4.2 Industrial Alternative Sources and Reuse of Process Water

Applicability

This BMP is intended for industrial water users that have the opportunity to reuse process water or other sources of nonpotable water such as treated effluent, rainwater collected on site, condensate, graywater, storm water, sump pump discharge or saline sources as a substitute for potable or raw water.

Once an industrial water user decides to adopt this BMP, the water user should follow the BMP process closely in order to achieve the maximum water efficiency benefit from this BMP.

Description

Replacing potable water use with an alternative water supply is an effective way to improve water use efficiency. The industrial water user should survey all water uses on site and determine if process water or other sources of nonpotable water such as treated effluent, rainwater collected on site, condensate from cooling, graywater, storm water, sump pump discharge or saline sources could be substituted for potable water uses. A feasibility analysis should be conducted to determine the cost-effectiveness of conversion to each potential alternative source of reuse water. Benefits from implementation of this BMP may include lower utility costs, energy savings, and reduced process costs. Water quality necessary for the intended end use should be understood as well as the engineering technology necessary for treatment of reuse water prior to use.

For an industrial water user within close proximity of a utility reclaimed water line, purchase of treated effluent or reuse water may also be an option for completing this BMP.

Implementation

To determine if the potential exists for using nonpotable water as an alternative source the industrial water user should conduct a facility survey and feasibility analysis generally following the guidelines outlined below. References that provide more detailed information are listed in Section I below.

1) <u>Preparation and information gathering</u>

Types of information that should be collected before beginning the survey include water use and water quality data for the past three years including utility records of water used and wastewater generated, actual water use on site including submetered use, and existing non-utility water use such as wells or storm water.

Any alternative sources that may be available such as municipal effluent, effluent from other industrial water users in the area, high quality process water that is being discharged, or brackish groundwater and storm water should be identified. Chapter 210 Reclaimed Water Rules of the Texas Commission on Environmental Quality should be reviewed. TCEQ

authorization is required when industrial reclaimed water is received from or sent to others, but these rules may not apply if the reuse system is internal to the facility and not discharging to surface waters. This information is necessary for completing the facility alternative water use report as described below in C.3.

2) Conduct facility survey

The water use survey should include identification and verification of all equipment and processes that use water and the required water quality and quantity for the equipment or process. Water quality should be measured so that the water quality of a process discharge can be matched with the water quality of a process or equipment need. It should be noted whether the equipment or process consumes water or is a nonconsumptive use. All sources of water that could be potentially be reused such as process rinse water, water used for equipment cooling, rainwater, etc., should be catalogued for water quality and water quantity. If reclaimed water is available from the local utility, another plant, or from another source such as seawater or brackish water, the cost to bring alternative water to the facility should be determined and included in the facility alternative water use report described next.

3) Prepare a facility alternative water use report

After the survey data is collected, the alternative water use report should analyze the reliability of the alternative supply and the equipment and processes that have been identified that could use an alternative source of water. The cost of piping, storage and any additional treatment that would be required for the alternative source of water should be calculated. When poorer quality source water is substituted, careful evaluation of effluent water quality is important to ensure that water quality discharge constraints are met.

4) Prepare a cost-effectiveness analysis

The cost-effectiveness analysis should determine if each alternative source of water can replace water used from other sources and should be based on equipment costs and any treatment that might be required. Additional guidance is provided in Chapter 3.15.

5) Prepare an action plan

The facility evaluation action plan should contain the alternative reuse project proposals and a timetable for implementation.

Schedule

1) The survey, alternative water use report and cost-effectiveness analysis should be completed in a timely manner. Very large or complex surveys, reports and analyses should be completed within the first twelve (12) months of initiating this BMP.
2) The action plan should be implemented in the normal business cycle. For very large or complex facilities, the action plan should be implemented within twelve (12) months immediately following the completion of the cost-effectiveness report in order that the maximum water efficiency

benefit can be achieved in a reasonable time frame. Major projects may take additional time for implementation.

3) If determined to be necessary for very large or complex facilities, the schedule can be extended. BMPs should be initiated in the second year and continued until the targeted efficiency is reached.

Scope

To accomplish this BMP:

1) Organizations with one facility, or several facilities with the same or very similar industrial processes, should conduct a facility survey following the schedule outlined in Section D.
2) For organizations with multiple facility sites, or multiple industrial processes, a progressive implementation schedule should be followed, implementing the BMP in successive facilities until all facilities have been surveyed and alternative water sources implemented.
3) Cost-effectiveness considerations may result in partial implementation of this BMP at one or several of a large number of facilities.

Documentation

To track the progress of this BMP, the industrial water user gathers and maintains following documentation and can utilize industry accepted practices:

1) The facility survey report;
2) Cost-effectiveness analysis;
3) The action plan;
4) Schedule for implementing the action plan;
5) Documentation of actual implementation of alternative water sources contained in the action plan; and
6) Estimated potable water savings and actual potable water savings for alternative water source implemented.

Determination of Water Savings

The industrial water user should calculate potable and/or raw water savings based on metering of the alternative water sources implemented. Water savings estimates can be calculated based upon the percentage of water estimated to be replaced by reuse water:

$S = R \times Wp$

Where S = Savings in Acre-feet/year

Wp = water use prior to implementing BMP for specific processes targeted for reuse water, and

R = percentage efficiency of reuse system.

An industrial water user interested in implementing this BMP can get reasonable estimates of potential reuse efficiencies from manufacturers' estimates, comparisons with similar facilities, or the list of references in Section H of this BMP.

Cost-Effectiveness Considerations

The industrial water user should determine the cost effectiveness to implement each identified replacement or equipment upgrade, utilizing its own criteria for making capital improvement decisions. A cost effective analysis under this BMP should consider not only the capital costs of any equipment or process changes and improvements, but also the one-time costs of the reuse opportunity survey and feasibility study, any water quality sampling and testing, and regulatory costs. Additional ongoing costs may include staff and labor, chemical and treatment costs, additional costs or savings in energy use, and potential savings in wastewater treatment costs.

References for Additional Information

1) *A Water Conservation Guide for Commercial, Institutional and Industrial Water Users*. New Mexico Office of the State Engineer, July 1999. http://www.seo.state.nm.us/water-info/conservation/pdf-manuals/cii-users-guide.pdf
2) *Handbook of Water Use and Conservation*, Amy Vickers, Waterplow Press, May 2001.
3) *Water Efficiency Guide for Business Managers and Facility Engineers*, State of California Department of Water Resources, October 1994.
4) *Waste Not, Want Not: The Potential for Urban Water Conservation in California,* Pacific Institute, November 2003. http://www.pacinst.org/reports/urban_usage/waste_not_want_not_full_report.pdf
5) *Texas Guide to Rainwater Harvesting,* Texas Water Development Board, 1997. http://www.twdb.state.tx.us/assistance/conservation/Cons-image/Downloads/RainHarv.pdf NOTE: To be updated Fall 2004.
6) *Commercial and Institutional End Uses of Water*, AWWA Research Foundation, Summer 2000.
7) *TCEQ Chapter 210 Rules on Reclaimed Water.* http://www.tnrcc.state.tx.us/oprd/rules/pdflib/210a.pdf
8) *TCEQ Application to Use Industrial Reclaimed Water.* http://www.tnrcc.state.tx.us/permitting/forms/20094.pdf