TO: CHAIR AND MEMBERS
ENVIRONMENT AND TRANSPORTATION COMMITTEE
MEETING ON JANUARY 28, 2008

FROM: PETER W. STEBLIN, P. Eng
GENERAL MANAGER OF ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER

SUBJECT REGIONAL WATER BOARDS RECEIVE ONTARIO PUBLIC WORKS ASSOCIATIONS AWARDS

RECOMMENDATION
That, on the recommendation of the General Manager of Environmental and Engineering Services and City Engineer the following announcement regarding OPWA Awards BE RECEIVED for information.

PREVIOUS REPORTS PERTINENT TO THIS MATTER

BACKGROUND

The purpose of this report is to announce the success of the Regional Water Services and London as the administrating municipality in the Ontario Public Works Association 2007 Awards competition. The Lake Huron Water and Elgin Area Water Systems have received two of the most prestigious awards for 2007.

In the Management Innovation Award category, both Elgin and Huron shared in the top award for the Drinking Water Quality Management System project, along with their contracted operating authority, American Water Canada. The DWQMS is an innovative system that focuses on continuous improvement of the quality of service and is aimed at reducing exposure to any associated hazards in the management and delivery of critical water supplies. The new delivery model not only allows for precise audits and improvements and strives to improve service levels, but recognizes the importance of the partnership between system owner, operating authority and the municipalities.

The Lake Huron Water System was also successful in receiving the 2007 Ontario Public Works Association award for Project of the Year for the Strathroy-Caradoc Pipeline Project. The Strathroy-Caradoc Pipeline Project was designed to upgrade the water supply to that region. Not only did the multi-million dollar project meet its 12 month construction deadline with the use of innovative design and construction techniques, the project came in six million dollars under its twenty million dollar budget. The Strathroy-Caradoc Pipeline Project was recognized for its teamwork between the owner, the operator, customers, design and build teams.

Joint Board representatives from London, Peter Steblin, Pat McNally and Andrew Henry along with the Mel Veale, Mayor of Strathroy-Caradoc, a key beneficiary of the Strathroy-Caradoc project, will be on hand to accept the awards which will be presented in Mississauga on January 31, 2008 at the OPWA Annual General Meeting.

PREPARED BY: SHARON HOUDE, CMA
MANAGER ADMINISTRATIVE SERVICES
ENVIRONMENTAL & ENGINEERING SERVICES

RECOMMENDED BY: PETER W. STEBLIN, P. Eng
GENERAL MANAGER OF
ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER

Attachments:
Drinking Water Quality Management System - OPWA Submission
Strathroy-Caradoc Pipeline Project - OPWA Submission
DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)

Elgin Area  Lake Huron
Primary Water Supply System  Primary Water Supply System

American Water  Canada

Submission for:
Management Innovation Award
2007 OPWA Awards Program
Introduction

Subsequent to the results of the Walkerton Inquiry in 2002, the Province of Ontario began sweeping changes to the legislation governing water systems in Ontario. As part of this change, the Province developed a Drinking Water Quality Management Standard, similar to management systems from the International Standards Organization and other international agencies, in cooperation with various stakeholders. In addition to aiding the Province in developing the management system, the Lake Huron and Elgin Area Primary Water Supply Systems were selected as a pilot site to test the Drinking Water Quality Management Standard given the relatively unique nature of the regional water systems.

Both the Lake Huron and Elgin Area Primary Water Systems were previously owned by the Province of Ontario and in November of 2000 the systems were transferred to two respective Boards of Management. The Lake Huron and Elgin Area Water Systems utilize a contracted Operating Authority, American Water Canada. Given the unique municipal water supply governance and administrative structure, and the contractual relationship with the Operating Authority, the implementation of the Drinking Water Quality Management Standard afforded unique and progressive opportunities. These opportunities included the integration of the Quality Management System with the Environmental Management System (ISO14001:2004) and the incorporation of the owner into the management system approach.

Background

Part 2 of the Walkerton Inquiry by Justice O'Connor and the subsequent Safe Drinking Water Act has lead to the Ministry of the Environment's initiation of a Drinking Water Quality Management Standard for Ontario. This standard will be part of the provincial Municipal Drinking Water Licensing regime and the accreditation of operating authorities for municipal drinking water systems. In order to obtain this license, among other license application requirements, municipalities will be required to have an operational plan (Quality Manual) prepared in accordance with the standards and an accredited operating authority. Having an accredited operating authority in place is an important step towards satisfying the owner’s due diligence responsibilities and standard of care. The Drinking Water Quality Management Standard was finalized and released in October, 2006.
What is the Drinking Water Quality Management System?

The DWQMS implements a systematic "continuous improvement" approach of planning, implementation and operation, checking and corrective actions, and management review to allow an organization to achieve and demonstrate sound quality management system performance by controlling the impact of their activities, products or services on quality. The success of a quality management system depends on the commitment from all levels and functions of the organization, including operators and "top management".

The implementation of the DWQMS affords drinking water system owners and operating authorities with a system which continually monitors the water supply system's ability to manage drinking water quality, and effectively manages the system's critical control points and associated hazards while "continuous improvement" becomes the cornerstone of the water supply system's operation.

The Ministry of the Environment (MOE) worked with municipal and water industry representatives to finalize the DWQMS. The DWQMS follows the basic underlying principles of ISO14001 (Environment Management System), ISO9000 (Quality Management System) and HACCP (Hazard Analysis and Critical Control Points relating to food products) standards.

Pursuant to the DWQMS standard, periodic "internal" audits are performed by the Board's administration to ensure continued conformance with the DWQMS standard. Internal audits of the management systems are undertaken to ensure the DWQMS implemented conforms with the DWQMS standard also ensures that the ongoing operation of the water supply system complies with the DWQMS as implemented. As required by the standards, internal audits are performed a minimum of once annually.

The documented DWQMS requires management review by Senior Management a minimum of once annually to ensure that the management team of the Owner and the Operating Authority stay informed of quality issues. Items discussed at the management review include water quality test results, legislative changes, significant non-conformances, corrective actions, changing circumstances and business strategies, and resource requirements.

Once a DWQMS has been implemented, Operating Authorities will be accredited through an audit process based upon the ministry-approved standard. Accreditation will be verified by an external audit and periodic review by a certified independent third party accrediting body. Periodic internal audits of the system will also be required as a condition of the standard.
Why did the Lake Huron and Elgin Area Primary Water Supply Systems participate in the pilot implementation of the DWQMS?

The Ministry of the Environment and the Canadian Standards Association worked with municipal and water industry representatives to prepare a standard relating to drinking water quality. The Lake Huron and Elgin Area Joint Board’s staff and Operating Authority, American Water Canada Corp. (AWCC), were actively involved in the development of the province’s Drinking Water Quality Management Standard as participants of the development team.

With the water system’s recent registration and experience implementing an ISO14001 Environmental Management System, the systems were well positioned to take a lead role in the development of the province’s Drinking Water Quality Management System. The Lake Huron and Elgin Area Primary Water Supply Systems were selected as test sites for the initial implementation of the DWQMS. The Elgin and Huron systems represented the pilot implementation for a large regional treatment and supply system. Three additional test sites across the province represented a groundwater system, a distribution system and a smaller residential communal supply and distribution system.

Details of the DWQMS Implementation

The DWQMS at both facilities was integrated with an existing ISO14001 Environmental Management System (EMS) and the combined EMS/DWQMS system is maintained by the Operating Authority, American Water Canada Corp. (AWCC).

The implementation of the quality management system is unique in that it was implemented in partnership between the owner of the system and the contracted Operating Authority. In a classical implementation of a management system, the system would be implemented for the operation of the facilities and would normally only involve the operating entity.

An implementation team was established for the development and implementation of the DWQMS at the Elgin and Huron facilities, and included the District Director of AWCC, the Joint Board’s Manager of Regional Water Supply, and the Joint Board’s Water Compliance Coordinator, to observe and monitor the implementation process. The Ministry of the Environment provided further assistance for the pilot sites.
At the beginning of the implementation process, DWQMS training sessions were held for management staff of the both the Owner and Operating Authority.

Training sessions for all other Operating Authority employees was held once the DWQMS procedures were finalized. Once all employees were trained, the DWQMS was considered to be fully implemented.

As required by the DWQMS, internal audits are conducted a minimum of once annually. The results of the internal audit are reported to management during a management review meeting. At this time corrective actions are assigned and the system benefits from a continuous improvement cycle.

Through the DWQMS implementation, the Lake Huron and Elgin Area Joint Boards of Management made commitments to:

- Managing and operating the drinking water systems in a responsible manner in accordance with documented quality management policies and procedures
- Providing the customer with clean, safe drinking water
- Being a quality leader in the water industry
- Promoting owner and consumer confidence in the safety of the drinking water supply
- At a minimum, meeting all relevant legislative and other requirements and encouraging our suppliers and subcontractors to similarly meet these requirements
- Promoting resource stewardship, including conservation

Challenges experienced during implementation were:

- Interpreting a draft DWQMS standard that had not been finalized
- Assumptions had to be documented
- Lack of guidance material, templates, model plans and examples as they were still under development by the MOE
- Difficulty achieving employee buy-in, given the historical regulated and reactive approaches previously used
- Support was limited to the general management system experience of staff and a consultant
- Many records, documents and drawings were missing
- Employee time and effort as everyone at all levels of the organization was involved to varying degrees

In December, 2006 the Lake Huron Primary Water Supply System underwent a full scope pilot accreditation audit by an external auditor. The full scope audit
required all elements of the DWQMS to be documented and implemented. The pilot audit was conducted by the Canadian General Standards Board and was the first DWQMS accreditation audit in the province. The system was recommended for accreditation at that time. The Elgin Area Primary Water Supply System will undergo an accreditation audit as soon as the MOE is in a position to start accepting voluntary applications for accreditation.

What was the proven success of implementing a DWQMS?

Implementing the DWQMS has met unique needs of the organization. The Lake Huron and Elgin Area Primary Water Supply System's have experienced many benefits as the result of implementing a DWQMS. These benefits have included:

- Internal audits and management review lead to early identification of issues and resource requirements
- Improved relationships with the local Ministry of the Environment and Health Units as documented processes lead to better understanding and greater comfort of system operation
- Consistency of practice and operation as consistent policies and procedures are communicated throughout the organization
- Improved documentation and record keeping
- Roles and responsibilities are clearly defined and documented and expectations are outlined
- The owner, the administration, the operations staff, and the system as a whole are striving to reduce risks
- Improved management and operation of the drinking water systems in support of the production of safe drinking water
- Better relationship with the Joint Water Boards and consequently the public
- Helps to facilitate community confidence in the drinking water supply and helps to fulfill the needs and expectations of consumers
- Improved communication between the owner and the operating authority
- A proactive rather than reactive approach to managing drinking water quality
- Demonstration of due diligence and standard of care

In addition, the 14 member municipalities of the regional water supply system will also benefit from the DWQMS implementation. Lake Huron and Elgin Area Primary Water Supply System staff are now experienced in DWQMS implementation and are in a position to provide peer support to member municipalities. Staff have also participated in area workshops hosted by the MOE to share their implementation experiences with others.
CANADIAN GENERAL STANDARDS BOARD recognizes that as part of a Ministry of the Environment pilot program American Water Canada Corporation has successfully implemented a Quality Management System at Lake Huron Primary Water Supply System that conforms to the requirements of Ontario's Drinking Water Quality Management Standard.

Chantal Plante-Tremblay
Director
Canadian General Standards Board

Canada

Expires May 2008
Lake Huron
Primary Water Supply System

STRATHROY-CARADOC PIPELINE

In Partnership with..........,

D’ORAZIO
Infrastructure Group

DILLON
CONSULTING

American Water
Canada

STANTEC

Submission for
Public Works Project of the Year
2007 OPWA Awards Program
(Structures – greater than $10 Million)
PIPEDLINE DESIGN/BUILD A GREAT SUCCESS!

In order to meet a Ministry of the Environment order to upgrade their water supply, the Municipality of Strathroy-Caradoc had 12 months to construct a $20 million pipeline. Design/build project delivery was determined to be the only way to achieve this.

Not only did the design/build project meet the very tight schedule, but it came in $6 million under budget and included innovative design elements for the long-term benefit of the municipalities. That's successful infrastructure delivery!

To achieve this success, it took teamwork by all parties involved...the owner (Lake Huron Joint Board), the operator (American Water Canada Corp.), the primary customer (Municipality of Strathroy-Caradoc), and the design/build team (D’Orazio Infrastructure Group and Dillon Consulting Limited). Everyone worked together towards the same end goal.

As the renewal and upgrading of infrastructure in Ontario becomes more critical and challenging, the Strathroy-Caradoc pipeline project is a successful example of how the design/build approach to project delivery has an important role.
BACKGROUND

The Lake Huron Primary Water Supply System services the communities of London, Lambton Shores, North Middlesex, South Huron, Bluewater, Middlesex Centre, Lucan-Biddulph, and now Strathroy-Caradoc, from a water treatment plant located in the Municipality of South Huron on Lake Huron. The Lake Huron Primary Water Supply System is governed by a Joint Board of Management who directs their staff to carry out any decisions made by the Board. In turn if there are any changes or requests, the Joint Board’s staff must bring the proposal to the Joint Board of Management for approval.

The Municipality of Strathroy-Caradoc is the latest member of the regional water supply system as they needed to upgrade their water supply system to be able to meet the new drinking water regulation. As a result, a pipeline connection to the Lake Huron Primary Water Supply System was identified as the best viable alternative in consideration of concerns with their groundwater water supply at the time and the long-term economic and social growth of the community.

THE PROBLEM

With deteriorating groundwater quality and reduced capacity caused by lowering groundwater tables, public health and safety concerns were becoming critical for the Strathroy Water Works Department. Four out of thirteen wells frequently had nitrate concentrations above limits set by the Ontario Drinking Water Standards. These wells represented 40% of the available water supply and had to be shut down until concentrations declined or dilution was provided. Also, during the summer of 2003, 50% of the capacity of the Frances St. well field was lost as a result of a declining water table.

A provincially-supported Groundwater Management Study established that land use controls would be required on over 42 square kilometres to protect the existing poor quality, declining well supplies. This would have a major negative impact on existing and future industrial and agricultural operations. The Municipality of Strathroy-Caradoc was faced with $4.5 million in costs to upgrade
the Strathroy Wells to meet the requirements under the Drinking Water Systems Regulation (Ontario Regulation 170/03).

These costs still did not address the nitrate issues and the declining water tables that were reducing well yields and system capacity. Due to the decrease in water quality and supply, the Ministry of the Environment issued an order for the Municipality of Strathroy-Caradoc to address the water supply problems by December 31st, 2005.

A comprehensive Class Environmental Assessment process, that examined several alternatives, determined that the best long term solution was to replace the well supplies with a connection to the Lake Huron Primary Water Supply System. This would require construction of a 26 km water pipeline, 3750 m$^3$ expansion of an existing reservoir and modifications to the pumping station in Strathroy.

THE SOLUTION

In preliminary discussions between the municipality, consultants and the Lake Huron Joint Board, there were two routes identified for the pipeline to Strathroy-Caradoc.

**Route 1:** A connection to the Lake Huron primary transmission main at Neil Road north of Carlisle, extending a pipeline along Fernhill Drive (the municipal boundary between North Middlesex and Middlesex Centre) and into Strathroy via Wardell, Newell, and Wright Streets and easements.

**Route 2:** A connection to the Lake Huron primary transmission main at 12 Mile Road north of Ilderton, extending a pipeline along 12 Mile, Ilderton and Egremont Roads, and into Strathroy via Hickory Drive and Second Street.
Route 1 was identified by the Municipality's consultant as the preliminary preferred option based on preliminary cost estimates for construction.

In recommending the Fernhill Drive route, the following reasons were noted:

- When supply to all four municipalities is considered (North Middlesex, Middlesex Centre, Strathroy-Caradoc, and Adelaide-Metcalfe), including supplementary costs for additional water mains and appurtenances within a municipality's water distribution system, the cost difference is marginally in favour of the Route 1.

- All four municipalities can be served from either route although the cost/benefit relationships for specific municipalities change. North Middlesex had indicated that they would be interested in only Route 1, whereas Middlesex Centre had taken a similar position with respect to Route 2.

- In both cases, the routes follow existing road allowances. The only environmental constraints noted were stream crossings. Impacts can typically be mitigated through timing of construction and if necessary, special construction techniques such as boring.

- The consultant noted that, in their opinion, Route 1 had fewer large crossings and afforded more space to implement solutions given the rural road profile.

- Route 2 was noted to potentially have a greater impact on traffic and the public through parts of the construction. It was specifically noted that the County of Middlesex Department of Transportation favoured Route 1 over Route 2 because of the traffic considerations and alignment through the villages of Poplar Hill and Coldstream.

- Given the urgent need for water by the Municipality of Strathroy-Caradoc, construction of the transmission main should proceed as soon as possible. The consultant noted that the Route 1 would likely allow for faster design, approvals and construction.

- Noting the distribution of costs between benefiting municipalities on each route, the cost of Route 1 was approximately $1.8 million less than the Route 2 for the Municipality.
THE TEAM

Stantec Consulting – Preliminary Engineering and estimates for anticipated project, including modeling and preliminary connection details

D’Orazio/Dillon Design/Build Team –
D’Orazio was the Team Lead and Construction Contractor
Dillon was the Engineer and Consultant responsible for the detailed design, obtaining all regulatory approvals and public communications

Lake Huron Primary Water Supply System / Regional Water Supply – as the Owner – Overall project management and project coordination with municipalities

American Water Canada Corp. – as the contracted operating authority for the Lake Huron Primary Water Supply System

Municipality of Strathroy-Caradoc – Primary Customer and Beneficiary, including the Canada Ontario Municipal Rural Infrastructure Fund
NUMBERS

Due to the deadline set by the Ministry of the Environment, the municipality had to find an alternate source of funding because of the extensive cost to complete the project. The Municipality of Strathroy-Caradoc had pursued and received funding from the Canada Ontario Municipal Rural Infrastructure Fund for upgrading their reservoir, distribution system and the connection to the pipeline.

- Lake Huron Primary Water Supply System's Joint Board of Management budgeted $20 million to complete the extension of the pipeline for the Municipality of Strathroy-Caradoc.
- O'Razio-Dillon team submitted a proposal in the amount of $13,492,000.00 which was significantly lower than the proposed budget amount for this project.
- Value of work completed including preliminary engineering and consultation, administration and legal, construction and property resulted in the amount of $13,849,736.00, which was significantly under the original budget for the project.
- Project included 26 km, of 600mm concrete pressure pipe, 59 valve chambers and 2 monitoring stations (flow and pressure regulation) to facilitate proper pipeline operation and maintenance, and 300mm diameter branch watermain connections for future servicing along the pipeline route.

THE DESIGN/BUILD APPROACH

Noting the immediate need to complete the pipeline, a design-build approach was recommended with a Request for Proposal process following the completion of the preliminary engineering assignment. Given the size of the proposed project, this approach affords the opportunity to streamline the detailed design and construction phases and effective coordination of detailed engineering design, construction of the pipeline as well as project management.

The preliminary engineering assignment by Stantec was concluded by the beginning of July 2004.
Noting the immediate need for the project within the deadline that the Ministry of the Environment had set for completion, the design/build approach was chosen as the best method to accomplish the projects' objectives without compromising construction coordination or system capabilities. Also the design/build method is based on teamwork, involving all parties throughout the entire process including owner, operating authority and customer.

Figure No. 1 seen below illustrates the effectiveness that the design/build technique has compared to the design/bid/build technique.

**Figure No. 1 – Design/Build Effectiveness**

Once the preliminary engineering assignment was completed the Joint Board's staff was in a position to issue a Request for Proposals (RFP) in early August 2004 for the timely completion of construction by the end of December 2005 as required by the Municipality of Strathroy-Caradoc and the Ministry of the Environment.

Prior to the RFP’s being issued, the Joint Board of Management directed it's staff to issued a Request for Expression of Interest (RFEI), to invite design/build proponents to provide details of their proposed team, including details of their individual and collective experience as well as evidence of their financial capacity to undertake a project of this nature and magnitude. There were seven RFEI's
received and once the documents were reviewed, three project teams were issued a RFP as part of the selection process.

The proposal for the design and construction of the Strathroy-Caradoc Pipeline from the Design/Build team of D'Orazio Infrastructure Group and Dillon Consulting Limited was selected as the proposal represented the best value of the proposals received, and therefore the Design/Build team of D'Orazio-Dillon was chosen as the preferred proponent.

The project team met with representatives of the D'Orazio-Dillon team on November 23, 2004 to clarify their intended design and construction delivery plan. Based on their review and follow-up discussions and their commitment to complete the pipeline by December 2005, the D'Orazio-Dillon team was awarded the contract.

Detailed design and construction was completed in a 12 month period and involved not only the design/build team, but the Joint Board staff, operating authority and partner municipalities as well.

The new pipeline was commissioned and put into operation on December 22, 2005 and has remained in operation since that time, with the exception of a short shut down to repair a misaligned valve.

Substantial Completion was declared on January 31, 2006.

During the construction of the pipeline, there was extensive coordination between all the municipalities and communities involved. At one stage in the construction, a 24 hour shutdown of the primary supply to the City of London and the other six municipalities was required in order to complete the connection to the newly constructed pipeline. With all the municipalities working together we were able to notify all affected parties and make the necessary arrangements to have the shutdown proceed smoothly with minimal disruption.
ACCOMPLISHMENTS

- The Design/Build construction method was a proven success because of the cost savings and the tight deadline set by the Ministry was achieved.
- By December 2005, a 26km pipeline was constructed and in use within a one year period, considering the construction contract was awarded to D'Orazio-Dillon team in December 2004.
- Contractor and Consultant partnership worked extremely well together to meet the tight deadline set by the Ministry of the Environment. However, it was an overall team effort that is owner, operator, customer, contractor and suppliers to make the project a success.
- Due to the overall safety program that was employed by all parties involved there was no lost-time accidents during this project.
- This project had a budget of $20 million but only expended approximately $14 million.
- Thanks to all municipalities working together, there have been many landowners that have expressed their appreciation for the efficiency and effectiveness of the construction process and in how concerns were addressed.
- The construction of the new pipeline would provide for future connections to three other municipalities.

Based on the success of the Strathroy-Caradoc pipeline project, the Joint Board of Management is currently undertaking another design/build project, a $19 million pipeline, reservoir and pumping station to supply Exeter and Hensall.