EPCOR EDMONTON WATERWORKS SYSTEM

ENVIROVISTA CHAMPION REPORT 2011
JUNE 2012

PROVIDING MORE
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Introduction

On June 1, 2011, Alberta Environment and Sustainable Resources Development (AESRD) granted EPCOR Water Services Inc (EPCOR) Champion Status for the Edmonton Waterworks system. EnviroVista is a voluntary program that recognizes Alberta industrial and manufacturing facilities, and municipal water operations with recognition for their environmental excellence. Some of the key requirements include at least five years of approved emissions performance with no AESRD prosecutions. Champion status involves a new ten-year outcome-based AESRD Approval-to-Operate (638-03-00) and a ten-year Stewardship Agreement.

Schedule A of the Stewardship Agreement outlines a set of environmental initiatives EPCOR has committed to, and that go above and beyond the requirements of a typical approval-to-operate for a waterworks system. Many of these commitments (detailed below) are programs EPCOR has had in place for some time, but were not recognized as regulatory requirements. The Stewardship Agreement now recognizes those programs, but also commits EPCOR to maintaining the level of these programs. This report summarizes the programs that were in place and the activities EPCOR undertook toward meeting those commitments in 2011. A few highlights are listed below:

- EPCOR made significant progress toward implementing an integrated Health, Safety and Environment Management System across all our operations
- EPCOR crews provided on-the-ground support to the Town of Slave Lake, Alberta during the forest fire crisis in May and followed-up with a report to the Provincial Government with recommendations to improve response in future similar situations
- EPCOR developed a three-year Strategic Watershed Program plan and continued to provide material support to the North Saskatchewan Watershed Alliance
- EPCOR participated in the Industrial Heartland Water Management Framework Initiative and several other provincially-led, water-related initiatives
- EPCOR sponsored the City of Edmonton’s River Clean Up Project and also participated in the City of Edmonton’s Way We Green Initiative
- Since the *Lead Service Line Program* started in 2008, EPCOR has replaced almost 400 lead service lines to Edmonton homes
- EPCOR completed several energy efficiency initiatives at the water treatment plants and the reservoir pump stations
- EPCOR continued its ongoing water conservation communication program with the *Blue Bucket Crew* promotions and a rain barrel event (2000 barrels were sold)
- EPCOR achieved an Infrastructure Leakage Index (ILI) of 1.71, which surpasses the utility benchmark of 3.0 for a water system of this size
- EPCOR reduced the discharge of alum residuals to the river during winter months by once again converting both treatment plants to direct filtration
- Construction progressed on the dechlorination system at the Rossdale Water Treatment Plant. Procedures were updated for draining and releasing water from storage reservoirs throughout the city and all discharges are now dechlorinated
EPCOR Stewardship Commitments

a) EPCOR will maintain a robust Environmental Management System that will include an environmental policy, required and voluntary undertakings, objectives and targets, roles and responsibilities, operational control, corrective actions, training, decision making/planning, document control and continuous evaluation and improvement. EPCOR will strive towards achieving and maintaining ISO14001 certification of the EMS.

b) EPCOR will strive toward continuous improvement in its Environmental Activities and will set and regularly review environmental goals and targets. EPCOR will identify and proactively address emerging issues in the water treatment industry and will work towards implementation of industry best practices.

c) EPCOR will use a source-to-tap, multi-barrier approach to provide a consistent supply of potable water that ensures protection of public health to both City of Edmonton and Regional customers. The treated water will meet or exceed all current Guidelines for Canadian Drinking Water Quality (GCDWQ) and other regulatory requirements. In addition:

   i. EPCOR will set and strive to meet its own internal water quality and plant treatment performance standards that exceed the minimum regulatory requirements.

   ii. EPCOR will monitor for all GCDWQ guideline parameters and will also carry out additional monitoring programs for unregulated parameters (including pesticides, pharmaceuticals, and disinfection byproducts) in both source water and treated drinking water in order to better understand and mitigate both known and emerging public health risks.

   iii. EPCOR will strive to meet Performance Based Regulation (PBR) requirements as listed in its agreement with the City of Edmonton (as updated), including the:

       a) System Reliability index
       b) Water Quality Index
       c) Customer Service Index
       d) Environmental Index
       e) Safety Index
       f) Any others as required or updated.

d) EPCOR will develop and document, by January 1, 2013, an operations program for its drinking water treatment and distribution system and will review and update the operations program on an annual basis.
e) With respect to public involvement and consultation, EPCOR will:

i. Continue open communication with customers by means of website postings, open houses and/or mailouts;

ii. Prepare and make public an annual EPCOR report with respect to progress toward and achievement of EnviroVista commitments;

iii. Maintain a Community Advisory Panel that consists of representatives from commercial/industrial, environmental, governmental, and residential sectors;

iv. Maintain a Water Quality Advisory Committee that consists of representatives from Alberta Environment and Sustainable Development, and other representatives from Government of Alberta, University of Alberta, Alberta Provincial Laboratory, City of Edmonton Emergency Response, the Regional Customer Group and other stakeholder groups as amended and required; and

v. Maintain working partnerships with AESRD and other stakeholders and will provide advice and support on water supply, quality and treatment issues in the Edmonton region and throughout Alberta.

f) With respect to industry leadership, EPCOR will:

i. Maintain accreditation to ISO/ANSI 17025 in its Quality Assurance Laboratories;

ii. Actively participate in the North Saskatchewan Watershed Alliance WPAC to enhance watershed and drinking water source protection, and will maintain and implement an EPCOR Source Water Protection Plan;

iii. Maintain distribution system pipe and appurtenance (valves, hydrants, blow-offs, etc.) replacement programs to minimize customer impacts from aging infrastructure;

iv. Maintain a mainbreak repair program which provides rapid response for isolation and repair of mainbreaks (with better than 90% of breaks repaired within 24 hours);

v. Maintain an annual unidirectional flushing and hydrant servicing program;

vi. Maintain a Lead Response Program to provide protection for customers from exposure to high lead concentrations at the tap arising from lead service lines;

vii. Maintain active membership in industry and research organizations including American Waterworks Association, the Water Research Foundation and Canadian Water and Wastewater Association and will participate in water industry research projects as contributors, lead researchers, and reviewers;
viii. Actively participate in Water for Life and other AESRD initiatives as invited;
ix. Support a program of research on the potential impacts of climate change on source water quantity and quality and treated water supply;
x. Continue to examine the energy efficiency of its operations and will continuously evaluate capital and operational improvements to increase energy efficiency;
xi. Partner with the City of Edmonton to support and promote a water conservation program;
xii. Maintain active staff recruitment, training, engagement and succession planning programs; and
xiii. Share the results of the above initiatives with AESRD.

g) With respect to reducing environmental impacts, EPCOR will:
i. Strive to reduce the impact of water treatment plant residual streams released to the North Saskatchewan River through a long-term residuals management program of continuous improvement that will include (as updated):
   a) Reduction of water treatment plants winter solid residual production by converting to direct filtration mode of operation during winter months (Nov – Feb) while maintaining treated water quality;
   b) Diversion of water treatment plants winter solids residuals to sanitary sewer, landfill or other solids disposal options; and
   c) Exploration of opportunities to further reduce solids loading to the river and expanding water plants residual solids management to other seasons.

ii. Eliminate all chlorinated discharges to surface water bodies by:
   a) Operating treatment systems to dechlorinate all chlorinated waste streams generated at both water treatment plants; and
   b) Implementing procedures to dechlorinate discharges of chlorinated water released from the distribution system during system flushing, reservoir draining, commissioning of new water lines or resulting from mainbreaks (after measures have been taken to isolate the break).
**Environmental Management System**

EPCOR is targeting 2014 to have a fully certified *ISO 14001 Environmental Management System* (EMS) in place at the Edmonton Waterworks. The EMS will cover all aspects of operations, and will include systems and procedures that ensure the drinking water supplied to customers is safe and the environmental impact of our operations is minimized. EPCOR currently has as a set of systems and procedures in place that satisfies AESRD’s requirements for a robust EMS; however, these systems and procedures do not fully meet the requirements of a formal ISO 14001 EMS.

In 2011, EPCOR focused on development of an enterprise-wide integrated *Health, Safety and Environment Management System* (HSE-MS). Under the HSE-MS, various standards to fulfill requirements under ISO 14001 and 18001 were developed and finalized. Work has started to align the current robust EMS at the Edmonton Waterworks with the developing ISO 14001/18001 framework. Also, an EMS Steering Committee was formed to facilitate integration of Edmonton Waterworks’ EMS with EPCOR’s corporate-wide HSE. Some of the early benefits of this integrated management system include a formalized Incident Management process and formalized procedures for identifying and assessing health, safety and environmental hazards and risks. Achieving formal ISO 14001 certification will ensure these systems and procedures are maintained and that public health protection and environmental performance are continuously improved.
Meeting External and Internal Standards

Source-to-Tap Multi-Barrier Approach

EPCOR has committed to maintaining a source-to-tap, multi-barrier approach to providing safe drinking water. This involves source water protection, treatment, distribution and storage, and monitoring.

1. Source Water Protection

EPCOR maintains a source water protection and monitoring program that identifies risks in the raw water supply - the North Saskatchewan River. EPCOR’s Source Water Protection Plan was developed in 2008 to help EPCOR, communities, stakeholders, and the public mitigate potential risks to source water supplies through understanding the pressures on the watershed. Updates to the plan, including enhanced land use maps, will be published in mid-2012.

2. Treatment

Both of the EPCOR Edmonton water treatment plants (Rossdale and E.L. Smith facilities) use conventional treatment which consists of coagulation with alum, and flocculation and dual-media (anthracite/sand) filtration to remove particulate and colloidal material from the North Saskatchewan River water. Treatment also neutralizes any bacteria, viruses, Giardia cysts and Cryptosporidium oocysts that might be present in the untreated river water. By ensuring individual filter turbidity is less than 0.1 NTU,
EPCOR earns 3.5 log (99.87%) removal credit for *Giardia* cysts and *Cryptosporidium* oocysts. Primary disinfection is provided by free chlorine which is an additional barrier against bacteria and viruses, and a partial barrier against *Giardia* cysts. Ultraviolet light disinfection provides an additional 3 log (99.9%) removal of *Giardia* cysts and *Cryptosporidium* oocysts. Ammonia is added to the water to form monochloramine which provides a lasting disinfectant residual through reservoir storage and the distribution system within the Edmonton and the regional waterworks systems.

### 3. Distribution System

On-going maintenance programs that safeguard distribution system integrity and water quality include:

- distribution system pipe and appurtenance replacement
- mainbreak repair
- uni-directional flushing and hydrant servicing
- distribution system leak detection
- distribution system pressure monitoring

An additional public health protection barrier is provided through a *Cross Connection Control (CCC) Program* maintained by EPCOR. Its goal is to minimize the potential for unintended backflow into the distribution system from high risk residential, commercial and industrial customers. This is done by ensuring backflow prevention devices are in place and tested as required by the City of Edmonton *Waterworks By-Law # 12585*. Each year, additional facilities are added to the program. In 2011, 643 new facilities were added which brought the total number at the end of 2011 to 7,942.

The *Lead Response Program* reduces the potential for exposure to lead in tap water in approximately 5,000 homes in the older part of the city that are supplied through lead service lines. More detail on this program is provided later in the report.

### 4. Monitoring

To ensure safety of the drinking water up to customers’ taps, EPCOR monitors raw water entering Rossdale and E. L. Smith Water Treatment plants, and treated drinking water entering the distribution system. In addition, a routine monitoring program ensures water quality throughout the reservoirs and the distribution system. The water is also tested in response to valid customer complaints and following any system depressurizations due to mainbreaks or planned maintenance work.

EPCOR performs monitoring and testing well above the minimum required by the regulatory approval. For example, Health Canada recommends 155 samples be collected from the distribution system each month for bacteriological testing for a city the size of Edmonton. However, on average, 234 samples were collected monthly. In 2011, the EPCOR Water Laboratory carried out more than 113,000 tests on 100 parameters (47 inorganic/physical, 47 organic and 5 microbiological) for Edmonton.
Another 5,000 tests were done on 222 additional parameters (211 trace organics and eight radionuclides) by external commercial laboratories.

In addition to the laboratory testing, EPCOR also uses numerous on-line analyzers to continuously monitor critical treatment performance and water quality variables in the treatment plants such as chlorine concentration and filtered water turbidity. Back-ups are provided for critical analyzers. There are over 75 on-line analyzers in each treatment plant. A quality assurance program is in place to confirm these on-line analyzers are reliable.

Meeting Regulatory Requirements and Health Canada Guidelines

In 2011, EPCOR’s treated drinking water met the Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) for all chemical, physical and radiological parameters. Our continuous analyzers detected low levels of volatile hydrocarbons in the raw water at the Rossdale treatment plant on a few days in June, July and August. During these events, very low levels of toluene, xylene and ethylbenzene were detected in the treated water for brief periods, but the levels were well below the Health Canada aesthetic objectives for these parameters. These river water contamination events were associated with periods of heavy rainfall.

A total of two water quality violations were reported to AESRD for the year; both were related to repeat total coliform bacteria positive events that occurred in the distribution system in September. One event was caused by the use of incorrect sampling procedures when water samples were collected from hydrants. The other event was caused by stagnation of water in a water main after a valve was left in the wrong position. Both events were resolved within 72 hours and there was no risk to public health. One isolated incident of very low levels of *Giardia* and *Cryptosporidium* in the finished water occurred at the Rossdale plant on Nov 21, 2011 (*Giardia* at 0.1 cysts/100 L and *Cryptosporidium* at 0.1 oocysts/100 L). Follow-up samples were negative. The treated water was disinfected with ultraviolet light (an additional barrier) so there was no risk to public health.

Meeting Internal Water Quality Standards

The Water Quality Index measures the number of treated water tests that do not meet EPCOR’s internal water quality standards. In 2011, 271 out of a total of 50,252 applicable tests on the treated water did not pass EPCOR’s internal quality standards. However, the cumulative Water Quality Index at the end of 2011 was 99.71%, which successfully surpassed the City of Edmonton’s *Waterworks By-Law Performance Based Regulation* target of 99.6%.
Performance Based Regulation Requirements

In addition to the Water Quality Index, EPCOR strives to meet other requirements set by the City of Edmonton Performance Based Regulation. These performance measures ensure EPCOR maintains performance in a number of areas, while aiming for improvements in efficiency. The 2011 performance against the five PBR measures is summarized below. EPCOR achieved or successfully exceeded the target number of points for each category with the exception of the Environmental Index. EPCOR’s average vehicle fuel efficiency goal was 31.58 L/100 km and did not meet the target of 29.11 L/100 km. This was primarily due to unusual winter conditions which required more vehicle idling to keep equipment running and to provide heat for staff. Additional detail on these performance measures can be found in the 2011 Annual Progress Report on the Performance Based Regulation which will be submitted to the City of Edmonton in June 2012. See Table 1.

Table 1 – 2011 Performance Based Regulation Results

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Basis</th>
<th>2011 Target Points</th>
<th>2011 Actual Points *</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Reliability index</td>
<td>water main breaks, repair duration, planned interruption, water pressure, water loss</td>
<td>25.0</td>
<td>27.5</td>
</tr>
<tr>
<td>Water Quality Index</td>
<td>no. of tests meeting internal standards</td>
<td>25.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Customer Service Index</td>
<td>post service audit factor, response time factor, home sniffing factor</td>
<td>20</td>
<td>21.6</td>
</tr>
<tr>
<td>Environmental Index</td>
<td>emergency response training, completeness of reporting, timeliness of reporting, environment incident reporting, water conservation, vehicle fuel efficiency</td>
<td>15</td>
<td>14.5</td>
</tr>
<tr>
<td>Safety Index</td>
<td>safety meetings, formal safe work plans, first aid training, work site inspections/ observations, lost time frequency rate, injury frequency rate, injury severity rate</td>
<td>15</td>
<td>16.3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>104.9</td>
</tr>
</tbody>
</table>

*It is possible to surpass target points by meeting stretch goals
Operations Program Progress

As part of the Stewardship Agreement, EPCOR has committed to developing a comprehensive operations program. The program must be submitted to AESRD on or before January 1, 2013. It is a compilation of programs, plans and procedures to ensure consistent production and reliable delivery of high quality drinking water while also reducing environmental impacts.

The operations program will consist of a three layer structure:

- **Executive Summary** which includes an outline of the program and a brief description of each section of the program
- **Operations Program** which will consist of a more in-depth overview of each section including plans, philosophies and procedures that are currently followed at EPCOR to produce treated drinking water and ensure environmental compliance
- **Supporting Documents** and detailed information (i.e. forms, operating procedures, control philosophies etc.).

Development of the program is proceeding rapidly and the draft program is scheduled to be completed by mid-2012. The final program will be submitted to AESRD on or before January 1, 2013 as required.
Public Involvement and Consultation

Communications

EPCOR is committed to open communication and consultation with its customers. EPCOR uses multiple vehicles to achieve this end including: face to face discussions, open houses, print and audio-visual material, news media, website (www.epcor.com), Twitter, Facebook, public events and advisory panels.

EPCOR strives to keep two-way communication open between its plant sites and the local neighbourhoods. For example, a newsletter keeps 3,000 local residents apprised of the various construction activities happening at the Rossdale site. The Rossdale Update bulletin is mailed to residents and posted on EPCOR’s website.

Annual Performance Report

EPCOR keeps its customers informed about utility activities undertaken to ensure a clean and reliable supply of tap water. Along with monthly and annual water quality reports, EPCOR produces a public annual Corporate Accountability Report.

Specific activities included:


Community Advisory Panel

EPCOR places a high priority on obtaining public input into all aspects of water service delivery. Since 1993, a voluntary panel has provided feedback on policies and programs impacting customers and the community in general. This includes public, customer and stakeholder input on emerging issues such as water efficiency, legislative and technological changes, pricing, customer care and watershed management. The panel includes representatives for the environment, the City of Edmonton, large and small commercial customers, developers, property managers and general customers. It meets quarterly and an annual report of activities is posted on EPCOR’s website.

In 2011, the Water Community Advisory Panel (CAP) provided input into a number of EPCOR initiatives ranging from renewal of the 2012-2016 Performance Based Regulations (PBR) to EPCOR’s use of social media for emergency communications. Some of the other sessions included: water rate changes, water emergency services business continuity, lead-to-copper service renewals, private development overview, Blue Bucket Crew marketing plans, Edmonton area water customer satisfaction survey, and EPCOR Water’s EnviroVista champion status responsibilities.

Water Quality Advisory Committee

This committee includes representatives from EPCOR, Alberta Health Services, Alberta Health and Wellness, AESRD (the water regulator), University of Alberta, City of Edmonton, and regional municipalities supplied by the EPCOR drinking water system. The panel shares information, researches water quality and treatment issues, reviews water quality standards and guidelines, and develops joint risk management protocols. Its scope includes drinking water, watershed issues, home water treatment devices, bottled water and related health care issues. The Water Quality Advisory Committee met on December 9, 2011 at the Rossdalen Water Treatment Plant and EPCOR provided updates on new and emerging Health Canada guidelines, EnviroVista Champion status, direct filtration operation of the water treatment plants, and its lead service line response program.
Working Partnerships with AESRD and Advice and Support to Industry

EPCOR continues to foster working partnerships with AESRD and provide advice and support to the drinking water industry in Alberta. Two key examples for 2011 include:

- Along with a number of other utility companies, EPCOR staff provided direct, on the ground, support during the forest fire crisis in Slave Lake. EPCOR also developed a post-response analysis report containing recommended follow-up items to improve response in future similar situations (**EPCOR’s 2011 Emergency Response Analysis for the Town of Slave Lake, Alberta – Oct 28, 2011**). This report was shared with AESRD.

- The EPCOR Water Lab was involved with a technical project to evaluate the possibility of rechlorinating water in the regional distribution system. Rechlorination of the water would potentially enable further expansion of the system to service more regional customers.
Industry Leadership

Laboratory Accreditation

The quality of the water testing data produced by the EPCOR Water Laboratory is assured by a quality management system that complies with the international standard ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories.

The Laboratory has been accredited to ISO/IEC 17025 since 2001 by the Canadian Association for Laboratory Accreditation (CALA). CALA completed a site visit and full audit in October, 2010 as part of the biannual audit cycle. The Laboratory performed internal audits in 2011, was successful on CALA proficiency testing samples during the year and maintained accreditation for all required tests.

Watershed and Source Water Protection Programs

EPCOR’s Watershed Protection Program (WPP) has two primary goals:

- provide a safe, secure drinking water supply through source water protection principles
- ensure minimal effects from our operations on water quality and aquatic ecosystem health in receiving water bodies
EPCOR recognizes environmental planning on a watershed scale is necessary and is best achieved through collaborative multi-stakeholder processes. In 2011, EPCOR developed a three-year Strategic Watershed Program plan and undertook planning, monitoring and research, implementation, and education and awareness. These initiatives are summarized below.

**Watershed Planning**

Watershed management in Alberta is complex, with various planning initiatives and frameworks to manage water and watersheds in Alberta, often at distinct levels or for select management areas. These include:

- government enabled watershed planning and advisory committees
- regulatory requirements contained in operating approvals
- large urban planning initiatives
- municipal planning
- provincial cumulative effects management initiatives

The Alberta approach to water and watershed management mirrors a general national trend to forge partnerships, multi-stakeholder councils and other forms of distributed governance.

EPCOR recognizes the importance of working within all of these multiple initiatives and/or frameworks to help meet its commitment to safeguard the health of customers and to minimize its effect on local water quality and aquatic ecosystems. These initiatives and/or frameworks include:

- Alberta Water Council
- Water Management Framework Committee
- North Saskatchewan Watershed Alliance (NSWA)
- City of Edmonton’s Way We Green Initiative
- regulatory or planning water management committees

EPCOR provided both financial and in-kind support to the NSWA in 2011. As the founding member of the NSWA, EPCOR continued work on the development of an integrated approach to watershed management in the basin. A major milestone of the NSWA was the release of the *Integrated Watershed Management Plan Discussion Paper* (IWMP) and follow-up Workbook. There was strong stakeholder engagement and support for recommendations in the IWMP. A key element of the plan is the development of proposed water quality objectives for specific reaches of the river. The underlying principle is no further degradation of water quality should occur, and improvements should be made when degradation has occurred.

Moving forward, the NSWA will provide a detailed summary of the feedback received during development of the IWMP Workbook. Final IWMP recommendations by the NSWA will provide long-term guidance for the management of the North Saskatchewan
River watershed. Although much work has been completed, a large amount remains to be carried out during the 2012-2019 implementation phase of the plan.

EPCOR continued work on the Government of Alberta led Industrial Heartland Water Management Framework in 2011. This work will set environmental outcomes (including water quality) for the reach just upstream of Edmonton to downstream of the proposed industrial development area. The framework would include Maximum Acceptable Loads (MALs) for each of the parameters of concern and a full stakeholder review.

Implementation

In 2011, EPCOR continued financial support of the Clear Water Landcare group which implements agricultural beneficial management practices (BMP’s) in the NSR basin e.g., ‘off stream’ watering systems and fencing of streams. EPCOR also supported the Alberta Low Impact Development Partnership (ALIDP) to reduce urban land use effects on NSR habitat degradation, water quality and ecological health.

Research and Monitoring

In 2011, EPCOR enhanced its internal water quality monitoring of select tributaries upstream of Edmonton. As part of an effort to better characterize water quality in the headwaters, Clearwater Land Care took additional samples during storm events and three additional sampling periods were added to the program. Tributary data collected in 2011, as well as historical data, was modeled to determine relative contributions from upstream tributaries. This work highlighted the need for targeted monitoring of specific tributaries, particularly during high river flow events.

EPCOR also continued to partner with the City of Edmonton to support their Environmental Monitoring Program (EMP) through in-kind assessment of water quality samples and assistance in monitoring plan development. As well, monitoring continued for pharmaceuticals and personal care products (PPCP) in the raw and treated water of the NSR.

Ongoing assessment and refinement of monitoring programs continued through the NSR Water Quality and Aquatic Ecosystem Health Monitoring Group, in partnership with the NSWA. The intent of this group is to develop an integrated, efficient and effective water quality monitoring program that meets the needs and interests of major stakeholders in the basin.

In 2011, the focus of the work was on refining water quality models to assess the impacts of future land use change. Other research projects on water quality and watershed function have primarily been facilitated through the NSWA and include:
• reports on water supply
• assessment of climate change effects on water quantity
• current and future water use
• groundwater assessment and water quality modeling

**Education and Public Awareness**

In 2011, EPCOR sponsored the City of Edmonton’s *River Clean Up Project* and also participated in the City of Edmonton’s *Way We Green Initiative*. EPCOR also continued to encourage staff to serve on the Board of Directors for *River Watch* and the *Alberta Lake Management Society* and to participate in technical committees for the *Alberta Low Impact Development Partnership*. EPCOR completed three conference presentations and two university lectures on watershed and land use management in 2011, as well as video on watershed protection for *World Water Day*. These are posted on EPCOR’s website.

**Distribution System Pipe and Appurtenance Replacement Programs**

EPCOR undertakes a number of annual capital and operating programs to maintain water quality in the distribution system and to minimize unplanned customer disruptions. In 2011, the following water assets were replaced.

**Table 2 - Assets Replaced in 2011**

<table>
<thead>
<tr>
<th>Water Asset</th>
<th>Number / Length Replaced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Line Valves</td>
<td>230</td>
</tr>
<tr>
<td>Service Valves (150mm)</td>
<td>40</td>
</tr>
<tr>
<td>Hydrants</td>
<td>153</td>
</tr>
<tr>
<td>Water Mains</td>
<td>17.9 km</td>
</tr>
</tbody>
</table>

In the past, the majority of water mains were replaced as part of EPCOR’s annual “Reactive” or “Proactive” water main renewal programs. However, in 2011 the utility implemented a new *Accelerated Renewals Program* to enhance coordination with City-initiated road rehabilitation projects. Under this new program, water mains with a single break in the past five years and located under roads scheduled for rehabilitation, are replaced in advance of the City’s construction. This program, which accounted for 70% of the total water mains replaced in 2011, not only significantly decreases the risk of a main break under new pavement but also resulted in an average cost savings of $300/m of pipe replaced due to decreased road rehabilitation requirements.

In an effort to reduce the risk of external corrosion and prolong the life of existing water mains, EPCOR continued to install cathodic protection on distribution and transmission mains. In 2011, this included the following.
Table 3 - Mains with Cathodic Protection Installed in 2011

<table>
<thead>
<tr>
<th>Water Asset</th>
<th>Length Protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast Iron Distribution Mains</td>
<td>7.9 km</td>
</tr>
<tr>
<td>Steel Transmission Mains</td>
<td>1.9 km</td>
</tr>
</tbody>
</table>

Improvements in internal crew design and equipment scheduling resulted in a 7% increase in efficiency in 2011 and there is a plan to double the program in 2012.

As part of its franchise agreement with the City of Edmonton, EPCOR relocates piping and distribution system appurtenances each year to avoid conflicts with new curb alignments, sidewalks, LRT extensions and sewer mains. In 2011, the following relocations were completed.

Table 4 - Relocations Completed in 2011

<table>
<thead>
<tr>
<th>Water Asset</th>
<th>Number / Length Relocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valves</td>
<td>21</td>
</tr>
<tr>
<td>Hydrants</td>
<td>33</td>
</tr>
<tr>
<td>Water Mains</td>
<td>7.5 km</td>
</tr>
</tbody>
</table>

Historically, it was standard practice to connect transmission mains to the sanitary or combined sewer system to allow draining of the distribution system for maintenance work. There are more than 200 of these “blow-off chambers” within the EPCOR system and they represent a potential cross connection risk. Therefore, in 2011, EPCOR eliminated 15 transmission blow-off chambers. EPCOR has developed a long-term plan to remove these connections based on risk priority. An update of that plan was submitted to AESRD in February of 2012.

Main Break Repair

In 2011, Edmonton experienced 385 water main breaks, an increase of 53 from the previous year. Tables 5 and 6 summarize the distribution of breaks in 2010 and 2011. The majority of the difference between 2010 and 2011 occurred during the first quarter of the year, and was primarily related to breaks in cast iron distribution pipe.

Table 5 - Timing of Mainbreaks in 2011

<table>
<thead>
<tr>
<th>Time of Year</th>
<th>Breaks in 2011</th>
<th>Breaks in 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>January to March</td>
<td>173</td>
<td>124</td>
</tr>
<tr>
<td>April to June</td>
<td>83</td>
<td>74</td>
</tr>
<tr>
<td>July to September</td>
<td>59</td>
<td>67</td>
</tr>
<tr>
<td>October to December</td>
<td>70</td>
<td>67</td>
</tr>
</tbody>
</table>
Table 6 - Mainbreaks by Pipe Material in 2011

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Breaks in 2011</th>
<th>Breaks in 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast Iron</td>
<td>338</td>
<td>296</td>
</tr>
<tr>
<td>Asbestos Cement</td>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td>Steel</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Poly Vinyl Chloride</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Other Pipe Materials</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

While there was an increase in the number of mainbreaks in 2011, a five-year trend shows a reduction.

One of EPCOR’s performance targets in 2011 was to repair at least 93.60% of water main breaks affecting supply to customers within 24 hours. EPCOR actually achieved a successful repair rate of 94.16%.

Uni-Directional Flushing and Hydrant Service

Each summer, water mains throughout the city are systematically flushed to remove sediment build-up and biological growth. In 2011, the Uni-Directional Flushing (UDF) Program completed 2,323 runs on distribution mains. About one-third, or approximately 1300 km of piping were flushed as part of this program. The transmission system was also inspected to confirm it was in good shape and working effectively.

There are 17,778 hydrants in the EPCOR Edmonton water distribution system which must be maintained and checked routinely so they are ready for emergency use. EPCOR checked the operation of 11,871 hydrants during its summer maintenance program and 17,638 hydrants were checked as part of the winter program. In addition, the operation of 5,615 hydrants was checked as part of the UDF Program.

Lead Response Program

Lead is not present at detectable levels in the treated and distributed drinking water in Edmonton, but is sometimes present in tap water in older homes due to old lead service lines and building plumbing components that contain lead (lead-tin solder, brass, etc.). Lead service lines were installed in some homes in older neighborhoods prior to 1955. In January 2010, Health Canada issued a guidance document Corrosion Control in Water Distribution Systems that recommends utilities sample and test for lead at customers’ taps to determine if corrosion control or lead service line (LSL) replacement is necessary. In 2008 and 2009, EPCOR notified customers at all of the approximately 5,600 known addresses with lead service lines in the city, collected samples for lead testing from about 4,000 addresses, and provided 4,900 point-of-use filters to reduce lead at these customers’ taps.
In 2011, EPCOR continued with a long-term lead service line program involving:

- annual notification of customers at all Edmonton addresses with known lead service lines
- continued testing for lead at the tap
- continued providing of point-of-use filters for interested customers
- prioritized lead service line replacement
- public education

In 2011, the residents at homes with a known lead service were reminded of the program by letter. As well as sampling water from homes with lead service lines, EPCOR is also sampling from some homes with non-lead service lines because building plumbing is also a potential source of lead in tap water. A summary of testing activity since 2008 is provided in Table 7 below.

### Table 7 – Lead Testing Activity since 2008

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homes with Lead Services</td>
<td>2313</td>
<td>1659</td>
<td>63</td>
<td>78</td>
<td>4113</td>
</tr>
<tr>
<td>Homes with Non-Lead Services</td>
<td>66</td>
<td>89</td>
<td>61</td>
<td>25</td>
<td>241</td>
</tr>
<tr>
<td>Total Samples Collected for Lead</td>
<td>2497</td>
<td>1937</td>
<td>171</td>
<td>173</td>
<td>4778</td>
</tr>
</tbody>
</table>

* Includes extra samples collected following lead service line replacements

A summary of the lead testing results from 2008 to 2011 is provided for homes with both lead and non-lead service lines in Table 8 below. For comparison, Health Canada’s *Guideline for Canadian Drinking Water Quality* health-based Maximum Allowable Concentration (MAC) for lead is 0.010 mg/L. The lead concentration has been less than the MAC in 73% of homes with LSLs that were tested. Only 5%, or about 200 homes, have tested greater than 0.030 mg/L.

### Table 8 – Lead Service test results from 2008-2011

<table>
<thead>
<tr>
<th></th>
<th>Lead Service Lines</th>
<th>Non-Lead Service Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number tested</td>
<td>4113</td>
<td>241</td>
</tr>
<tr>
<td>50th percentile lead concentration (mg/L)</td>
<td>0.004</td>
<td>0.001</td>
</tr>
<tr>
<td>90th percentile lead concentration (mg/L)</td>
<td>0.022</td>
<td>0.008</td>
</tr>
<tr>
<td># where lead concentration was less than 0.010 mg/L</td>
<td>73%</td>
<td>92%</td>
</tr>
<tr>
<td># where lead concentration was greater than 0.030 mg/L</td>
<td>5%</td>
<td>0.4%</td>
</tr>
</tbody>
</table>
EPCOR is avoiding partial service line replacements, where the utility piece is replaced but the owner’s piece remains lead. Studies have shown that partial replacements are not effective for reducing lead at the tap and may even result in a temporary increase in lead concentration. The priority for replacement is based on the concentration of lead measured at the tap and the presence of high risk individuals in the home (children less than five years old and expectant mothers).

Table 9 below summarizes lead service line replacement activity since the start of the program in 2008. Overall, 396 lead services were replaced - 208 were replaced proactively as part of the program and 188 were replaced reactively due to leaks and other emergency repairs. There are approximately 5,200 Edmonton homes that still have lead service lines, according to records as of end of 2011.

**Table 9 – Proactive vs Reactive LSL Replacements from 2008-2011**

<table>
<thead>
<tr>
<th>Year</th>
<th>Proactive LSL Replacements</th>
<th>Reactive LSL Replacements</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>25</td>
<td>53</td>
<td>78</td>
</tr>
<tr>
<td>2009</td>
<td>39</td>
<td>50</td>
<td>89</td>
</tr>
<tr>
<td>2010</td>
<td>114</td>
<td>30</td>
<td>144</td>
</tr>
<tr>
<td>2011</td>
<td>30</td>
<td>55</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td>208</td>
<td>188</td>
<td>396</td>
</tr>
</tbody>
</table>

EPCOR conducted a field study in 2011 that confirmed the faucet mounted point-of-use devices and pitcher filters we are providing to customers with lead service lines are effective for reducing lead at the tap. We thank all of the customers who assisted with the study.

**Membership in Industry and Research Organizations**

EPCOR is an active member in industry organizations. In 2011, EPCOR renewed its subscription to the Water Research Foundation and its membership in Canadian Water and Wastewater Association. In addition, EPCOR employees served on a number of industry committees and teams. A summary of some of EPCOR’s research and industry initiatives is provided below:

Participation in industry research projects as a participating utility:

- **Water Research Foundation** - Long Term Performance of Asbestos Cement Pipe
- **Water Research Foundation** - Update and Expand Residential End Uses of Water
- **Water Research Foundation** - Minimizing Water Treatment Residual Discharges to Surface Water
Participation in industry research projects as advisors/reviewers:

- *Water Research Foundation* - serving on the Project Advisory Committee for *Best Practices in Claims Management*
- *Water Research Foundation* - recently appointed to the Technical Advisory Committee for the *Water Utility Finances: Best Practices for Setting Rates*
- Participated on advisory board for the *National Research Council Institute for Research in Construction (NRC-IRC)*

Sample of Other Industry/Committee Memberships:

- Director for the Western Canada Section of the *American Water Works Association* and board member of *Western Canada Water and the American Water Works Association*
- Member of *North Saskatchewan Watershed Alliance*
- President of *Northern Alberta Lake Management Society*
- Member of Board of Directors for the *Geospatial Information Technology Association*
- Member of the *Canadian Water Network* - Canadian Municipal Water Consortium
- Member of *Financing Capital Improvements and Achieving Public Support*
- Member of *Canadian Water and Waste Water Association* Energy Committee
- Member of *American Water Works Association* PVC Pipe Committee
- Member of *EAPUOC* (Edmonton Area Pipeline and Utility Operators Committee)
- Member of *UDI* (Urban development Institute, Edmonton)
- Member of *Edmonton Area Locate Consortium*
- Contribute to *Canadian Water and Waste Water Association* - Canadian Workshop on Water Efficiency and Conservation: "Developing a Targeted Water Conservation Strategy through Customer Demographic Analysis"

Sample of Industry Articles:

- "Direction Filtration: A Tale of Two Winters" Article in *American Water Works Association* OPFLOW
- "Developing a Targeted Water Conservation Strategy through the Use of Geospatial Techniques" Article in *Vector 1* magazine
- "Best Practices for Capital Management Within Utilities" Interview by *Economist Intelligence Unit*
Participation in Water for Life and other Alberta Environment Initiatives

EPCOR was actively represented in several provincial Water for Life initiatives, including:

- watershed planning and advisory councils and the Alberta Lake Management Society
- Board of Directors of the Alberta Water Council (AWC)
- Non-Point Source Pollution Project Team and the Riparian Project Teams
- Moving From Words to Action Project and Sector Planning for Water Conservation, Efficiency and Productivity Project Team

These teams will make recommendations for watershed management and policy directions to ensure source waters remain of high quality.

Several EPCOR staff also participated in the various committees for the AESRD’s Industrial Heartland Water Management Framework Project.

The goal is to develop a world-class integrated water management system for the North Saskatchewan River using a cumulative effects assessment approach to sustainably support the environment, and social and economic development.

Research on Impacts of Climate Change on Source Water Quality

EPCOR continued its partnership with The Prairie Adaptation Research Collaborative (PARC). In early 2011, an EPCOR co-funded a climate change research project was finalized - Past, Recent and Future Hydroclimatic Variability, North Saskatchewan River. This study provides a better understanding of natural variability in NSR flow conditions and predicted changes based on climatic regimes. This included estimation of a thousand year record of hydroclimatic variability of the NSR and predicted the effects of future climate change on water yield. This work has identified that long periods of water scarcity have occurred sporadically in the past and the impacts of future climate change in the Prairies could include:

- changes in annual stream flow and timing, possibly with large declines in summer stream flow and higher winter flows
- increased likelihood of severe drought
- changes in water quality due to more frequent runoff events
- increased aridity in semiarid zones

This work will allow EPCOR to better assess future risks to water supply and quality. Moving forward, EPCOR will assess mitigation strategies to increase the City of Edmonton’s resiliency in the event of future water scarcity resulting from climate change.

Other research projects on water quality and watershed projects have primarily been facilitated through the NSWA and include reports on water supply, assessment of climate
change effects on water quantity, current and future water use, groundwater assessment and water quality modeling. In 2011, the focus of NSWA’s work was on refining water quality models to assess the impacts of future land use change.

**Energy Efficiency Initiatives**

EPCOR has a four pronged approach to energy management. This includes strategies related to contract purchasing, green energy, and operational and capital initiatives related to energy management. The energy management team has benchmarked energy-related activities and developed plans for improvements. Operational energy efficiency activities for 2011 include:

- negotiation of a new energy contract
- installation of four real-time pump efficiency meters in the E.L. Smith highlift pumphouse to assist operators in selecting the most energy efficient way to achieve pumping goals
- maximization of the use of both E.L. Smith and Rossdale highlift pumps as the main support pumps to the primary distribution zone resulting in minimizing the use of primary zone reservoir pumps
- reduced reservoir operating levels to 60% during summer months and to 75% during winter months in order to save energy
- determine the feasibility of converting some reservoirs to booster-mode operation to improve pumping efficiency
- evaluation of valves and controls in the Millwoods reservoir to improve reservoir fill rates by 17 MLD

EPCOR also has an annual maintenance and equipment upgrade energy efficiency capital program. In 2011 capital activities took place at the Rossdale high lift station, Papaschase Reservoir, and Castledowns Reservoir and included:

- modifications to provide higher pressure at the reservoir pump inlet
- enhancement of PLC and SCADA controls on motor and drives to actively manage power consumption on real time bases
- replacement of capacitor banks to improve power efficiency
- upgrades to existing pumps

In addition, a feasibility analysis of green energy production on EPCOR sites was completed. The analysis reviewed solar, wind and biogas alternatives and found they had limited cost/benefit results.

EPCOR also tracks vehicle fuel efficiency as a performance measure. The 2011 fuel efficiency score was 31.6 litres/ 100 km compared to the target of 29.11 litres/ 100 km. Weather in February and March had the most significant impact on fuel efficiency. Due to extreme weather, vehicle idling was necessary for crew warmth and to operate the thawing equipment for a large number of frozen services. In March, fuel consumption rate was 69.2 litres/ 100 km.
Active Staff Recruitment

EPCOR has consistently been recognized as a top company to work for and has most recently been recognized as one of Alberta’s Top 55 Employers (www.canadastop100.com/alberta/). We have dedicated teams that focus on finding and increasing the external talent pool as well as on internal employee development and training for technical and leadership positions. EPCOR managers are responsible for succession planning and ensuring a supply of competent employees who are motivated to perform their job in a professional and engaged way.

Water Conservation Program

EPCOR's conservation platform focuses on identifying and addressing inefficient water use in different customer classes or groups. For example, a detailed assessment of the city's water use patterns identified some high-use neighbourhoods. These areas were targeted for customer education on water wastage awareness. EPCOR's Blue Bucket Crew Program helped promote this message to the public. The program educates consumers about using water wisely in their homes and businesses. Communication activities included:

- eight Blue Bucket Crew staff were recruited to participate in ten summer community events
- promotional material (brochures, banners, dye tabs, water bottles)
- rain barrel event (2000 rain barrels sold out within hours)
- two promotional water tanks provided drinking water at a dozen public events and marathons around Edmonton
- online conservation tips, including videos demonstrating how to fix leaking taps and toilets can be found at epcor.com and on EPCOR Facebook & Twitter feed
- efficiency ads run at four local radio stations

Subsequent years' campaigns may be broadened to include high-use multi-residential and commercial customers, as well as programs to encourage school children to use water efficiently. Water usage trends will be monitored regularly to ensure the conservation platform is meeting operational objectives as well as our customers’ needs.

System Water Losses

EPCOR has a program for monitoring and controlling water losses in the distribution system. The utility has recently adopted the Infrastructure Leakage Index (ILI) as a measure of water loss performance. It is considered a good overall measure of system performance because it adjusts for size and complexity and also enables comparisons between different systems.
The ILI is the ratio of real water losses compared to the lowest losses possible if all available best management practices were successfully applied. This approach was developed by the *International Water Association* (IWA) and is recommended by the Government of Alberta for water utilities.

The ILI computed for the EPCOR Edmonton waterworks system for the past five years is provided in Table 10 below. The ILI consistently compares favorably to the ILI recommended by the *Water Research Foundation* of > 3.0 to 5.0 for a system of the same size and characteristics as the Edmonton system. A low ILI is a better rating but reducing the ILI below 3.0 is not cost effective in Edmonton. Based on these factors, EPCOR has set a benchmark of 3.0 ILI as a reasonable goal.

**Table 10 – EPCOR’s ILI results from 2006-2011**

<table>
<thead>
<tr>
<th>Year</th>
<th>ILI</th>
<th>EPCOR Benchmark Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1.9</td>
<td>3.0</td>
</tr>
<tr>
<td>2008</td>
<td>1.88</td>
<td>3.0</td>
</tr>
<tr>
<td>2009</td>
<td>1.51</td>
<td>3.0</td>
</tr>
<tr>
<td>2010</td>
<td>1.51</td>
<td>3.0</td>
</tr>
<tr>
<td>2011</td>
<td>1.71</td>
<td>3.0</td>
</tr>
<tr>
<td>Average</td>
<td>1.70</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Reducing Environmental Impacts

Residuals Management Program

EPCOR has a long-term residuals management program in place to reduce the impact of the solids present in the water treatment plant residual streams released to the North Saskatchewan River. These residuals streams include particulate and colloidal material naturally present in the river that is removed during the water treatment process, as well as the residuals of treatment chemicals (primarily alum and some powdered activated carbon).

A zero-discharge option was evaluated in previous years and the net environmental benefit is not clear. While some raw water sources have a steady and low amount of particulates, the NSR particulate levels vary widely based on the season and the amount of upstream runoff. Complete, year-round diversion, treatment, removal and off-site disposal of all solid waste streams from both Edmonton water treatment plants would require construction of very large and expensive treatment facilities at both plants, and trucking of large volumes of solid material to landfills. EPCOR has deferred this zero-discharge option pending the outcome of AESRD’s Industrial Heartland Water Management Framework cumulative effects assessment on the North Saskatchewan River. Meanwhile, EPCOR is evaluating alternatives for reducing the discharge of solids residuals during the winter season. The volumetric flow of the river and the background suspended solids and colour are lowest during the winter season, therefore, the river is believed to be most sensitive to solids discharges during this period.
Reduction of Water Treatment Plants Winter Solids Residual Production

Since 2009, the EPCOR Rossdale and E.L. Smith Water Treatment Plants have converted to direct filtration operation to reduce the amount of residuals released to the river during the winter months. The switch from conventional mode to direct filtration mode has reduced alum use by approximately 75% and the total mass of solid residuals discharged to the river by approximately 50% lower during winter. While direct filtration operation was successful in terms of maintaining excellent treated water quality and substantially reducing residuals discharged to the river, there were operational challenges. See below for the 2011 details:

**2010/2011 Winter Season (Early 2011)**

During the 2010/2011 winter season, Rossdale operated in direct filtration mode from October 26, 2010 to March 22, 2011 and E.L. Smith from October 26, 2010 to March 5, 2011. The operational challenges in early 2011 were mostly due to higher-than-normal colour in the river water, including a late January peak of 7 TCU. In addition to the unseasonably high raw water colour, the E.L. Smith plant faced higher production demands due to the shutdown of Rossdale Plant 2. During this period, filter run times decreased by approximately 40% relative to those observed during conventional operation.

Most of the work in early 2011 revolved around optimizing chemical dosing during direct filtration operation. Average alum dose during the late 2011 direct filtration operation period was approximately 6 mg/L at both treatment plants. Attempts to reduce filter ripening times by dosing more alum generally had a negative effect on filter run times but increasing filter polymer did help improve the times.

**2011/2012 Winter Season (Late 2011)**

During the late 2011 season, Rossdale operated in direct filtration mode from October 15 to November 23, 2011 and again from November 28 into 2012 and E.L. Smith for a few days in late October, a few days in late November and from December 7 into 2012. Operational challenges were attributed mainly to higher than normal colour levels in raw water but also to raw water turbidity spikes.

Rossdale operated very well in direct filtration mode during October to early November when turbidity and colour remained low (less than 4 NTU and 5 TCU, respectively). Combined filter effluent particle counts remained at less than 20 counts/mL. In early November, turbidity and colour increased rapidly and created operational challenges for the plant. The E.L. Smith plant operated in direct filtration mode for only a few days during this time before it was converted back to conventional mode due to increased filter effluent particle counts and low plant production.

There were challenges in mid-November during river freeze-up when there was a spike in raw water turbidity and increased raw water colour. Again E.L. Smith was
quickly converted back to conventional mode to maintain production. Rossdale was also later converted back to conventional mode. Once raw water quality stabilized, both plants were switched to direct filtration mode and remained this way into 2012.

In summary, EPCOR determined applying an alum dose greater than 8 mg/L during direct filtration operation results in rapid plugging of the filters and short filter runs. It was also determined both Rossdale and E.L. Smith could not operate in direct filtration mode when the colour increased to greater than approximately 7 TCU. Therefore, triggers were developed for conversion back to conventional treatment based on raw water colour level and filter run times (i.e. plant production). EPCOR also discovered both plants were able to quickly convert between direction filtration and conventional modes without impacting treated water quality.

**Diversion of Water Treatment Plants Winter Solids Residuals to Sanitary Sewer, Landfill or Other Solids Disposal Options**

In addition to direct filtration to reduce solids production at source, EPCOR has also been examining options to divert the solids residuals produced during the winter season away from the river. A desktop study conducted previously determined the most cost effective options were: 1) disposal to sanitary sewer at Rossdale; 2) thickening, dewatering, trucking and landfill disposal of solids residuals from E.L. Smith. Both options to divert solids residuals will require design and construction of a disposal system and associated capital investment. In 2011, EPCOR retained a design consultant to carry out a pre-conceptual design study on the various technical options for sanitary sewer disposal system at Rossdale; eighteen different options were evaluated. In 2012, EPCOR will be evaluating these options against other alternatives for solids residuals reduction at source, include extending the direct filtration operation into fall months.

**Dechlorination**

EPCOR has committed to eliminating, or reducing to as low as is reasonably achievable, all discharges of chlorinated water to receiving water bodies. This includes discharges of chlorinated water from the E.L. Smith and Rossdale Water Treatment Plants and discharges of chlorinated water arising from activities at reservoirs and in the water distribution system.

**Dechlorination at the Water Treatment Plants and Field Reservoirs**

The E.L. Smith Water Treatment Plant wastewater dechlorination system was commissioned in December 2008. The dechlorination system was optimized in 2009 to ensure more than 99% dechlorination of all plant chlorinated waste streams discharged to North Saskatchewan River. In 2011, all chlorinated waste streams from E.L. Smith WTP were dechlorinated almost 100% of the year. The exception was a five-minute period in June when on-line analyzers detected chlorine in the waste streams.
Construction of a new dechlorination system started at the Rossdale facility in 2010 and the system will be commissioned in mid-2012. The presence of solids in the waste streams made monitoring more difficult. As a result, a project to separate non-chlorinated solid waste streams from chlorinated liquid streams will be initiated in 2012. After the commissioning of the dechlorination system, EPCOR will optimize the system to ensure greater than 99% dechlorination of all chlorinated waste streams from the plant. Optimization is likely to continue until early 2013.

EPCOR has also updated its procedures for draining and releasing water from storage reservoirs through the city. As of 2011, all of these discharges are dechlorinated prior to release. By the end of 2012, EPCOR’s goal is to achieve zero chlorine discharge from the water treatment plants and field reservoirs into receiving water bodies.

**Dechlorination of Water Released to the Environment in the Distribution System**

EPCOR uses sodium bisulphite pucks to dechlorinate water released into the environment due to activities in the water distribution system. There is a variety of delivery mechanisms, ranging from mesh bags and hydrant flushing diffusers to dechlorination boxes.

This dechlorination procedure applies to the water emergency first responders, the crews completing work following repairs and contractors employed for water main renewals. While it may be difficult to ensure 100% dechlorination of all releases (especially those that occur due to mainbreaks or other emergency events), the procedures will ensure the majority of the water released from the distribution system is dechlorinated.
Looking Forward - 2012

EPCOR will continue to support its EnviroVista Championship status in 2012 through various capital and operational initiatives. EPCOR will continue to pursue and make progress on each of its Stewardship agreements. Some interesting items on the horizon include:

- Work will continue on alignment of the Edmonton Waterworks Environmental Management System with the ISO14001 standard with the goal of having full certification by mid-2014
- EPCOR will complete a drinking water safety plan exercise in 2012. The plan looks systematically at all the potential risks to drinking water safety, from source to tap. Any unacceptable risks or opportunities for improvement are identified and an action plan is developed
- A comprehensive operations program will document the various plans, philosophies and procedures that EPCOR uses to ensure public health and environmental protection; this will be submitted to AESRD by year-end 2012
- An updated Source Water Protection Plan will be released in mid-2012
- EPCOR will be continuing with both the reactive and accelerated cast-iron main renewal program in 2012 and will try to better coordinate main replacement with City of Edmonton’s Neighbourhood Renewal Projects
- The Lead Service Line Program will continue with a goal of 120 lead service line replacements in 2012
- EPCOR will be continuing to optimize and extend the time frame of direct filtration operation in 2012; this will result in further reductions in the amount of water treatment plant residuals discharged to the river during periods when the river is most sensitive
- With the commissioning of the Rossdale dechlorination system in mid-2012, EPCOR’s goal is to achieve zero discharge of chlorinated water from the water treatment plants and field reservoirs into receiving water bodies