry, Justice Dennis O'Connor issued reports in January and May 2002 making recommendations for improving Ontario's water system from "source to tap." The government of the day and the current government have accepted these recommendations and have committed to their implementation.

Of the 121 recommendations made by Justice O'Connor, the Ministry identified 22 that specifically related to the protection of source water, including groundwater. These recommendations included the development of source protection plans and requirements that development decisions be compatible with these plans. The Ministry of the Environment was to be the lead provincial agency in establishing a framework for developing source protection plans. In addition, the Ministry was to help fund and

participate in the development of the plans and approve completed plans. The plans for protecting water sources were to be based on watersheds, which are areas of land that drain downward in elevation into a lake or river.

Groundwater management planning is designed to mitigate the many human activities that have the potential to contaminate groundwater resources. Contamination occurs when water and other fluids, such as chemicals, move from the surface into groundwater. Chemical contaminants may include fertilizers, pesticides, substances leached from landfills, industrial discharges, gasoline leaked from storage tanks, and discharges from improperly maintained septic tanks. Many of these chemicals, even at low concentrations, render groundwater highly undesirable or unusable as a source of domestic or public water supply. For example, Environment Canada has determined that just one litre of gasoline can contaminate 1 million litres of groundwater. With a threat of this magnitude, it is of paramount importance that the Ministry have groundwater management and protection strategies in place to ensure the future sustainability of the groundwater supply.

We reviewed five aspects of groundwater management: watershed-based planning for the protection of water sources; groundwater management studies; the mapping of aquifers; nutrient management plans; and contaminated groundwater.

Watershed-based Source Protection Planning

Watershed-based planning is a process for protecting groundwater, lakes, streams, and wetlands within a watershed from pollution. The process requires developing an understanding of activities that affect water quality and groundwater levels within the watershed. From this understanding, a plan is developed to prevent, reduce, or minimize any adverse impacts of those activities.

Conservation authorities were first established in Ontario in 1946, with jurisdiction over natural areas based on watersheds. There are now 36 conservation authorities in the province governed and financed by local municipalities. Since conservation authorities were established, there have been many attempts to implement watershed-based protection plans. Most recently, in 1993 the ministries of the Environment and Natural Resources released three guidance documents to provide conservation authorities and municipalities with advice on how to voluntarily develop watershed protection plans. In April 2002, a report was jointly issued by the Ministry of the Environment, the Ministry of Natural Resources, and Conservation Ontario. This report updated the methodologies and watershed management processes used in the 1993 guidance documents and included a summary of the status of watershed planning in Ontario. However, the Ministry does not know how many plans were completed and has not reviewed or monitored the implementation of any plans that were finalized to determine whether they are sufficient to address environmental risks.

In April 2003, the Ministry obtained policy advice from its Advisory Committee on Watershed-Based Source Protection Planning. Based on the recommendations of this committee, the Ministry established further committees in November 2003 to review source protection. The committees' work was to be completed and a report submitted to the government by the fall of 2004. Following the submission of the report, the Ministry intends to undertake further consultations with stakeholders and the public. Further consultation with the public is to take place in response to the Ministry's *White Paper on Watershed-based Source Protection Planning*, which was released in February 2004. The consultation is expected to result in the refinement of Ontario's policy and legislative framework for source protection planning.

The Ministry anticipates that six of the 36 conservation authorities will complete source protection plans by the 2007/08 fiscal year and hopes to have interim strategies established for the other 30 conservation authorities at that time. The Ministry has not established a time frame for the completion of the other 30 source protection plans. Until these source protection plans and interim alternatives are in place to provide direction for development projects and other activities, the province is currently at risk of not adequately protecting, preserving, and restoring groundwater resources.

A 1993 study on watershed management noted that water management has traditionally been issue-driven and segmented among jurisdictions, making it difficult, costly, and not particularly effective. Current attempts to implement source protection plans will take several years, and, in the meantime, the quality of the groundwater resources in Ontario may continue to deteriorate. In addition, since source protection efforts were being undertaken on a voluntary basis by municipalities and conservation authorities, these measures may not be sufficient to protect groundwater resources. Consequently, the Ministry needs to play a more proactive role by developing an overall province-wide strategy to ensure that groundwater resources are being protected from current threats of contamination and threats to sustainability.

Groundwater Management Studies

Groundwater management studies are designed to collect data for developing an information base on local groundwater conditions and to document potential environmental risks. Such studies provide information necessary to the development of source protection plans. In 1998, as part of a source protection initiative, the Ministry began providing funding for groundwater management studies, and to date it has provided $19.3 million to assist municipalities in undertaking local studies to review the long-term use and protection of groundwater resources.

Although 97 groundwater management studies had been funded at the time of our audit, only 44 final reports had been submitted to the Ministry. The Ministry expects that the rest of the reports will be submitted by December 2004. We noted that the Ministry was having difficulty reviewing and interpreting the reports because there

were inconsistencies in the information provided and the level of detail included. Such inconsistencies make it difficult to, for example, input relevant information into the Ministry of Natural Resources' computerized geographic information system, develop a comprehensive inventory of contaminants, and determine to what extent contaminants are affecting groundwater resources.

Groundwater Aquifer Mapping

To promote and enhance the proper development, management, and protection of groundwater resources, the Ministry needs detailed three-dimensional maps showing the depth and boundaries of aquifers, the location of wells, groundwater flow patterns, and other geological characteristics, such as the water-absorption capacity of the rock involved. Information from aquifer mapping makes it possible to determine the maximum amount of water that can be withdrawn without threatening the aquifers' sustainability. This information is also important in gauging the potential impact of contamination—once an aquifer is contaminated, it may be unusable for decades. If the contamination is chemical, it could take thousands of years for the aquifer to recover naturally, and, depending on water flow patterns, the contamination could pollute other aquifers as well as surface water.

The only aquifer maps that the Ministry has are the partially completed Major Aquifers in Ontario Map Series published between 1973 and 1978. Based on the limited data available at the time (primarily well records), these maps attempted to identify aquifers in terms of their geographic area and groundwater yield potential. However, this series was never completed and covers only parts of eastern and central Ontario.

The Ministry also has maps that were produced for specific purposes, such as evaluating development proposals or reviewing applications for a gravel quarry. The information from these maps is site specific and does not, and was not intended to, include aquifer-wide information sufficient to properly manage the resources to ensure their sustainability.

In 2001, the Ministry of Northern Development and Mines started a multi-ministry aquifer-mapping program to characterize aquifers and accumulate information on Ontario's groundwater resources. This program is expected to identify, for each aquifer, the location, thickness, area, types of rock, sustainable water yield, and interconnections with other aquifers, as well as recharge and discharge areas. Such maps, on a provincial basis, can help identify the level of management and protection an aquifer requires. There is no timetable for completing the aquifer-mapping program, and we were informed that it could take several decades to complete the mapping of Ontario aquifers.

Nutrient Management Plans

Chemical fertilizers as well as human and animal waste are agricultural nutrients often used to increase crop yields. The excessive use or improper treatment of these nutrients can lead to imbalances in the soil, runoff into streams, and pollution in nearby wells. The objective of nutrient management is to ensure nutrients are used in ways that minimize any adverse impacts on human health and the environment.

To help address the Walkerton Inquiry recommendations for source protection from agricultural nutrients, the Ministry put in place the *Nutrient Management Act, 2002,* responsibility for which is shared between the Ministry of Agriculture and Food and the Ministry of the Environment. The purpose of the new Act is to achieve the above objective of nutrient management so that both the natural environment and agricultural operations have a sustainable future. In general, the Ministry of Agriculture and Food will be responsible for receiving, reviewing, and approving the nutrient management plans that are to be submitted by farmers, and the Ministry of the Environment will be responsible for the enforcement of the Act.

A regulation under the Act requires that farm operations that produce a significant amount of animal waste have a nutrient management plan in place. Of the 60,000 farms in Ontario, approximately 29,700 produce or utilize sufficient waste to require a plan. The 1,200 largest farms in the province must have a nutrient management plan in place by July 1, 2005. The Ministry and the Ministry of Agriculture and Food are to develop a process by 2008 to phase in nutrient management planning for 28,500 other farms that produce enough waste to pose a potential contamination threat.

As of March 31, 2004, we noted that only 32 of the 1,200 large farms in the province had submitted a nutrient management plan, and only five plans had been approved. Also, at the time of our audit, the Ministry had not yet developed risk-based enforcement procedures for periodically reviewing compliance by farmers with their approved nutrient management plans and for monitoring those farms that do not require a plan until 2008.

Groundwater Contamination

In 1985, the government established the Environmental Clean-up Fund to deal with contaminated sites in order to contain the damage and minimize the environmental and health risks associated with the contamination. Of the 250 contaminated sites that are part of the Fund, 120 relate directly to groundwater sources.

Research from other jurisdictions indicates that efforts to clean up contaminated groundwater sites in both Canada and the United States have, for the most part, been ineffective, despite large expenditures. Following this pattern, since 1985, despite approximately $180 million being paid out by the Fund with respect to contaminated sites, many groundwater resources in the province have been lost due to contamination.

People in some areas have resorted to drinking bottled water as a temporary measure and then piping in surface water across large distances.

Examples where groundwater has not been adequately protected, resulting in high costs and putting in doubt future sustainability, include the following:

- In 1989, Elmira's groundwater supply was contaminated with a toxic chemical that leaked from a local chemical plant. The remediation period to restore drinking water from the groundwater aquifer could take more than 30 years, so arrangements were made to have water piped in from the Waterloo Region. Total costs for remediation and providing an alternative water supply are estimated to be $50 million.
- In Smithville, more than 30,000 litres of high-strength PCB oils leaked from a storage facility into the fractured bedrock and groundwater below the facility site. Since 1985, when the Ministry assumed ownership of the site, it has spent approximately $50 million to clean it up. However, complete remediation is not currently possible, since the technology necessary to clean up the bedrock has yet to be developed.
- In 1979, the Ministry assumed control of an abandoned mine site in the Village of Deloro after surface and groundwater resources were contaminated by radioactive waste, arsenic, lead cobalt, mercury, and other metals. By the completion of our audit in March 2004, the clean-up costs were over $20 million, of which the Environmental Clean-up Fund paid $8 million, with an additional $40 million estimated to be needed to complete the remedial work by the 2008/09 fiscal year.
- In 1995, the Ministry and the Hamlet of Port Loring proceeded to build a communal water system because the village's groundwater was contaminated by gasoline from underground storage tanks. Approximately 40 private wells were found to have benzene levels that exceeded acceptable standards, and additional properties were thought to be at risk. Remediation costs for constructing a communal water supply system from a groundwater source outside the contaminated area, as well as the costs for providing bottled water in the meantime, were estimated to total $2.7 million.

These occurrences highlight the potential risk for groundwater resources being lost, perhaps forever, when polluted by toxic chemicals. Even though the Ministry uses its enforcement powers to promote compliance with environmental laws, the Ministry's efforts are predominantly reactive, resulting from following up complaints and attending to chemical or other spills after they have occurred. The costs incurred to clean up groundwater resources that have been contaminated may far exceed those incurred to implement preventive measures. Preventive measures can be effectively implemented only if the key risks and potential threats to groundwater contamination are known and remedial strategies are appropriately planned.

Recommendation

To ensure that groundwater resources are protected from existing threats of contamination while new protection measures are put in place, the Ministry of the Environment should:

- **review the existing source protection plans and any other measures in place at each conservation authority and consider developing an overall strategy for protecting the province's groundwater resources from current contamination threats;**
- **establish a clear timetable for the completion of all watershed-based source protection plans and for the implementation of any required protection measures;**
- **consolidate, in a medium such as the Ministry of Natural Resources' geographic information system, information from the groundwater management studies done by municipalities and verify the completeness of each study;**
- **incorporate into its information system and source protection plans the information generated by the Ministry of Northern Development and Mines with respect to its aquifer-mapping project;**
- **develop risk-based inspection procedures to ensure the compliance of farms required to complete a nutrient management plan by July 1, 2005 and consider monitoring farms that do not require a plan until after 2008; and**
- **identify groundwater pollution sources on a timely basis so that remedial action can be taken before serious contamination occurs.**

Ministry Response

The government has proposed a legislative framework for the development, review, and approval of source water protection plans, in addition to ways to enhance Ontario's management of water takings. While source protection planning is currently undertaken on a voluntary basis, source protection legislation, once proclaimed, will make watershed-based source protection planning mandatory across the province. The Ministry will be developing a province-wide program that ensures source protection plans are developed and implemented locally in watersheds throughout Ontario.

On June 23, 2004 the Ministry posted a proposed **Drinking Water Source Protection Act** ***on the Environmental Bill of Rights Registry for a 60-day comment period. The draft source protection planning legislation establishes a framework for the development of source protection plans that will protect human health by ensuring that current and future sources of drinking water in Ontario's inland lakes, rivers, and groundwater and the Great Lakes are protected from potential contamination and depletion. Assessing the quality of groundwater and identifying risks to groundwater (e.g., sources of contamination) will be a key component of the source protection planning process. The government will be establishing specific assessment report criteria for regulation and is currently developing a provincial threat***

assessment process. The assessment process will be supported by technical guidance documents prepared by the Ministry and the Ministry of Natural Resources. The source protection program will also include a monitoring component, focused on high-risk areas, including groundwater supplies.

The Ministry will be developing a province-wide program that ensures source protection plans are developed and implemented locally in watersheds throughout Ontario. The Technical Experts and Implementation committees are developing approaches to implementing those components of source protection that will provide the most protection against significant threats to drinking water and are anticipated for delivery over the next three years. Priority components could include wellhead protection zones for municipal (residential) systems using groundwater; intake protection strategies for municipal (residential) systems using surface water; aquifer protection areas to provide greater protection for municipal residential supplies but that will also benefit other supplies (i.e., private supplies, non-municipal residential, and municipal non-residential); and water budgets. The work of both of these committees is expected to be finished in fall 2004. Their recommendations will provide a basis for the development of the implementation provisions of source protection legislation.

The main purpose of the groundwater studies is to provide communities with the information they need to take action to protect their groundwater sources. The Ministry will look to strengthen external partnerships to manage and provide access to the information that is critical to support local and regional decision-making on source protection.

The Ministry has been working with the Ministry of Northern Development and Mines (MNDM) to ensure that information produced by previous groundwater studies is integrated and built upon through subsequent aquifer mapping. As part of the design and implementation of the Provincial Groundwater Monitoring Network, draft aquifer maps were prepared for the province's 36 conservation authority watersheds and 10 municipal area watersheds. At the same time, the MNDM has initiated the mapping of Ontario's aquifers on a regional scale. The Ministry will initiate a project to finalize and publish the watershed aquifer maps and all other associated groundwater maps used for the network design and make these accessible to all municipalities, conservation authorities, and other ministries in a digital form. Two hydrogeology reports, **The Hydrogeology of Southern Ontario** *and* **An Assessment of the Groundwater Resources of Northern Ontario***, were recently prepared by the Ministry and are in the process of being approved for release to the public. These reports describe the occurrence, distribution, quantity, and quality of groundwater in the northern and southern regions of Ontario. The aquifer maps and accompanying descriptions of groundwater resources are critical pieces of information to these studies. Municipalities and conservation authorities will not have to reproduce the work contained in the reports and as such should recognize significant savings. It is expected that these reports will be recognized as a major contribution by the Ministry to groundwater*

management in Ontario, as they compile all available pertinent groundwater characteristics and geology data for the province for the first time.

The Ministry has always done incident response for all farms, including complaint response, spill response, and advice or mediation relating to legislated and regulatory requirements. The Ministry will continue to do so, whether or not farms require a plan. Dedicated Ministry agricultural compliance officers have been on farms ensuring compliance with the* Nutrient Management Act, 2000 *and regulation since September 2003. This regulatory compliance function includes incident response and farm inspections for farm and non-farm nutrients and an after-hours environmental response program. As of July 2005, these officers will monitor large livestock operations based on nutrient management plans approved by the Ministry of Agriculture and Food. As more diagnostic information becomes available, the Ministry will develop a risk-based approach for farm inspections based on the Ministry's Operations Division's risk-based approach introduced in 2004/05.

Risks to all sources of drinking water, including groundwater, will be identified using a provincially established threat assessment process. Requirements for undertaking an assessment report, which will include standards for assessing both the quality and the quantity of groundwater, will be developed by the two multi-stakeholder advisory committees tasked with providing advice to the government on the implementation and technical aspects of source protection. Their recommendations will inform the development of the implementation provisions of source protection.

MONITORING GROUNDWATER QUALITY

Approximately 3 million residents of Ontario rely on groundwater as their drinking water source. Of these, approximately 1.8 million use groundwater from private wells, while the remainder derive their water from municipal groundwater-based systems. The Ministry does not have any data on the number of illnesses caused annually by contaminated groundwater. But contaminated water can be the direct cause of infections, gastrointestinal problems, liver damage, and even death.

Drinking-water Wells

There are over 500,000 private and public wells in the province. The most common reasons for contamination of well water are substandard well construction, poor maintenance, and building a well in an inappropriate location. Minimum standards for locating, constructing, maintaining, and decommissioning both public and private wells are set out in Regulation 903 under the *Ontario Water Resources Act*.

Regulation 903 requires that all new wells be installed by ministry-licensed well contractors. There are approximately 800 such contractors in Ontario. Well contractors must complete and submit to the Ministry a water well record when a new

well is installed. An improperly installed well could allow contaminants to enter the water supply. Until 1997, the Ministry inspected new wells and ensured that all wells were constructed by a licensed contractor. However, since that time the Ministry has discontinued this practice and does not inspect new wells. There are also no ministry checks to verify that the person constructing a well is licensed. We noted several examples where wells were installed by persons who did not have a valid well contractor's licence. Most problems associated with improperly installed wells are brought to the Ministry's attention through complaints. Thus, the Ministry has little assurance that all new wells are properly constructed.

Proper maintenance of wells is also critical for preventing contaminants from entering the water supply. For example, a ministry inspector by chance noted that a well serving several rental properties was not properly maintained and that as a result, surface water could enter the well; also, several animals had died in the well. *E. coli* bacteria were present in water samples from this well at levels greatly exceeding the drinking-water standards. Proper maintenance is particularly essential for older wells. Those that are 50 years old are likely to be shallow and located at the centre of a property, where they may be surrounded by potential contamination sources. Also, the casings used in wells that are more than 20 years old (over 50% of the wells in the province were constructed before 1980) are subject to corrosion and perforation. However, unless there is a complaint, the Ministry may not be aware of pollution problems associated with poor well maintenance.

In the past, ministry well inspectors inspected abandoned well sites to ensure that proper well abandonment procedures had been followed. Such procedures included proper sealing against contaminants that could enter the well and, through the groundwater, pollute other wells. Inspection of abandoned wells was discontinued in 1997, with the result that the Ministry has little assurance that abandoned wells are properly sealed.

Groundwater from Municipal Waterworks

The Ministry has determined that, since the 1950s, well water in Ontario has shown a pattern of declining water quality. The events in Walkerton in May 2000 that claimed seven lives and caused thousands of water-related illnesses further contributed to making water-quality issues a priority concern. Since the Walkerton Inquiry, the Ministry has set up various water-monitoring programs, including establishing minimum sampling, analysis, and reporting requirements for each water system; inspecting each municipal water system annually; and requiring water-testing laboratories to automatically report test results to the Ministry. The purpose of the monitoring programs is to identify factors that affect water quality, track the extent and magnitude of these impacts, and provide data for effectively managing the resource.

The Ministry monitors the water samples from municipalities' systems through its Drinking Water Information System, which contains test samples of raw water (untreated or source water) and treated water (water that has been processed and is ready for distribution). Treatment can remove unwanted substances from raw water, rendering it safe in accordance with Ontario drinking-water standards. However, if water treatment fails, as was the case in Walkerton in 2000, threats to human health could result. Moreover, finding high concentrations of certain high-risk substances such as *E. coli* and other fecal coliform bacteria indicates a potential weakness in an area's source protection, which could be a concern even if treatment renders the water safe for drinking.

Ontario's drinking-water standards require that there be no *E. coli* or other fecal coliform bacteria in drinking water. We had the Ministry provide us with a list of raw-water test results for these bacteria from groundwater sources in the period from June to December 2003. We noted that there were 373 cases where municipal raw-water tests showed concentrations of *E. coli* and other fecal coliform bacteria present in the water. Test results for this untreated water ranged from one organism to a high of 620 organisms per 100 millilitres of water, with 10 cases having more than 100 organisms per 100 millilitres of water. Effective municipal treatment would remove these contaminants from the groundwater used for drinking purposes. However, and as noted by Justice O'Connor in Part Two of the *Report of the Walkerton Inquiry*, the protection of source water is the first step in providing safe drinking water and as such is extremely important because "some contaminants are not effectively removed by using standard treatment methods" and some rural residents who do not have access to treated water rely on untreated groundwater from wells for drinking.

Groundwater from Private Wells

While the Ministry carries out routine inspections of municipal drinking-water facilities, the Ministry does not routinely inspect the water quality in private wells supplying water to Ontario's rural population. A private well may be inspected as a result of a complaint, but, according to the Ministry, the ongoing monitoring of water quality in these wells is the responsibility of the owner.

The only major ministry research pertaining to the quality of groundwater from private wells was a 1992 study of 1,300 Ontario farm wells that was sponsored by the federal Department of Agriculture and Agri-Food Canada in partnership with the Ontario ministries of the Environment and Agriculture and Food. The study indicated that about 40% of the wells contained one or more of the contaminants tested—such as *E coli* and other fecal coliform bacteria, nitrate, and pesticides—in concentrations above the provincial drinking-water standards that existed at that time. No other studies have been done to update this information to determine whether the water quality has improved or deteriorated further. The Ministry informed us that the results

of this 12-year-old study are still used when referring to groundwater quality in rural agricultural areas.

Private wells that are in the vicinity of municipal wells that showed high concentrations of high-risk substances in raw-water tests may have similar contamination problems. While this risk is mitigated at municipal wells through appropriate treatment, private-well users may not be aware of the test results and the need to treat their water accordingly. The Ministry did not have a process in place for informing private-well users of high concentrations of *E. coli* and other bacteria in untreated water at nearby municipal wells, so such users may be at risk of drinking contaminated water and contracting water-related illnesses.

The Provincial Groundwater Monitoring Network

The Provincial Groundwater Monitoring Network was established in 2000 at a cost of $6 million to collect data regarding baseline groundwater quality from approximately 380 wells. The Ministry intends to use the Network to track water quality over time. The wells being monitored are located in areas where water quantity and quality are not affected by other wells in the area and therefore can be measured independently of short-term fluctuations and contaminant movement. While the wells themselves do not supply drinking water, many are located in aquifers that provide drinking water. The Ministry intends to test samples for chemical parameters every six months in high-risk areas and annually in other areas. At the completion of our audit in March 2004, the Ministry had results from 177 of the 380 monitoring wells, with samples from the remaining wells either at the Ministry's laboratory for testing or still being collected. The Ministry's analysis and interpretation of the test results were in the early stages. The Ministry informed us that a report on these test results would be released in late fall 2004.

Recommendation

To ensure that Ontarians have a groundwater supply that is safe and clean to drink, the Ministry should:

- **verify that the persons installing new wells are licensed well contractors;**
- **randomly inspect new, existing, and abandoned wells to ensure that they are properly installed, maintained, and sealed in order to prevent contaminants from entering the water supply;**
- **consider expanding its monitoring program to include a sample of private wells in high-risk areas and inform potentially affected users in the area of any adverse raw-water test results; and**
- **review the concentrations of high-risk substances, such as *E. coli* and other fecal coliform bacteria, in raw water, determine the sources of the contamination, and develop remedial strategies to correct the problem.**

Ministry Response

Ontario's standards under Regulation 903 of the* Ontario Water Resources Act *for well construction, maintenance, and abandonment now match or exceed those in other leading jurisdictions in North America. Justice O'Connor indicated that rural households have an obligation to construct and decommission wells properly and that government could play an important role in providing information to the public on such topics as wells and their protection, water treatment options, and good sanitation practices. The Ministry recognizes that the regulation requires an appropriate level of provincial oversight in order to be effective.

The Act states that all persons installing new wells are to be licensed well contractors. The Ministry uses several methods to clarify the requirements of the regulation and make it an effective tool for drinking-water protection for private-well owners. For example, the Ministry updated and made available four "Fact Sheets" on well construction and, in partnership with the Ontario Groundwater Association, held multiple information sessions on the regulation for well drillers. The Ministry also intends to provide more information on the contents and requirements of the regulation in plain language.

The Regulation sets standards for well siting, construction materials, and methods for all wells, including private wells. When a well is constructed or abandoned, a record (including well location) must be submitted to the Ministry. The Ministry's database currently contains more than 550,000 well records. These records can be accessed by location/area to address a variety of groundwater protection program needs (for example, municipal groundwater studies, spills response). The Ministry will put procedures in place to ensure that well records submitted are by licensed well drillers. The Ministry has also undertaken a pilot project within the Ottawa area in order to develop an overall compliance strategy to ensure wells are properly installed and maintained.

The Ministry has successfully established a province-wide groundwater monitoring network to monitor changes in water supplies and water quality on a regional scale in the major aquifers in Ontario. It is the Ministry's intention to further review the current network with partner municipalities and conservation authorities to identify more specific areas that could be subject to stress and potential water-quality problems and to optimize the network to address such needs. As part of such a review, future source protection requirements (which are yet to be developed, but which could potentially include identification of private wells that are located in high-risk areas) and responsibilities of the partner municipalities and conservation authorities, as well as those of the province, will have to be considered.

Assessing the quality of groundwater and identifying risks to groundwater (for example, sources of contamination) will be a key component of the assessment process within the mandatory source protection planning framework. The government will be establishing specific assessment reporting criteria for

regulation and is currently developing a provincial threat assessment process that will support the assessment and identification process. Source protection planning will also include a monitoring component, focused on high-risk areas, including groundwater supplies.

Through the source protection planning process, information related to measurements of the quality and quantity of surface water and groundwater will be made publicly available through the assessment reporting process. In addition, landowners with private wells residing in sensitive areas will directly benefit from source protection planning and implementation measures. For example, education and outreach programs will be put in place to ensure landowners are notified that they reside in a sensitive area. The development of education and outreach programs by the Ministry is consistent with recommendations made by Justice O'Connor on source protection.

MANAGING GROUNDWATER FOR SUSTAINABILITY

The public demand for groundwater continues to escalate due to population growth, climate change, and competing interests and priorities among the agricultural sector, municipalities, recreational users, and natural habitats. Because of these stresses, the Ministry's challenge is how to manage groundwater resources to ensure that all Ontarians have access to clean and sustainable groundwater.

The sustainability of groundwater resources can be threatened by many factors, including decreases in groundwater storage levels, reductions in streamflows that feed groundwater aquifers, loss of wetland ecosystems, and changes in groundwater quality. The greatest of these threats are the drawdown of water levels in aquifers, affecting the long-term capacity to provide water to wells, and the contamination of aquifers, making the groundwater unusable for drinking.

A first step towards groundwater sustainability is to have a groundwater management strategy that would protect the quantity and quality of groundwater in the province. After our 1996 audit of the Environmental Sciences and Standards Division, the Ministry committed to review groundwater management and protection in the province. The objective of this review was "to develop an overall groundwater management strategy based on a common set of management and protection principles and a clearer delineation of roles and responsibilities among provincial agencies, local/regional and non-governmental groups." During our 1998 follow-up, the Ministry informed us that a groundwater strategy had not yet been finalized.

Although the Ministry has had sufficient time to complete a groundwater management strategy, there was still not one in place at the completion of our audit in March 2004, and the Ministry did not provide a date for when one would be put in place. Without

a groundwater management strategy, it is difficult for the Ministry to plan for, develop, and implement the procedures necessary to ensure a clean and sustainable groundwater supply.

Permits to Take Water

Water takings in Ontario are governed by the *Ontario Water Resources Act* and regulations. Any person taking more than 50,000 litres of water a day from either surface or groundwater sources requires a ministry-issued permit to take water. The majority of the groundwater permits are issued for municipal drinking water and agricultural irrigation. The purpose of the permit system is to promote fair sharing of water supplies, help ensure the sustainable use of water resources, protect the natural functions of the ecosystem, and help the Ministry to better plan for and manage the usage of water resources. As at March 31, 2004, the Ministry had issued approximately 2,800 permits for groundwater, for total maximum takings of about nine billion litres a day.

In December 2003, a regulation under the Act put a moratorium on certain takings and uses of water until December 31, 2004. This moratorium applies only to new permits to take water for certain types of manufacturing. Holders of existing permits may renew their permits provided that the maximum amount of water allowed to be taken is not increased.

We reviewed the Ministry's assessment and evaluation of applications for groundwater-taking permits against its policies and regulatory requirements. We found that the policies and requirements were inadequate to ensure the protection and future sustainability of groundwater resources. The following are some of the major weaknesses we observed:

- For large groundwater takings, the applicant must submit a hydrogeologic report that identifies the potential impact of the proposed water taking on groundwater resources. We noted many instances where a hydrogeologic report was not on file. In cases where there was a report, many of the reports were more than 10 years old. For example, the hydrogeological report submitted to support a 2003 renewal application had been done in 1989. We found no evaluation of the relevance of such old reports when renewals or new water permits were issued in the same areas where the hydrogeologic studies were conducted. For example, in the case of the 2003 renewal application cited above, the ministry approval quoted testing results from the original report with no evaluation of the current relevance of those results.
- A regulation under the Act effective from 1999 onwards states that in evaluating a permit to take water, the Ministry shall consider the protection of the natural functions of the ecosystem and the surface water that may affect or be affected by the proposed groundwater taking. A majority of the files that we reviewed where permits had been renewed since 1999 did not have the required evaluation and

assessment of the cumulative impact of all groundwater users. Assessments that were done were specific to the site of the water taking, without any determination of the cumulative impacts that the taking of water has had on an aquifer or watershed as a whole.

- For the majority of the permits that we reviewed, there was no documentation on file that the Ministry had monitored the actual water taken by individual permit holders to ensure that the permit holder did not extract more water than was allowed by the terms of the permit.
- The Ministry did not follow up on holders of expired permits to determine whether they were still extracting groundwater. Without such follow-up, the Ministry cannot accurately estimate total water takings in any given area when reviewing new permit applications.
- The Ministry lacked the information needed to properly assess the total water takings by all permit holders. The Ministry maintains information with respect to the maximum amount of groundwater allowed to be taken by individual permits, but it does not track the actual amounts of groundwater taken by the permit holders. Although groundwater takers themselves are required to maintain records of the amount of water taken, they do not need to submit these reports to the Ministry unless a special condition of the permit or a request by the Ministry requires that they do so. We noted that even when submission of the report was required, most files did not contain the reports. Information on amounts of water taken would help the Ministry manage groundwater takings and determine the cumulative impact of all users on groundwater resources. Other jurisdictions in Canada and the eastern United States require that permit holders report the actual amounts of water taken on a daily, monthly, or annual basis.

Groundwater Sustainability

Permission to take groundwater is generally given on the condition that the amounts taken are sustainable and do not interfere with existing groundwater users. A water taking is sustainable if the amount taken does not exceed the amount of water that is naturally recharged. Not maintaining this equilibrium and continuously drawing down an aquifer from year to year is referred to as "mining" the aquifer. Although the Ministry does not allow mining, some of its practices are putting a strain on groundwater resources and could eventually lead to the mining of aquifers. The consequence of such mining could be a drop in groundwater levels, which may result in the drying up of wells and streams. This could affect sensitive ecosystems that rely on groundwater, in addition to leading to a non-sustainable groundwater supply.

We noted two examples where major aquifers have had declining water levels over a number of years. In one case, the groundwater levels have dropped 32 metres over a 20-year period, while in the other case, the groundwater levels have dropped 40 metres

over a 40-year period and continue to decline on an annual basis. Even though groundwater levels have continued to drop, the Ministry renewed permits to take water from one of the aquifers and increased the allowable takings, although the Ministry could not determine the impact of the increases on the sustainability of the aquifer. Continuing this practice could result in damage to the habitats of aquatic-based life, degradation of sensitive wetlands, reduction in the capacity of the water to dilute contaminants, and mobilization of contaminants caused by changes in the directions of groundwater flow.

In addition, the Ministry has not taken the responsibility to develop a sustainability strategy for these two aquifers. Rather, it has delegated the responsibility to users, requiring that, when the current permits to take water from these two aquifers expire, the water takers assess how their takings have affected the groundwater and develop a strategy for sustainable groundwater use in these areas. Nevertheless, the Ministry is directly responsible for all groundwater takings in Ontario, and the practice of relying on users to ensure the sustainable use of groundwater in an entire aquifer warrants reconsideration.

Recommendation

To help ensure the sustainable use of groundwater resources, the Ministry should:

- **enhance its assessment and evaluation process for applications for permits to take water by:**
  - **ensuring that it receives and retains the required hydrogeologic studies for new permit applications;**
  - **evaluating the relevance of dated hydrogeologic studies for permit renewals; and**
  - **assessing the cumulative impact on the ecosystem that could result from the taking of groundwater by multiple users;**
- **monitor the actual amounts of water taken by permit holders to verify that permit holders are not extracting more water than they are entitled to;**
- **follow up on expired permits to take water to determine whether former permit holders are still extracting groundwater; and**
- **establish a province-wide framework for monitoring water takings so that continuously drawing down, or "mining," of aquifers is prevented.**

Ministry Response

The government has taken concrete steps that will enhance its assessment and evaluation process for applications for permits to take water. One fundamental component is ensuring that the Ministry receives and retains the required hydrogeologic studies for new permit applications and also moves towards a watershed approach to assessing the cumulative impact on the

ecosystem that could result from the taking of groundwater by multiple users. As part of the government's overall framework for source protection, the Ministry posted amendments to the Water Taking and Transfer Regulation (285/99) of the* Ontario Water Resources Act *and improvements to the Permit to Take Water Program on the Environmental Bill of Rights Registry on June 18, 2004 for public comment for 60 days, until August 17, 2004. The proposed regulation will ensure that ministry directors follow stringent safeguards before issuing permits to take water. This proposed tough new regulation supports Justice O'Connor's recommendations in the* Report of the Walkerton Inquiry*.

The proposed amendments will clearly spell out the factors that the Ministry will consider in assessing water-taking applications, including consideration of the impact of proposed water takings on the ecosystem, water availability, proposed uses of the water, water conservation, mandatory reporting of water takings, and enhanced notification to municipalities and conservation authorities. The proposed regulation also provides a means for assessing high-use watersheds and for outlining conditions under which proposals for new or expanding uses that remove water from a watershed will not be permitted. In addition, the Ministry will be replacing the* Permit to Take Water Program, Guidelines and Procedures Manual *with a new manual that will reflect changes to the regulation. A draft of the new manual will be posted on the Environmental Bill of Rights Registry for consultation, before the regulation is finalized.

While many permit holders currently monitor their water takings and report them at the expiry of their permit, the draft amendments to the regulation also propose to require annual reporting of water takings to the Ministry, starting with municipal water supplies, major industrial dischargers, and water takings that remove water from the watershed.

As part of the Ministry's efforts to improve overall inspections, the Ministry has adopted a risk-based approach for inspections. A project is currently underway to apply this approach to permits-to-take-water inspections that will include an assessment of expired permits.

To support mandatory reporting of water takings by permit holders, the Ministry funded a pilot project with Conservation Ontario to assess issues involved in establishing a consistent monitoring and reporting system. The findings from this pilot will guide the Ministry as it considers how to develop a monitoring and reporting system that could be applied across the province.

ENFORCING COMPLIANCE WITH LEGISLATION

The *Environmental Protection Act* and the *Ontario Water Resources Act* outline the inspection and enforcement powers of ministry environmental officers. Inspection and enforcement include applying measures to bring about compliance with the legislation

and are focused directly on the control, prevention, reduction, and elimination of pollution sources. Specific inspection activities include responding to spills, following up on complaints, and proactively inspecting potential areas of risk. Depending on the severity of an incident, environmental officers can seek an offender's compliance by either soliciting the offender's voluntary co-operation or inducing corrective action using the enforcement provisions of the legislation. When the offender does not comply, the environmental officer prepares a referral report. This report may initiate further investigation and enforcement action, including prosecution.

Inspections

Environmental officers are assigned to ministry district offices, where they carry out inspections of facilities that either the public has complained about or the Ministry has proactively selected. In addition, since September 2000 the Ministry has used an "Environmental SWAT Team" to increase its inspection coverage. The team focuses on proactive inspections in priority areas where compliance by industries or companies is a major concern. During the 2003/04 fiscal year, the Ministry performed 4,700 district and SWAT inspections.

District offices are required to allocate a minimum of 20% of environmental officers' available time to proactive inspections. Districts are to set priorities for inspections based on three factors: known or anticipated human health impacts; environmental impairments; and noncompliance with legislation. However, we noted that none of the three district offices maintained documentation to show that selection criteria had been applied to arrive at the final list of planned inspections.

We reviewed the inspection process at three district offices and found that non-compliance issues of an administrative nature were noted in half the inspections. However, the inspectors judged that known or anticipated impacts to human health or the environment existed in only 5% of these inspections. In contrast, we found that SWAT inspectors, using a risk-based approach to select facilities for inspection, found non-compliance in 95% of the facilities inspected and threats to the environment or human health that needed to be corrected in almost 25% of these facilities.

Risk assessment should be an important component in targeting facilities for inspections. We were informed that inspection targets were developed using professional judgment and knowledge of potential polluters, but we found cases where risk assessment was not used as part of this process. For example, at one district office, inspections were carried out in 2002/03 on all sewage plants because of a potential for groundwater contamination. All the plants were re-inspected in 2003/04, even though ministry policy requires that such inspections be carried out only once every four years and despite the fact that some plants had only minor compliance failures—none of which affected the environment.

Since 2000, the Ministry has attempted to use a number of risk-based models to select candidates for inspection. Districts carried out a pilot test for the latest model used. We reviewed the 25 inspections performed by one district office as part of the pilot test and noted that environmental officers had recorded that there were no indications of known or anticipated human health or environmental impacts for any of the facilities inspected, which may indicate that the pilot model is not effectively identifying high-risk facilities.

Recommendation

To more effectively identify incidents of non-compliance with environmental legislation and threats to human health and the environment, the Ministry should:

- **review the results of its proactive inspections to determine why they have not been as effective as inspections conducted by the "Environmental SWAT Team" in identifying threats to the environment and human health; and**
- **develop and implement a more effective risk-based model for its proactive inspection program to target areas that have the most potential for detrimental environmental impact if not corrected.**

Ministry Response

As part of the Ministry's efforts to improve overall inspections, the Ministry conducted a District Risk Assessment Pilot in 2003. The results of the pilot were assessed to determine the best approach for implementing a risk-based approach for proactive district inspections. Using the lessons learned from this pilot, the Ministry's Operations Division has introduced a risk-based district inspection framework with a community-based approach that will identify threats to the environment and human health.

The risk-based district inspection framework for inspections uses three risk categories to determine known health/environmental risks in order to prioritize inspections, and these categories are supplemented with best professional judgment.

Inspection locations are determined through the review and analysis of incident reporting information and then categorized according to their risk and reviewed further to determine whether a single-medium, multimedia, or site-wide inspection is warranted. The framework will be reviewed after this fiscal year to identify opportunities for a more robust risk ranking of facilities. The Ministry also plans to establish a database that will provide diagnostic capabilities to further enhance the risk framework.

Investigations and Prosecutions

When inspections do not result in compliance, a referral report is prepared and sent to the Ministry's Investigations and Enforcement Branch. Each report is reviewed by a branch supervisor to determine whether an investigation is warranted and, if it is, the case is assigned to an investigator. An investigation is then conducted to determine whether reasonable and probable grounds exist for laying charges. More than 1,100 investigations were initiated during the 2002/03 fiscal year, and 900 cases were referred to the Ministry of the Attorney General for prosecution.

We reviewed the investigation and enforcement process and noted the following:

- In a number of cases, either files were not promptly assigned for investigation or investigations were not completed on a timely basis. In some cases, the delay in assigning files for investigation occurred because the information needed before investigations could proceed was weak or missing. Because legislative limitations require that legal proceedings commence within two years of the offence, files that were delayed beyond this time were closed. We could not determine the extent of this problem, since the Ministry's information system did not have complete information on cases that were not assigned for investigation and on cases that were closed due to statute limitations.
- We were informed that, since the Walkerton Inquiry, some inspection staff have referred all their cases to the Branch for investigation. We noted cases where inspection staff referred violators to the Branch before the violators' compliance period to take corrective action had expired. Such referrals result in an unnecessary increase in the Branch's workload.
- A ministry agency operates 450 facilities consisting of 31% of Ontario's water treatment facilities and 43% of Ontario's wastewater facilities. The agency operates these facilities for various municipalities. The agency is required by legislation to provide water treatment and wastewater services for the protection of human health and the environment. We noted that this agency had incurred a number of compliance violations, including improperly operating and maintaining facilities resulting in discharges that could impair water quality; failing to properly take and analyze water samples and report adverse-water-quality incidents; and failing to report discharges of sewage into a nearby creek. We were informed that in some of these cases the problems could be ongoing, as they were attributable to aging municipal facilities.

Recommendation

To help ensure the timely disposition of cases of serious environmental violations, the Ministry should:

- **review and, where necessary, adjust current procedures for sending referral reports to the Investigations and Enforcement Branch;**
- **take the necessary steps to lay charges and start proceedings within the two-year time frame required by legislation; and**
- **review the operations of its agency to determine the reasons for incidents of non-compliance and work with the agency to correct the situation.**

Ministry Response

The Ministry acknowledges the need to ensure the timely disposition of cases of serious environmental incidents. The Ministry's Investigations and Enforcement Branch will be undertaking a review of the current incident referral procedures, and this will be completed by January 2005.

The Investigations and Enforcement Branch has also initiated a review of operational procedures to expedite the laying of charges for serious environmental offences, and this will be completed by January 2005.

The Ministry continues to work with the agency to ensure that it has the tools it needs to comply with environmental legislation and that there are clear and effective lines of communication to reinforce the impact and timing of regulatory changes. The agency's overall goal is to have compliant operations. The agency's 2003–05 Business Plan includes immediate and long-term strategies for ensuring compliant operations within a changing regulatory environment. The Ministry does acknowledge, however, that actions must be taken when there are instances of non-compliance.

MEASURING AND REPORTING ON PROGRAM EFFECTIVENESS

To demonstrate that its program and policies for groundwater protection are effective in accomplishing its mandate of restoring, protecting, and enhancing the environment to ensure public health, environmental quality, and economic vitality, the Ministry needs to establish a framework for tracking the results of its initiatives with respect to improving the quality of groundwater in Ontario, ensuring the sustainability of the resource, and taking corrective action when objectives are not met. To enable such tracking, the Ministry needs to establish desired outcomes, identify performance measures, and have technically sound data. Only with these three components can the Ministry determine whether its policies and management practices are succeeding in

achieving or failing to achieve the protection and long-term sustainability goals for groundwater resources.

At the completion of our audit in March 2004, the Ministry did not have desired outcomes or performance measures in place for the groundwater program. The only performance measures being reported were not associated with groundwater—they related to the quality of drinking water, tracking quarterly reporting from municipalities as well as the percentage of reported incidents of adverse water quality.

To properly develop meaningful performance measures, there needs to be an understanding of what is being measured. Although the Ministry has gathered site-specific information from various areas of the province, it still lacks a specific understanding of groundwater resources in Ontario as a whole. This specific, province-wide understanding should include the dynamics of how groundwater is recharged, the impacts of human-made impervious surfaces on recharge areas, the quantity of water that can be reasonably withdrawn from groundwater sources, and what actions need to be taken to protect wellheads from pollution.

The Ministry acknowledges the need to develop groundwater outcomes and performance measures. The information it currently has is not sufficient to enable it to properly measure the extent to which groundwater protection objectives are being achieved. Therefore, the Ministry has started to develop new activity-based measures and refine existing ones for which it can begin collecting data on baseline conditions and then track changes.

The Provincial Groundwater Monitoring Network is one of the initiatives where the Ministry is following the above process. Specifically, the Ministry is collecting data to develop baseline information on groundwater quantity and quality to enable it to track the improvement or deterioration of groundwater resources over time.

However, any data from the Ministry's previous water-monitoring programs have not been included in the new system. Whether legacy data available from old systems or reports will be included will not be known until after the Ministry reviews the information to determine if it would be useful in the new system. One potential problem is that the old legacy data systems and the new system are not consistent in format and in the type of information kept, nor are they compatible, so data-sharing could be cumbersome and time-consuming. Without historical information, it will be difficult to determine groundwater trends and the overall effectiveness of the groundwater program.

Recommendation

To help promote accountability, the Ministry should identify desired outcomes for its groundwater program and develop performance measures that would enable it to assess the extent to which program outcomes are being met and be more effective in ensuring the restoration, protection, and sustainability of groundwater resources.

Ministry Response

The Ministry recognizes the need for performance measures related to groundwater. The Ministry will be developing program-level measures, including those associated with groundwater resources, by the end of the 2004/05 fiscal year.