TOTAL WATER REUSE AT A WASTE-TO-ENERGY FACILITY

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Discussion by

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This paper is a good example of a nontechnical paper that contributes nothing to the state of the art of water and waste water management. It is quite possible that the authors in their desire to further the image of their company in being first to present what they felt to be an innovative water management system, ended up presenting this paper prematurely. It should be noted that the mass burn facility for Lancaster County is not scheduled for completion until early 1991 and that not much design engineering may have been completed at the time the authors commenced writing the paper.

This could have turned out to be a good technical paper and have provided a worthwhile contribution to the field of water and waste water management since the use of sewage plant effluent for plant makeup water is still unusual so that design and operating data is scarce. Also, every zero waste water discharge plant design encounters unique problems related to site and specific plant equipment that it offers an opportunity for innovation and there is never an overabundance of this type of technical data.

The authors could have improved their paper by having introduced their water balance diagram near the beginning of their paper and walked the readers through the major water use processes with their related waste treatment problems. The value of the paper could have been enhanced if the following data had been included:

(a) A comparison of Susquehanna River water quality to Elizabethtown WWTP effluent quality and how this influenced the selection process.

(b) A table presenting the economic comparison used as the the basis for selecting between Susquehanna River or Elizabethtown WWTP effluent water for plant makeup.

(c) Predicted influent and effluent water quality for each major plant water usage.

(d) A description of Chemical/Physical treatment systems studied and provided anticipated treatment results.

(e) A description of the dewatering and sludge handling systems under consideration.

(f) A description of any methods considered for protecting ground water from contamination due to ponded water leakage or filter cake leachate.

I would recommend that the authors follow-up on this paper after the mass-to-energy plant of Lancaster County goes into operation in 1991, and prepare a good technical paper which should compare plant operating results to the predicted design results. The future paper should include all of the water quality data that is missing from this paper and describe the various water treatment processes as well as providing operating results. If the authors make a good effort to provide good technical data in the followup paper, they would then be making a worthwhile contribution to the field of water and waste water management.

Discussion by

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ABSTRACT

This paper discusses the study made pertaining to the selection of a potable and nonpotable source of water for the 1200 ton/day Lancaster County Waste-to-Energy Facility located on the Susquehanna River near Elizabethtown, Pennsylvania where water resources and sewage treatment facilities are very limited. This includes the steps where-in effluent water from the Elizabethtown Wastewater Treatment Plant (WWTP) is utilized as the source of nonpotable water in a zero discharge system.

CONCLUSIONS & RECOMMENDATIONS

This paper is lacking in substance in that no specific details are provided about the plant water system other than it uses effluent wastewater as the source of nonpotable water and well-water which is limited, for potable water services. The only potential sources of nonpotable water are the Susquehanna River and WWTP.

Other than an overall conceptual water balance diagram, there are no supporting data pertaining to method of treatment, backup for major upsets in the WWTP facility or the quality of the water.

This paper could be used as a fill in should there be a shortage of papers to fill up the session.

The use of effluent wastewater from a municipal sewage treatment plant as a source of nonpotable water is not new. It has been used as makeup to cooling towers and for use in condensers for many years. In some municipalities it has been evaluated for indirect return to the potable water supply system.

COMMENTS ON SUBJECT PAPER

This paper reviews the sources of water available for use in the plant. There are primarily two sources, namely, the Susquehanna River and the effluent from the WWTP facility. Potable water is obtained from an on-site well.

The decision to use effluent wastewater rather than water from the Susquehanna River was based on an environmental and economic analysis. There is, however, no reference or documentation in the paper to support this. It also appears that the Lancaster County Consultants had experience in the use of wastewater effluent at three other waste-to-energy projects. All other things being equal this represented a good political decision.

The concept of total reuse of water with no discharge would be applicable to both options. While not stated directly, it is implied that the quality of the wastewater from the tertiary treatment system was almost as good as river water and was consistent in quality. Furthermore, the supply was guaranteed by contract.

It was also stated that by using the effluent wastewater additional river water would be preserved for uses such as drinking water. The effluent wastewater currently flows into the Susquehanna just upstream of the proposed waste-to-energy plant location. Thus it would appear that either alternative would be equally acceptable.

A conceptual Water Balance Diagram—Total Water Reuse is included, but there is no discussion or indications as to what type of system would be used to treat the wastewater and other internally generated wastewater streams.

There are a couple of interesting aspects about the water balance; these include:

(a) The balance shows the onsite well water as being used for potable, partial makeup to the boiler feed water system with the balance going to an aerated water storage pond. This pond is also the source of firewater.

(b) The primary water for the boiler feedwater system is from the physical/chemical treatment system. In this system, all blowdowns from the boiler, the onsite sewage treatment system, the cooling tower blowdown, miscellaneous washwaters and makeup from the Elizabethtown WWTP facility are treated. It doesn't appear practical to combine all of these streams for pretreatment and then use it as the primary source of water to the boiler feedwater treatment system.

(c) This paper does not show a single stream analysis. These would be interesting considering the mode in which the water is being utilized.

AUTHOR'S REPLY

To James Rios

Our paper has obviously failed to properly convey that it was presenting a concept rather than a design or a research project. The discusser appears to have missed this point. The concept being presented is of total (sanitary and process), not partial, water reuse and is new to the best of our knowledge. The following is offered by way of clarification:

(a) The paper describes the logical sequence which led us to arrive at the concept and allow us to invite bids from full-service contractors. All the contractors responding gave firm, nonnegotiable bids based, in part, on the concept.

(b) No purpose would be served by using project funds to develop a reliable measurement of Susquehanna River water quality. The river is more than three-quarters of a mile wide at the project site with very dangerous rapids.

(c) Specific design parameters are being developed and may be the subject of a future paper as the discusser suggests.

The suggestion to include an analysis of the effluent is a good one and the data does exist. We decided to leave the data out of this paper since standing alone without design information appeared confusing.

To Lloyd Winsor and Luisito Alibutod

Again, we have clearly not made the point strongly enough that a concept is being presented, not a design. Additionally, the water reuse is total and not partial. The reason that partial reuse systems exist today is that the treatment of the remainder is of greater difficulty.

Two comments give me concern. The wastewater discharge is treated to secondary quality as stated in the paper, not tertiary as stated in the discussion, and nowhere is it implied that secondary effluent is equal in quality to the river water. Secondly, the effluent discharge is about a mile upstream. The chances of it remaining unmixed and undiluted when drawn into an intake would appear somewhat remote.

Concerning development of the conceptual water balance diagram, initial exploratory investigations indicated a limited groundwater potential at the site location. Although it was expected to be adequate for potable requirements, its availability for other higher water quality users (e.g., boiler feedwater) was uncertain. Therefore, provisions were incorporated into the concept to allow for increased reliance on groundwater for boiler feedwater and water storage pond maintenance should detailed subsurface investigations show greater potential. Until that could be substantiated, primary water supply for these areas would be the water treatment system. Furthermore, when design details are completed, it would seem reasonable to expect that some waste streams could be handled independently and that combined treatment of all streams would not be required.