

# TRIBUTARY TRIBUNE

## Effluent Flow Meters

All permits have a requirement for some form of flow quantification. In many permits, the requirement is for an effluent flow meter from pretreatment.

This article will describe common types of effluent flow meters in use and some things to keep in mind when selecting and maintaining your flow meter.

Flow meters will be either open channel or closed pipe.

### Open Channel Meters

Open channel flow meters consist of primary and secondary devices.

Primary devices such as weirs and flumes are constructed in such a way that a water depth measured at a certain point is proportional to the flow rate.

Secondary devices such as bubblers or ultrasonic transducers are used to measure the water depth and convert the depth to a flow rate. The flow rate would then be displayed and the cumulative flow totalized.

When selecting a combination of primary and secondary devices it is very important that you consider the effect of sediment and other characteristics of the

wastewater on your open channel flow meter.

For example, a wastewater discharge containing sediments would be better measured in a flume, which flushes itself, rather than a weir, where the sediments would build up. On the other hand, a bubbler used to measure the depth of water in the flume could be clogged by the sediments and give erroneous readings.

### Closed Pipe Meters

Closed pipe flow meters require a full pipe to operate properly. There are several types of closed pipe flow meters, two common types are electromagnetic and paddle wheel flow meters.

**Electromagnetic flow meters** measure the voltage produced by a conductor (the wastewater) moving through a magnetic field. The voltage is proportional to the velocity of the conductor and can be converted to a flow rate.

**Paddle wheel flow meters** convert the speed of rotation of a paddle wheel in flowing water to an average velocity, which is converted to a flow rate.

Equipment hidden inside a pipe cannot be casually inspected. Closed pipe flow meters must be

## QUICK TIPS

- *A requirement for an effluent meter means an accurate and working meter.*
- *The effluent flow should be compared to the incoming flow to check accuracy.*
- *Notify your Source Control Inspector if your flow meter is not working.*
- *Verify that the manufacturer's requirements of straight pipe lengths upstream and downstream of the meter have been followed.*

checked frequently for proper operation, particularly paddle wheel meters. A regular schedule must be established to shut down the discharge, take the pipe apart, and clean the flow meter.

### Requirements

The location of the effluent flow meter should be selected so that it will generate flow numbers that

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The *Tributary Tribune* serves the cities of San José, Santa Clara, Milpitas, Cupertino Sanitary District, West Valley Sanitation District (including Campbell, Los Gatos, Monte Sereno, Saratoga), County Sanitation Districts 2-3, Sunol & Burbank Sanitary Districts

represent all process wastewater discharging from your facility.

Your permit requires all wastewater monitoring equipment to be properly operated and maintained. Maintenance and calibration of the flow meter is necessary to ensure that it remains in proper working condition. Annual calibration is required. Certification of annual calibration must be submitted to your Source Control Inspector with a Self Monitoring Report; please check your permit for due dates.

A daily log of the flow meter totalizer readings is required to be submitted as part of your Self Monitoring Report. This daily log gives you an opportunity to check the operation of the flow meter.

A daily total of gallons discharged that varies significantly while no changes in operation have taken place or an unusual trend in flow rates may indicate the flow meter is not working properly.

The effluent flow should be compared to the other quantifiable flows. Quantifiable flows include: incoming water bills, R/O meters,

and influent flow meters dedicated to process. Performing this comparison can help detect a flow meter going out of calibration.

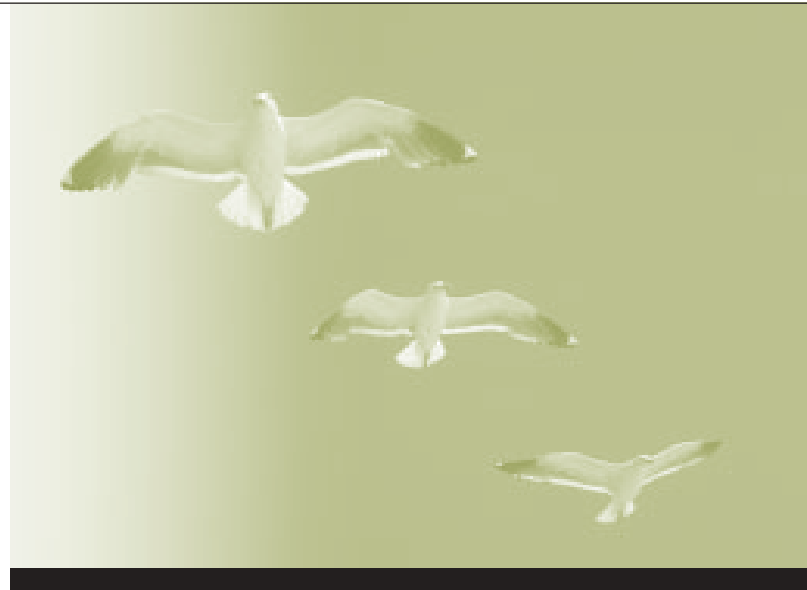
### **Selecting a flow meter**

Many factors can influence the selection of the proper flow meter for each application. It is very important that the manufacturers' information is thoroughly reviewed to determine which flow meter is most appropriate for your particular situation.

Each flow meter is accurate over a limited range of flows. To get an accurate flow measurement, you must select a flow meter that corresponds to the range of flows that will be discharged from your facility.

A discharge with a widely fluctuating flow may not correspond to the flow range of available flow meters; this means you may have to equalize the flow prior to the effluent meter, such as in an equalization tank.

Flow meters are sized for specific diameters of pipe, and require certain lengths of straight pipe upstream and downstream



of their installation to ensure the measured flow will be accurate. The amount of space you have will determine which type of flow meter can be properly installed in your facility. For example, a flume may need to be two feet longer than an electromagnetic flow meter for the same discharge application.

The characteristics of your wastewater will also help determine the appropriate type of flow meter for your discharge. A build up of material from wastewater with sediments or a lot of dissolved solids or oil & grease may clog any type of flow meter. A flow meter installed in such a waste

stream will require a lot of cleaning and maintenance.

For instance, in closed pipes, the accuracy of a paddle wheel flow meter can be degraded by fouling from a build up of material or a piece of debris in the waste stream.

### **Final points**

Check with your inspector before installing an effluent meter, to be sure that the location will accurately measure your flows.

A required effluent flow meter must be operating properly and recording the flow accurately. Failure to have a properly operating flow meter could result in enforcement action being taken against your company.

Notify your Source Control Inspector if your flow meter is not operating properly so alternate arrangements can be made to accurately quantify your wastewater discharge flow rate.



# Get WET With Cooling Tower Modifications

For many industrial and commercial businesses, cooling systems are the single highest water user. Cooling systems are also ideal candidates for water conservation. By modifying cooling system operation, using recycled water or optimizing the use of potable water, companies can significantly reduce the amount of water use and wastewater discharge and qualify for a **Water Efficient Technologies (WET)** rebate.

In their most recent project completed earlier this year, an Industrial User (IU) installed a Reverse Osmosis (RO) system to further treat Acid Waste Neutralization (AWN) wastewater so it could be suitable to reuse in an onsite cooling tower. A bulk storage tank stores the RO water prior to introduction into the cooling towers (Figure 1).

The RO system is monitored by a control panel that tracks the water quality in the cooling towers and the flowrate. The system was installed by a third-party vendor and cost an estimated \$78,000 to purchase and install.

The changes in blowdown were also monitored to determine how the change in water quality affected the cooling tower blowdown rates. The results showed a 16% overall decrease in blowdown. This was attributed to the lower amount of Total Dissolved Solids (TDS) in the RO water versus City water.

Flow meter readings showed that their project

**saved over 16,000 gallons per day**, an estimated 50% reduction of the overall water use at the facility. For their efforts to reduce flow to the Bay, the IU **received a check for \$31,608**. With the rebate and saved costs in water and wastewater discharge, the project payback is estimated to be less than 2 years.

In order to encourage wastewater conservation projects, WET offers rebates for companies that

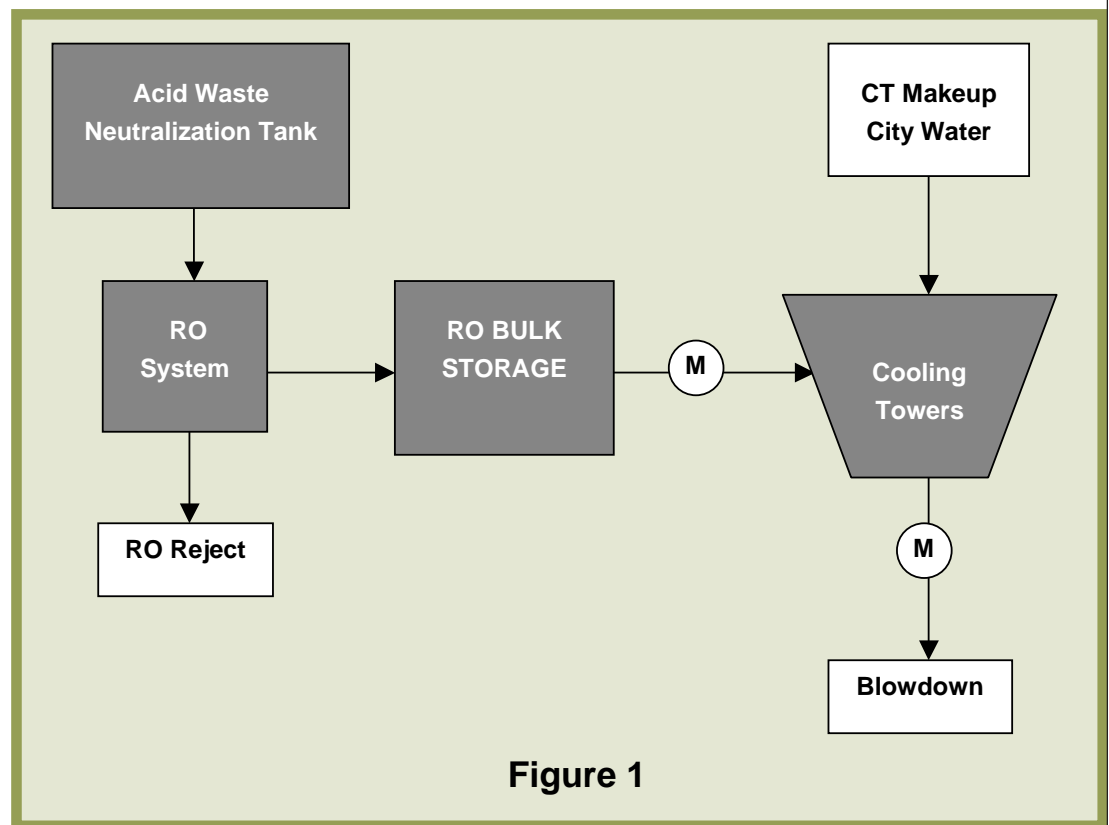
result of equipment installed for a product change. The minimum water savings required for a WET rebate is 100 cubic feet of water saved per year (or 74,800 gallons per year).

The rebate is based upon the annual water savings and is \$4 per hundred cubic feet of water saved per year (748 gallons). The maximum rebate is \$50,000 or 50% of project cost, whichever is less.

provided to document costs. After the post-installation inspection is performed, WET staff determine the water savings, and a rebate check is issued.

To find out how your company can participate in **Water Efficient Technologies**, please call **(408) 945-3700** or visit our website at:

[www.slowtheflow.com](http://www.slowtheflow.com)




**Figure 1**

make equipment changes that reduce wastewater discharge.

The qualification criteria is designed to be straightforward. The project must reduce wastewater flows to the sanitary sewer and be the result of replacing an existing process, not the

To apply for the rebate, complete the one page application and schedule a pre-project meeting with the WET Project Coordinator. Typically, water metering is required to document pre- and post-project water savings. Project costs such as equipment and labor invoices need to be

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In accordance with the Americans with Disabilities Act, City of San José Environmental Services Department materials can be made available upon request in alternative formats, such as Braille, large print, audio-tape or computer disk. Requests may be made by calling (408) 277-5533 (Voice) or (800) 735-2929 (CRS).

## FREE Water Efficiency Workshop

The Watershed Protection Division of the City of San José Environmental Services Department (ESD) is pleased to announce its upcoming **Commercial and Industrial Water Efficiency and Reuse Workshop**. The workshop will take place on **November 22, 2002** at 5700 Almaden Expressway in San José at the Santa Clara Valley Water District offices.

This workshop will focus on flow reduction technologies and processes. It will include technical presentations, case studies and a vendor's showcase. ESD

will introduce the recently completed **Guidelines for Managing Water in Cooling Systems** to encourage companies to more efficiently operate cooling systems. *The workshop is free* and lunch will be provided.

This will be an excellent opportunity to learn about technologies, hear success stories, and interact with peers, vendors, and regulators.

Seating is limited. You may register online at: [www.slowtheflow.com](http://www.slowtheflow.com) or call Geoff Blair at (408) 945-5332.



*Turn to page 3 to see an example of cost-saving cooling tower practices at work.*

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