Council Direction:

N/A

Information:

PW07045 is the 2006 annual report card respecting the operation and maintenance of the City of Hamilton’s water and wastewater treatment facilities. Various qualitative and quantitative objectives and performance targets were identified in the ‘Draft Service Agreement’ (DSA) that was provided to private operators for bidding. The operations of 2006 are compared with those objectives and performance targets and it is apparent that the facilities have been operated within the guidelines laid out in the DSA.

The contract rating criteria was divided into two primary categories. There was a mandatory ‘compliance criteria’ for water quality and wastewater treatment, for which penalties were assessed for not achieving these minimum quality criteria and there was also a much more stringent ‘performance criteria’ for which the DSA awarded incentive payments based on monthly achievement of those criteria.

The treatment facilities were operated in line with the DSA during 2006. The Woodward Wastewater Treatment Plant (WWTP) recovered well from the upset conditions, as a result of the repair and upgrades projects, in late 2005 and the treatment performance was significantly improved throughout the year. During the year, the treatment performance of the Woodward WWTP was better than the previous twelve years, despite the fact that the incoming average sewage flows were the highest ever and are closely approaching the rated capacity of the plant.

The DSA proposed separate water quality and wastewater treatment incentive payments of $10,000 and $15,000 per month respectively to the contractor for achieving certain performance criteria. Based on the performance that is described in this report for 2006, a contractor would have been entitled to an incentive payment of $185,000.

Staff have been able to achieve this higher level of performance at the treatment facilities, while at the same time coming in approximately $950,000 below the approved
budget of $27.9 M. In short, the in-house model has been a success and is bringing benefits to the City in terms of improved performance and cost effectiveness.

Looking forward, staff will continue to build on the momentum and complete the various programs and initiatives to further optimize the processes and achieve improved standards and cost effectiveness.

Background

At the September 15, 2004 Council meeting, Council directed staff to implement an “In-house Model” with respect to the operation and maintenance of the water and wastewater treatment facilities. As part of the report respecting “Hamilton’s Water and Wastewater Operations Contract (PW04001(a))”, Council directed that Item 5 of Public Works, Infrastructure, and Environment Committee Report 04-015 be amended by adding the following as sub-section (d):

(d) That the Director of Water and Wastewater bring forward an annual report card with respect to the operations and maintenance of the water and wastewater treatment systems, and that this report will be an update on how staff are performing financially with respect to compliance issues, including the impact of pay equity.

Staff were directed to operate and maintain the water and wastewater treatment facilities as closely as possible to the terms and conditions of the DSA and report annually on their performance with respect to the DSA.

Analysis

In 2004, the City prepared a ‘Draft Service Agreement’ (DSA) for contract operators to bid on for the operation and maintenance of the water and wastewater treatment facilities. The DSA outlined a higher standard of performance than had been present in the previous 10 years and identified wide-ranging qualitative and quantitative performance indicators and objectives, such as water quality targets and wastewater effluent targets. The contract rating criteria was divided into two primary categories. There was a mandatory ‘compliance criteria’ for water quality and wastewater treatment, for which penalties are assessed for not achieving these minimum quality criteria and there was also a much more stringent ‘performance criteria’ for which the DSA awards incentive payments based on monthly achievement of those criteria.

The various performance indicators and overall operation and maintenance objectives were described in detail throughout various sections of the DSA. To determine how the City’s staff managed and operated the facilities, a detailed assessment was carried out and a comparison undertaken of these performance indicators and the objectives listed in the DSA with the actual operations during 2006. An overview of this comparison is provided below.

1. General Operations and Maintenance of Facilities

   1.1 The DSA required that the facilities be operated and maintained in a cost-effective and professional manner and in accordance with Best Management Practices, the Certificates of Approval (CofAs), and the requirements of other applicable laws.
During 2006, staff have successfully operated and maintained the water and wastewater treatment facilities in a professional manner and were consistent with the requirements of the various CofAs and other applicable laws.

1.2 The DSA required that a quality management system and other operational plans be developed to improve operations and to ensure long-term sustainability of the facilities.

(a) To ensure quality management, the Water and Wastewater Division developed a Beyond Compliance Operation System (BCOS). The final structure of the system is consistent with the Drinking Water Quality Management System mandated by the Ministry of the Environment under the *Safe Drinking Water Act*.

(b) To ensure long-term sustainability, staff have developed an Asset Management Plan for the facilities with the help of outside professional services. The plan will help establish short- and long-term priorities.

(c) To ensure proactive maintenance and long-term sustainability of the facilities, a Computerized Maintenance Management System has also been developed and implemented. The system will assist the plant’s maintenance staff to effectively respond to maintenance issues, while assisting management with asset replacement decisions.

(d) A SCADA optimization plan was completed and its recommendations are being implemented, which will ensure that current and future operational and regulatory needs are consistently achieved. In addition, various upgrades and modifications have been completed to improve data communication and storage.

1.3 The DSA required preparation of quarterly and yearly reports as required under the various regulations and CofAs.

Staff produced all quarterly and annual reports as required under the various regulations and CofAs.

1.4 The DSA required development and implementation of employee training and certification programs, and health and safety programs and plans.

(a) The Water and Wastewater Division developed a staff training matrix to ensure that the training and certification programs are met in accordance with the requirements of the new Regulation 128/05 under the *Safe Drinking Water Act*.

(b) A cross-training plan is also being implemented at the plant to cross train operators in both water and wastewater systems.

(c) An active health and safety program is also being implemented at the facilities, including the development of a permitting system for “Entry to Confined Spaces”.

1.5 The DSA required the revision and update of operations and maintenance manuals.

Staff continued to update the various Operation and Maintenance Manuals and finalized many new Standard Operating Procedures (SOPs), completion is
expected in May of 2007. Staff have made progress towards developing a web-based SOP system so that staff will be able to access up-to-date information at all times.

2. Water Quality

2.1 The DSA required that water facilities be appropriately operated to ensure adequate production, transmission, and storage of water to meet water quality compliance and performance criteria while maintaining appropriate main pressures and emergency and fire storage volumes.

(a) Staff were able to consistently meet all the drinking water quality requirements at the Woodward Water Treatment Plant under the Safe Drinking Water Act.

(b) Staff were able to ensure adequate production, transmission, and storage of water to maintain appropriate pressure and emergency and fire storage.

2.2 The DSA proposed ‘Performance Criteria’ for water quality in respect of turbidity, total aluminium, pH, fluoride, residual, Trihalomethanes, taste and odours, and microbiological concentrations.

(a) Staff were able to consistently achieve the performance criteria for the Woodward Water Treatment Plant throughout the year with the exception of aluminium, which was achieved for ten months of the year. In order to achieve the aluminium performance target a capital upgrade is required, which will be shortly implemented.

(b) With the exception of four incidents where low chlorine residual was observed in remote locations in the distribution system, the performance criteria was consistently achieved by the Woodward based system.

(c) Staff were able to consistently achieve the performance criteria for the various well based systems with the exception of well water turbidity and few low chlorine incidents at the Greensville Well System.

(d) The performance criteria for the well water Turbidity target are not achievable due to the various changes made to the SCADA data collection approaches.

(e) Greensville Well System had four incidents of low chlorine residual during the construction and start up of the new treatment system. The issues were immediately rectified without any impact to public health.

2.3 The DSA proposed a drinking water quality incentive payment of $10,000 per month to the contractor for achieving the water quality performance criteria.

A performance similar to that achieved in 2006 would have entitled the contractor to a water quality incentive payment of $80,000.
2.4 Further, the DSA required optimum filter performance to prevent loss of granular activated carbon (GAC) and not to exceed more than a 25 mm depth during a twelve month period.

Initial estimates suggest that there was no GAC loss more than 25 mm during the period. However, this will need to be confirmed once the construction on one of the quadrants is complete.

3. Treatment of Wastewater

3.1 The DSA required that the wastewater facilities be operated to consistently achieve all compliance and performance criteria, while reducing bypass events and working towards achievement of Hamilton Harbour Remedial Action Plan targets.

(a) The wastewater treatment plant performance was better than the average performance over the previous twelve years. The Woodward Wastewater Treatment Plant (WWTP) recovered well from the upset conditions, as a result of the repair and upgrades projects, in late 2005 and the treatment performance was significantly improved throughout 2006.

(b) The rated capacity of the Woodward WWTP is 409 MLD. During 2006 the average flow to the plant was 393 MLD, which is the highest recorded average flow in the past twelve years. The plant was able to effectively deal with the extreme storms that occurred during the year.

(c) On December 1, 2006, the Woodward WWTP received its highest ever flows and was able to pump over 1700 MLD and prevented flooding in the City. There were many other wet weather events resulting in very high flows. Those events were effectively managed during the year.

3.2 The DSA proposed ‘Performance Criteria’ for wastewater treatment at the Woodward WWTP in respect of Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), Total Phosphorous, Faecal Coliform, and pH. Similarly performance criteria were also proposed for the King Street WWTP and the Main Street WWTP.

(a) Staff were able to achieve the performance criteria for seven months, ten months and twelve months at the Woodward WWTP, King Street WWTP, and Main Street WWTP respectively during 2006.

(b) The DSA proposed wastewater treatment incentive payment of $15,000 per month to the contractor for achieving the effluent performance criteria. A treatment performance similar to what staff achieved in 2006 would have entitled the contractor to an incentive payment of $105,000.

(c) During 2006, significant treatment improvements were achieved at the Woodward WWTP throughout the year. The following is an assessment and comparison of the last year’s performance with the historic data:

(i) In the case of effluent Total Suspended Solids (TSS), the compliance targets were achieved for twelve months and the performance targets were achieved for nine months. The performance targets were not achieved in the first three months of 2006 as the plant continued to recover from the upset conditions in the last two months of 2005,
which occurred due to capital upgrades being completed at the plant. The average annual effluent TSS concentration during 2006 was lower than the previous twelve years’ averages and for eight months, the average monthly effluent TSS was below or very close to the “initial RAP” target.

(ii) The average annual effluent ammonia concentration during 2006 was lower than the previous twelve years’ averages and for eight months, the average monthly effluent ammonia was well below the “initial RAP” target and approached “final RAP” targets.

(iii) In the case of effluent Total Phosphorous (TP), the compliance and performance targets were achieved throughout the year. The average annual TP concentration during 2006 was lower than the previous twelve years’ averages.

(iv) In the case of effluent Biological Oxygen Demand (BOD), the compliance and performance targets were achieved throughout the year and the average annual effluent BOD concentration during 2006 was lower than the previous twelve years’ averages.

3.3 The biosolids from all three plants were to be effectively managed and treated to the compliance targets.

Staff were able to effectively manage and treat the biosolids from all three plants to meet the compliance targets. As well, a Biosolids Master Plan and Biosolids Environmental Management System (EMS) are being implemented.

Financial Implications

At the start of 2006, $27.9 M was budgeted for the in-house model. The significant improvements in operations and the transition to the in-house model were achieved for a budget of $26.95 M with a savings of $950,000 from the original anticipated budget. In addition to these savings, the City avoided incentive payments to a potential contract operator of over $185,000.

Staff Implications

Throughout 2006, significant efforts were made to fill the various vacant positions. The response to the advertisements was not good and not many qualified and certified operators applied for the positions. This is reflective of the overall shortage of skilled and certified operators within the industry. Going forward, the City will have to undertake more aggressive marketing to attract skilled and well-trained operators.

With respect to pay equity, there has been no notable link to increase in staff compensation throughout the corporation due to the migration of the treatment facilities to an “in-house” model.

Consultation

As directed by Council, Water and Wastewater staff held three Public Information Centres (PICs) at various locations throughout the City. The majority of comments were positive with respect to the performance of the Treatment Facilities and the overall “in-house” model to date.
Staff consulted with the Human Resources Department with respect to Pay Equity and they were in agreement with the fact that there was no notable link to increase in staff compensation and the migration of the Treatment Facilities to an “in-house” model.

Staff also consulted with the Budgets and Finance Division of the Corporate Services Department and they are in agreement that the Treatment Facilities were operated by more than $950,000 under budget.

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