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**Publisher's version / Version de l'éditeur:**

*Journal of Commerce, 89, April 17 30, p. FS5, FS8, 2000-04-17*

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**IRC-VISI-289**

A version of this paper is published in / Une version de ce document se trouve dans :
Journal of Commerce, v. 89, no. 30, April 17, 2000, pp. FS5 & FS8

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# IRAP and Reid Crowther establishing benchmarking : measuring the performance of utilities

**By Stefan Koehl**

Publishing in Journal of Commerce, v. 89, no. 30, April 17, 2000, pp. FS5 & FS8

**Abstract:** How do not-for-profit operations, which do not compete for customers, measure their performance? For businesses, the marketplace has a brutal but accurate way of indicating effectiveness-at least financially. In the past wastewater utilities, like many government-run organizations, could refer to few performance yardsticks based on real industry track records. Now a new partnership, forged over the past two years with the help of the Industrial Research Assistance Program of the National Research Council, is giving Canadian wastewater utilities an array of equivalent measurements and a network for sharing management experience.

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Supported by IRAP and facilitated by Reid Crowther and Partners Ltd., 17 utilities from across the country recently completed the second phase of a project to develop wastewater collection and treatment benchmarks.

As they move into the third phase, the partnership is looking for more wastewater utilities to participate and reap the benefits of their on-going joint research and analysis.

"Utility managers were asking: 'How well are we doing? How do we compare with similar organizations? Are we getting value for money?'" said Andy North, manager of Reid Crowther's environmental department in Vancouver.

"There were few reliable benchmarks out there on which they could build an overall management model," said North. "In the last few years there have been some benchmarking efforts in North America, but the majority have had too broad a scope and were based on questionnaires sent out to the utilities."

"Each respondent interpreted the questions based on their own situation. The overall results were meaningless."

Determined to devise representative benchmarks that reflected the real experience of the full spectrum of Canadian wastewater collection and treatment performance, wastewater managers from Vancouver and Calgary together with Reid Crowther wastewater consultants approached IRAP in late 1997 to propose a benchmarking pilot project.

Soon after, the Edmonton and Victoria wastewater departments joined in. The effort began with an in-depth literature review of wastewater benchmarking by Reid Crowther.

Then, three workshops were held in which utility and operations managers began the complex task of precisely defining the important benchmarks in a way that would fit their different situations and equipment.

Said North: "One of the things we discovered early was the importance of involving top level decision-makers. Many had a background of process operations, so they were very familiar with the details of how the systems worked."

Although there were many differences between their operations, the managers found that two main operations models-one for collection and one for treatment-could encompass the local variation factors.

Altogether, the four original wastewater management teams came up with about 25-30 initial benchmarks between the two models, said North. The benchmarks fall into four broad contexts: productivity, reliability, labour/community/environment and financial impact.

But the pilot phase also showed that the data set was still too small and more work was needed to prefect the benchmarks to fully encompass the differences between systems. With additional funding from IRAP, Reid Crowther and the first four utilities set out in early 1999 to recruit other Canadian wastewater operations.

Soon an additional 13 utilities were attracted to the program. These included:

- The Victoria Capital Regional District,
- The Regional District of Nanaimo,
- The City of Red Deer,
- The City of Regina,
- The City of Windsor,
- The Regional District of Ottawa-Carleton,
- The Communauté de Montréal,
- The City of Kamloops,
- The City of Winnipeg,
- The Regional Municipality of Niagara,
- The Regional Municipality of Hamilton-Wentworth,
- The Region of Durham, and
- The Capital Regional Sewerage Commission in Edmonton.

Levels of technology vary greatly among the 17 utilities. Some have tertiary treatment, others only primary, though most have secondary treatment. Some have automated systems for gathering certain types of operations data, others none.

"But just because the collection is automated, doesn't mean the data is good or better," noted North.

To draw out fresh ideas from the new participants in the phase two sessions, the initial benchmarks were described to them only broadly, said North. "We didn't want the earlier work cast in stone."

At the end of the phase two workshops the number of benchmarks had not changed significantly, but some had been dropped, others combined and some added. Definitions had also been further clarified and refined.

Especially valuable, said North, was the personal interaction the wastewater managers achieved. "Getting everyone together in one room for two or three days was one of the big benefits of the project. They left saying it was time well spent."

For the collection system model and for the treatment system model, the benchmarking project defined a set of input performance measures and a set of outcome performance measures. Modifying the input measures are sets of variables relating to the physical plant and the utility operation. A set of dependent variables modifies the outcome measures.

For the collection system model, for example, some input measures are:

- Number of inspections per 100 kilometres of length
- Number of planned maintenance hours per number of total maintenance hours
- Labour full time equivalents per 100 kilometres of length

Some defined variables for collection system characteristics include:

- Age of the system
- Number of service connections
- Catchment area
- Topography

Some collection system outcome benchmarks are:

- Number of repairs per 100 kilometres of length
- Field crew labour hours lost to sickness per total field crew labour hours

- Number of service requests per total number of service connections

"The value lies not so much in the particular benchmarks selected, but the thought process behind each definition and its links to the way other measurements and variables are defined," said North. "It's knowing what each means and why."

From May to September last year a two-person team traveled to each utility and collected data on performance and variables from operations in 1997 and 1998 in accordance with the benchmark definitions.

The on-site visits by designated researchers was key to gathering information that could be compared effectively, said North. In the meantime, the original four utilities have begun to structure their systems to conform to the definitions within the benchmarking models.

With all the data in hand, Reid Crowther assembled it in a Microsoft database and subjected it to empirical analysis, statistical analysis and hypothesis testing. The findings were reported at a three-day gathering of the managers of all 17 participating utilities last October.

The results included some useful indicators. For example, there was wide variation in capital reinvestment levels and methods-if any-for calculating what such reinvestment levels should be.

"Collection and treatment plant systems generally last 50 to 100 years," said North. "Utilities are still trying to understand how to quantify replacement values and how much upgrade expenditure is appropriate. Not many have a good grasp of these amounts."

The findings also showed a considerable variety of personnel policies and labour measurements such as levels of absenteeism.

Overall, North feels three fundamental advances have been achieved by the benchmarking project so far: · An effective methodology has been devised for gathering meaningful data; · Performance models have been developed that reflect and encompass the full diversity of Canadian wastewater utility experience; and · A network for exchanging wastewater management expertise has been created. This spring, as Reid Crowther prepared the final report on phase two, phase three of the benchmarking project was getting underway.

"We would like to involve all wastewater treatment operations in Canada serving communities of 50,000 or more," said North. "The 17 current participants handle the wastewater treatment for 30 per cent of the Canadian population. Our goal this time is to involve 25 utilities."

Phase three will be a five-year effort and will shift the focus of the benchmarking project from metric benchmarking to process benchmarking. That is, crunching numbers gathered in the next few years in accordance with the benchmark definitions should show correlation with levels of process performance.

"You need to understand the metrics before you can use them to identify process problems or improved process efficiency," said North. "For example, the metrics might point to the part of

treatment involving excessive energy consumption, but process benchmarking would be needed to understand specific energy usage that impacts the plant's overall cost and performance."

A few gaps still remain in the components of the metric benchmark models, he said, and these will probably undergo some additional tweaking in phase three as the utility managers make further suggestions to perfect them.

Utilities joining phase three will subscribe to it on an annual basis, receiving copies of the annual reports showing the relative performance of all the collection and treatment operations and can participate in the yearly workshops.

Interested Canadian wastewater utilities should phone Andy North at Reid Crowther and Partners Ltd. (604) 298-6181; fax (604) 294-8597 or e-mail anorth@reid-crowther.com.