

Environment and Sustainable Resource Development—Systems to Promote Drinking Water Safety and Regulate Water Well Drilling Activities

Summary

History of the audit

In 2006, we audited the Department of Environment and Water systems to regulate and promote safe drinking water under the *Environmental Protection and Enhancement Act*,¹ as well as systems to regulate water well drilling under the *Water Act*.² It is the Department's responsibility to report on the safety of drinking water and effectiveness of Alberta's drinking water regime. The audit dealt only with drinking water quality, not with raw water supply and source protection.

We did the original audit in 2006 (our *October 2006 Report*, vol. 1—pages 25–61 and vol. 2—pages 84–86) because the quality of drinking water is important to the health of Albertans. Systems to properly operate and monitor drinking water treatment and distribution in the province are vital to the well-being of people. In our *October 2006 Report* we concluded that necessary systems exist, and are generally well designed. However, we also identified a number of opportunities for improvement, resulting in seven recommendations (see table below). In 2009, we followed up on three of the recommendations that were aimed at areas directly involved in managing risks associated with waterworks operations. We expected the Department to take immediate action in those three areas. The remaining recommendations required a longer implementation timeframe. See the table below for our audit conclusions.

2006 Recommendations	2009 Status	2011 Status
Recommendation No. 1 Improve system to issue waterworks approvals and registrations.	Satisfactory Progress	Implemented
Recommendation No. 2 Improve drinking water inspection systems.	Satisfactory Progress	Implemented
Recommendation—unnumbered Expand communication with partners involved in drinking water matters at the district level.	---	Implemented
Recommendation No. 3 Update strategies to deal with the Province's needs for certified water treatment operators.	Implemented	
Recommendation No. 4 Improve the information systems used to manage its drinking water businesses.	---	Satisfactory Progress
Recommendation No. 5 Ensure that Department's legislation, programs, and practices support its drinking water goals.	---	Implemented
Recommendation No. 28 Improve system to regulate water well drilling.	---	Implemented

¹ E-12 RSA 2000

² W-3 RSA 2000

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What remains to be done and why it is important

We concluded that the Department has made satisfactory progress in implementing our recommendation to improve its information systems. This recommendation is important because without effective information systems, the Department cannot perform timely and efficient analysis of drinking water data to better understand and manage risk. Such analysis is important for maintaining the strength of the Department's regulatory system for drinking water in the future.

To implement the remaining recommendation, the Department needs to:

- finalize its assessment of current and future business requirements and existing limitations of its information technology systems
- identify the long-term solution to redesign or replace the Environmental Management System, and support it with an action plan that provides objectives, timelines, allocated responsibility and resources
- systematically monitor progress against its plan to implement the identified solution for redesign or replacement of EMS

Audit objectives and scope

Our original audit objective was to assess if the Department of Environment and Water has adequate systems to regulate and promote safe drinking water under the *Environmental Protection and Enhancement Act*. It is the Department's responsibility to report on the drinking water safety and on effectiveness of Alberta's drinking water regime.

Our current audit objective was to determine if the Department has implemented the six remaining recommendations on drinking water and water well drilling from our *October 2006 Report*.

In performing the audit, we:

- examined applicable internal and publicly available documentation
- interviewed management and staff in respective program areas
- examined samples of approval and compliance files in respective program areas

We conducted our field work in 2011 and focused on the Department's actions since our 2006 audit.

Background

Drinking water in Alberta is provided mostly by municipal waterworks. Some industrial and private facilities also produce drinking water for onsite consumption and/or supply to nearby communities. Water treatment facilities obtain water either from surface water bodies or from groundwater aquifers. An increasing number of communities in Alberta do not rely on local water treatment facilities and obtain drinking water through regional distribution pipelines.

Different risks are associated with different drinking water sources. Generally, high quality groundwater³ poses less risk than surface water. Groundwater is less likely to contain bacteria and other organic and non-organic matter. However, groundwater may contain high concentrations of naturally occurring elements that may require additional treatment and monitoring, such as heavy metals. In some cases, groundwater contains elements such as iron that do not create direct and immediate health risks, but affect taste and odour.

³ High quality groundwater is defined by EPEA *Potable Water Regulation* as the groundwater that:

- does not require treatment to comply with the applicable physical, chemical and radiological Maximum Acceptable Concentration or Interim Maximum Acceptable Concentration, except for fluoride, specified in the Guidelines for Canadian Drinking Water Quality, published by Health Canada, as amended or replaced from time to time, for the parameters listed in the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, published by the Department, as amended or replaced from time to time,
- contains a concentration of naturally occurring fluoride of less than or equal to 2.4 milligrams per litre, and
- is not under the direct influence of surface water.

The Department of Environment and Water regulates waterworks under the *Environmental Protection and Enhancement Act*. The Department is responsible for approving waterworks, as well as monitoring and enforcing compliance with the *Act*, regulations and codes of practice under the *Act*. To deliver its mandate, the Department relies on a number of key regulatory information management systems, particularly the Environmental Management System.

The Department also regulates water well drilling activities under the *Water Act*, including issuing approvals to drill water wells, and collecting groundwater and geological information via drilling reports that water well drillers are required to submit under the *Water Act*. The information gathered through the water well drilling reports is important for understanding location and condition of the groundwater resource in the province.

The Department also plays a lead role in coordinating with stakeholders to achieve goals of the Government of Alberta's *Water for Life*⁴ strategy.

Findings

Approval and registration systems—implemented

Background

In our *October 2006 Report* (no. 1, vol. 1—page 37), we recommended that the Department of Environment and Water make its system to issue approvals and registrations more effective by:

- strengthening supporting processes such as training, manuals, checklists and quality control for approvals and registrations (implemented in 2009)
- ensuring that applications are complete and legislatively compliant (satisfactory progress in 2009)
- documenting important decisions in the application and registration processes (implemented in 2009)

- processing applications and conversions promptly (satisfactory progress in 2009)
- maintaining consistency in the wording of approvals and registrations across the province (implemented in 2009)
- following up short-term conditions in approvals (satisfactory progress in 2009)

In our *April 2009 Report* (page 38), we concluded that the Department made satisfactory progress in implementing this recommendation. To fully implement this recommendation, the Department had to:

- improve timeliness of approval actions by establishing and following guidelines for application processing times
- clarify design documentation requirements for original engineering plans and design drawings
- establish a system to follow up on short-term approval conditions

Our audit findings

The Department has implemented this recommendation by improving its systems in each of the three areas that had remaining weaknesses in 2009.

Timeliness of approval actions

The Department has introduced an internal guideline for application processing times. The processing target for routine applications is 50 working days. The processing target for non-routine applications is 100 working days.

We examined a sample of approval files that the Department processed between 2008 and 2011. Overall, the Department has met its targets for approval processing times. In cases where timelines were exceeded, we concluded that the processing delays had reasonable justifications.

⁴ See <http://www.environment.gov.ab.ca/info/library/6190.pdf>

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Design documentation requirements

The Department had to clarify its requirement for storage and retention of original engineering plans and design drawings. The Department has introduced internal guidelines for filing, storing and subsequent archiving of engineering plans and design drawings. The Department also amended the waterworks approval template to clarify responsibilities of the approval holder with respect to storage of engineering plans and design drawings.

System to follow up on short-term conditions

The Department has implemented a formal system to monitor compliance with short-term conditions in approvals. The Department has added a new electronic component to its Environmental Management System to track all short-term approval conditions for drinking water treatment and distribution facilities across the province. Compliance staff use this information to plan their work and verify that facility operators comply with short-term conditions in their approvals.

For our sample, we deliberately selected facilities that had short-term conditions. We found that short-term conditions were either met by the specified deadline, or the Department was taking timely and appropriate action to ensure that operators comply with conditions.

Inspection systems—implemented

Background

In our *October 2006 Report* (no. 2, vol. 1—page 43), we recommended that the Department improve its drinking water inspection processes by:

- applying the same inspection frequency targets to all waterworks regulated by the *Environmental Protection and Enhancement Act* (satisfactory progress in 2009)
- ensuring inspectors receive sufficient training in waterworks systems and operations (implemented in 2009)
- revising documentation tools and practices, including making them more focused on risk (implemented in 2009)
- informing operators promptly of inspection results, ensuring operators respond appropriately, and concluding on each inspection (implemented in 2009)

In our *April 2009 Report* (page 41), we concluded that the Department made satisfactory progress in implementing this recommendation. While the Department clearly defined inspection frequency targets for municipal waterworks, it was still working to define which industrial and private facilities should be included in the drinking water inspection program. To implement this recommendation, the Department of Environment and Water had to:

- confirm regulatory requirements for existing industrial and private waterworks by visiting all of these facilities to confirm their operation and consider amending their approvals to reflect the current regulatory requirements
- finalize the review of all applicable industrial and private waterworks, and clearly determine which waterworks meet the potable water definition and must be included in the drinking water inspection program
- inspect appropriate industrial and private facilities that have waterworks supplying potable water

Some industrial and private waterworks system in Alberta supply drinking water for onsite or public use. While the Department inspects municipal drinking water facilities annually or biennially, in 2006 we found the Department was inspecting industrial or private waterworks system that supply drinking water only once every ten years.

Our audit findings

The Department has implemented this recommendation by completing all three steps that were remaining in 2009:

- The Department has assessed all existing industrial and private waterworks to identify those that meet the potable water definition under the *Act*.⁵
- The Department identified industrial and private waterworks that supply potable water and included them in the drinking water inspection program.
- We examined files of all these waterworks and found that the Department now inspects them on an annual or biennial basis, as required under the drinking water inspection program.⁶

Communication with partners—implemented

Background

In our October 2006 Report (vol. 1—page 48), we recommended that the Department at the district level expand its communication with partners involved in drinking water matters.

Systematic communication with community partners, particularly health authorities and municipalities, can be effective in identifying waterworks that need to be regulated, or resolving problems at the already regulated waterworks. In 2006, we found that only one out of six district offices of the Department had a mechanism to

regularly meet with local Alberta Health Services public health staff and systematically identify waterworks that need to be regulated.

Our audit findings

The Department has implemented this recommendation. In 2011, we found that the Department has expanded its communication with health authorities to other district offices and now has an ongoing formal relationship with Alberta Health Services to identify waterworks that need to be regulated and to better manage risks at the already regulated waterworks.

The Department established closer relationships with municipalities and continues to formalize its involvement as it regularly attends meetings with the Alberta Urban Municipalities Association and Alberta Association of Municipal Districts and Counties.

Information systems—satisfactory progress

Key findings

- The Department made some improvements in the operation of existing information systems
- The Department formalized its commitment to replace or redesign its Environmental Management System
- Although the Department has taken important steps in assessing current EMS limitations, it has not yet decided on how it will redesign or replace the EMS

⁵ Potable water is defined by *Environmental Protection and Enhancement Act* as water that is supplied by a waterworks system and is used for drinking, cooking, dish washing or other domestic purposes requiring water that is suitable for human consumption.

⁶ Drinking water treatment facilities that obtain raw water from rivers, lakes or shallow groundwater wells must be inspected by the Department once every year. Drinking water distribution systems and drinking water treatment facilities that rely on deep groundwater must be inspected once every two years.

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Background

In our *October 2006 Report* (no. 4, vol. 1—page 52), we recommended that the Department of Environment and Water improve the information systems used to manage its drinking water business by:

- updating Environmental Management System forms and improving reporting capacity
- coordinating regional, district and personal information systems to avoid overlap and encourage best practice
- using data to improve program effectiveness and efficiency

The EMS is the main system for managing information on drinking water activities in Alberta, including the Department's approval and compliance actions. The system is approximately 17 years old and the Department contracts a private service provider for ongoing EMS operation and maintenance.

In 2006, we found that some EMS forms and functionality were not up to date, EMS limitations had led staff at different districts to develop their own overlapping and poorly integrated systems, and that EMS lacked analytical and reporting functionality that would allow the Department to use drinking water data more effectively.

Criteria: the standards for our audit

Automated information and management systems used to support the Department's drinking water program should be well-designed and operate efficiently and effectively.

Our audit findings

The Department made satisfactory progress in implementing this recommendation. Although the Department made some important IT improvements, the main challenges related to inherent limitations of EMS functionality have not yet been resolved.

Because drinking water is only one of the Department's regulatory businesses that rely on EMS, the work to find and implement an appropriate solution will be neither fast nor simple. The Department recognizes the current limitations of EMS and started an initiative to review the existing EMS functionality to:

- identify current and future business needs and system limitations
- make basic improvements and software fixes to make better use of the EMS in the short term
- in the long term, either perform a major upgrade or completely replace EMS with better technology

This initiative is a major undertaking. EMS functionality is deeply imbedded in many of the Department's regulatory activities. The Department emphasizes that the success of this initiative depends heavily on extensive planning and involvement of various functional units within the Department.

In 2007, the Department's IT team initiated a review to identify existing system limitations and make immediate improvements, where possible. During this process, the Department made a number of software fixes and other improvements. Due to the inherent complexity of the system, there were limitations to what the review team could do to resolve all data and reporting problems at this stage.

In 2008, the Department commissioned an external consultant to review the technology architecture of the EMS to determine its future ability to support the growing needs of the Department, including the drinking water business. The assessment confirmed that the current database structure was fragmented and difficult to support. The review also confirmed that the current state of the system was an impediment to improving the needed integration of data and function with the other information systems.

In 2009, the Department established an EMS operational committee to increase involvement of management and staff from operational areas in the ongoing IT improvement activities and in planning to redesign or replace the EMS. The committee is comprised of the Department's staff in water business areas, IT staff and an external contractor that maintains EMS infrastructure. The committee meets regularly to review, prioritize and approve system changes.

In 2010, the Department upgraded the EMS database to the latest software version. Although this was not a solution to main EMS challenges, it was an important step to improve system response time, access to data, and day-to-day maintenance and operation of the system.

In its 2011–2012 operational plan, the Department has a project, titled “New Environment Management System,” to investigate options for replacing EMS. This is aligned with the Department's information management and technology plan for 2011–2014. In these plans, the Department commits to develop a business case for EMS transformation, set up a project steering/governance committee and assign a project manager.

What remains to be done

To implement this recommendation, the Department needs to:

- finalize its assessment of current and future business requirements and existing system limitations
- identify the long-term solution for redesign or replacement of EMS, and support it with an action plan that outlines objectives, timelines, allocated responsibility and resources
- begin implementing the plan and formally monitor progress

Implications and risks if observation is not implemented

Without effective information systems, the Department cannot perform timely and efficient analysis of drinking water data to better understand and manage risk.

Systems to support drinking water goals—implemented

Background

In our *October 2006 Report* (no. 5, vol. 1—page 55), we recommended that the Department ensure that its legislation, programs and practices support its drinking water goals. This includes:

- clarifying how approvals will move facilities towards current standards
- delivering central initiatives that enhance the drinking water program
- determining how the Department should promote policy initiatives such as regionalization, including the financing of those initiatives
- establishing how the Department can partner with others while mitigating the risks inherent in partnering
- reinforcing a “beyond compliance” mindset with Department staff

Our audit findings

The Department has implemented this recommendation.

Moving facilities toward current standards

The new Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems came into effect in 2006. Some waterworks were able to comply with new standards by simply changing their operating procedures. Others had to undertake lengthy and expensive upgrades, or replace existing infrastructure.

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The Department has improved its system to move facilities to current standards.⁷ It has a target of substantially completing this transition by 2012. The Department expects a few specific facilities to complete their transition to current standards by 2016. The Department has recently updated its approval process and templates to facilitate the transition. The Department systematically tracks progress individual facilities make, and estimates that 75% of all regulated waterworks now operate at 2006 standards. The Department expects the remaining facilities to meet water treatment requirements while completing their transition to current standards. If water testing results at individual facilities indicate immediate risk to public health, the Department will work with AHS to issue a boil water advisory to the community.

The Department also improved internal communication and information support for approval and compliance staff at the district level. Examples of initiatives include annual compliance and approval staff meetings, weekly province-wide teleconferences to discuss current problems, share information and identify best practices, and development of an internal web-based application to provide staff with better access to professional resources.

Delivery of central initiatives

In 2006, we identified a number of challenges the Department faced in implementing the electronic water quality data reporting initiative, the treated water survey and the laboratory data quality assurance initiative.

The Department has improved the implementation of the electronic reporting initiative. The success of this initiative relies on the voluntary participation of facility operators. Currently, the Department receives bacteriological testing results electronically for all facilities. About 20% of facility daily routine

reporting is also done electronically, compared to 10% in 2006. The Department makes this information available to the public through its website.⁸

In 2006, we found that the Department was not systematically using data it gathered through the treated water survey to better understand and manage drinking water risk in the province. The Department indicated that it has discontinued this survey because limited analytical and reporting functionality of the current information system prevents timely and efficient analysis and use of the information. Some of the Department's drinking water information needs are met through the increasing participation of facilities in the electronic reporting initiative. The Department indicated that it will incorporate its drinking water information needs, together with other information requirements, into the EMS transformation initiative discussed in the section above.

The Department's laboratory data quality assurance initiative was a three-year project to provide assurance over reliability of the laboratory data submitted by regulated facilities. Based on the results of this project, the Department identified the need for a mechanism to ensure the quality of the submitted water information. As of April 2010, the Department implemented three options facilities may select from:

- operate an in-house laboratory accredited by a recognized national or international accreditation body
- submit water samples to an external laboratory accredited by a recognized national or international accreditation body
- analyze water samples through the use of portable test kits, according to the manufacturers specifications

⁷ Within the current 2006 *Standards and Guidelines* the Department closely references "Guidelines for Canadian Drinking Water Quality," and requires compliance with Canadian guidelines as part of its regulatory framework. The Canadian guidelines are regularly updated by Health Canada, with the Department's participation on the federal-provincial-territorial committee.

⁸ See <http://environment.alberta.ca/apps/regulateddwq/>

In addition, standard operating procedures will be posted on the Department's website detailing pertinent background information and a simplified step-by-step procedure for laboratory analysis for parameters such as fluoride, turbidity and free chlorine.

Regionalization of drinking water supply

Regional distribution of water via pipelines from centralized treatment locations is one of the government's long-term solutions for meeting drinking water needs in the province. A centralized system provides greater consistency in operational practices and makes it easier for the Department to manage health risks associated with drinking water.

With a regional distribution system, individual municipalities do not have to construct and maintain their own costly water treatment infrastructure. Regionalization also helps reduce problems caused by the shortage of certified waterworks operators in the province.

To facilitate participation of municipalities in this voluntary program, the Alberta government provides 90% of the cost of new infrastructure to link a municipality to a regional water distribution line. Although municipalities have to assume subsequent operating expenses, in most cases the cost of operating a water distribution system is substantially less than operating one's own water treatment facility. The Department of Transportation administers funding for the program, and relies on the Department of Environment and Water to engage municipalities. Regional staff of Alberta Transportation process applications for funding and provide the information so that the Interdepartmental Committee on Water and Wastewater can make approval recommendations. The Department of Environment and Water has developed a formal system to prioritize application decisions based on risk, and tracks regionalization progress across the province.

Partnering with others

The Department has implemented this portion of the recommendation. Work done by the Department in this area is discussed on page 75 of this report.

Beyond compliance mindset of Department staff

Work done by the Department in this area is discussed in this section under "moving facilities toward current standards" and in our 2009 follow-up audit report.

Systems to regulate water well drilling—implemented

Background

In our *October 2006 Report* (no. 28, vol. 2—page 84), we recommended that the Department of Environment and Water improve its system to regulate water well drilling by:

- ensuring that drillers and drilling companies meet approval requirements
- implementing controls to ensure that water well drilling reports are:
 - received on time
 - complete and accurate
 - accurately entered into the Groundwater Information System
- obtaining assurance that water well drilling activities in the field meet legislated standards

As required under the *Water Act*, when a water well is drilled for the diversion and use of groundwater, the driller must submit the water well drilling report to the Department within 60 days. These reports, submitted electronically or on paper, provide valuable data on groundwater in Alberta. Under the *Act*, all water well drilling contractors must obtain an approval from the Department. For some types of drilling activity the Department requires individual drillers to hold a valid journeyman certificate as a water well driller. Training and certification of individual water well drillers is done through the Department of Advanced Education and Technology.

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The Department has implemented this recommendation.

The Department eliminated the backlog of water well drilling reports. This data is now entered into the Alberta Water Well Information Database (referred to in the original audit report as the groundwater information system). To avoid data entry backlogs in the future, the Department improved its system for timely entry of information into the AWWID. The Department also implemented new controls to ensure quality of information submitted by water well drillers.

We reviewed a sample of water well drilling reports processed by the Department, and found significant improvement in timeliness and quality of both paper and online report submissions. In cases where the Department's data quality controls identified problems with accuracy or completeness of drilling reports, the Department systematically followed up with water well drillers to resolve current problems and prevent them in the future.

The Department improved its system to issue and maintain water well drilling approvals. We examined approval files of all water well drillers that appeared in our sample of drilling reports. All of these drillers held proper approvals at the time of the drilling activity.

The Department developed a compliance mechanism for individual water well drillers who persistently submit reports that are late or of poor quality. Staff within the Department's water well data section have started to compile summary compliance reports for individual problem drillers. Management indicated that these reports will be used by regional staff in planning their compliance activities.