1986 Kansas Industrial Water Conservation Plan Guidelines

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INDUSTRIAL WATER CONSERVATION
CONSERVATION PLAN GUIDELINES

INTRODUCTION

Chapter 392 of the 1986 Session Laws of Kansas requires the preparation of guidelines for water conservation plans and practices. The primary goal of conservation plans and practices is to achieve more efficient use of the state's limited water resources. The Kansas Water Office is the state agency directed to develop and maintain conservation guidelines with approval by the Kansas Water Authority. The primary objectives in establishing state conservation guidelines are: 1) to provide guidance to local water users when preparing water conservation plans; and 2) to serve as a general guide for state agencies in reviewing and approving conservation plans.

These guidelines are intended for use by industries with self-supplied water systems which are required by law to prepare conservation plans.

DEFINITIONS

Water Conservation - Water conservation measures are actions that reduce demand for water, improve efficiency in water use and reduce water losses and waste.

Supply Management - Supply management seeks to alleviate stresses on the supply (depletion, pollution) and minimize the loss of water between withdrawal points and the points of delivery.

Demand Management - Demand management addresses the amount of water needed for specific industrial uses such as cooling, processing and incorporation into a final product.

Industrial Water Use - Industrial water use as defined by K.A.R. 5-1-1(n) includes: The use of water in connection with the manufacture, production, transport or storage of products, or the use of water in connection with providing commercial services including water used in connection with steam electric power plants, secondary and tertiary oil recovery, air conditioning, heat pumps, restaurants, hotels and motels.

INDUSTRIAL WATER USE EFFICIENCY

Based on a survey by the Kansas Water Resources Board, approximately 972,600 acre-feet of water was used by industries in Kansas in 1975. Of this total, 58 percent was used in thermal electric power generation, 28 percent in mining and 15 percent in manufacturing.

Overall, about 70 percent of the water used in manufacturing is for cooling and condensing. Also, cooling accounts for nearly all the water use in steam electric power generation. Cooling water is used to protect equipment, to maintain proper operating temperatures, for air conditioning and to speed the production process by reducing the time for cooling between cycles.

Water is used in several mining or oil and gas operations. Among these are washing of coal, sand and gravel or limestone. Water flooding of oil wells is used to enhance production from depleted wells.

Of the manufacturing firms reporting in 1975, 84 percent obtained their water from municipal systems with the remainder utilizing self-supplied systems. Most of the water use, approximately 63 percent, was attributable to the self-supplied systems.

All diverted quantities of water are not consumed. Water not consumptively used is discharged and available for further use.

Industrial conservation planning includes consideration of long-term measures and those measures specifically of value during drought or other short-term emergency situations. Both supply and demand management options are available for use in planning an industrial water conservation program over the long term. Several supply or demand management options are described briefly below:

Supply Management Options:

1. Use of Wastewater as Process Water Elsewhere

   The Dow Chemical Company plant at Pittsburgh, California, achieved a 93 percent reduction in water use by using the waste streamflow from one process as raw water for another process. A fruit cannery in the Pacific Northwest reduced effluent quantities by 50 percent by using its wastewater for container cooling, initial product conveyance and floor and gutter wash.

2. Leak Detection and Repair

   Leaks in industrial plants are as important as leaks in municipal systems. Water audits can help locate such leaks.

3. Substitution of Low-Quality Water.

   Some industrial and mining functions do not require the use of high-quality water. Examples include floor or gutter washing, some product conveyance systems and washing of limestone. The use of low quality or brackish water otherwise unfit for use can reduce demands made upon the

higher-quality supply.

4. Skimming of Excess Streamflow

Within the authority of the law, excess streamflows may be diverted and stored for use during periods of low flow.

Demand Management Options:

1. Alternative Cooling Methods

Once-through cooling or dry cooling towers may be considered as alternatives to conventional wet evaporative cooling towers.

2. Recycling

The most efficient method of reducing process water use is to initiate a recycling system. Regulatory standards are a major disincentive to recycling. When water quality standards are based on concentration rather than quantity, it effectively discourages recycling.

3. Pressure Reducing Valves

Pressure reducing valves can be installed upstream of rinse tanks to eliminate waste caused by excess pressure.

4. Increased Process Water Application Efficiency

The use of cascade rinses, spray rinses, or interval spray rinsing can save water. Air blown rinses can increase efficiency as can multiple rinsing and proper design of rinse tanks. Water use reductions of over 90 percent have been achieved through the use of air in conjunction with water in washing and rinsing processes, counter flow rinse, multiple rinse and mechanical agitation.

5. Use of Residential Conservation Techniques

The use of toilet dams or displacement bottles in the toilet tank, or water-saving commercial toilets can reduce employee sanitary and personal water use substantially. Low flow shower heads and faucet aerators can affect additional water savings.

6. Process Modification

Process modifications such as switching from water to air cooling or to a dry product conveyance system can reduce water use.

7. Rinse Water Reduction

   The amount of rinsing water required to clean parts can be reduced if the amount of chemicals on the parts being processed is reduced.

DROUGHT CONTINGENCY MEASURES

During an emergency situation such as a prolonged drought, water supplies may be threatened. A drought contingency plan should be developed to deal with such emergencies. The conservation options available for dealing with such an emergency are described above in relation to long-term water conservation. An industry may wish to implement some of these for long-term conservation while phasing in others in the event of an emergency. Also, an industry should investigate the availability of alternate or substitute water supplies for use if emergency conditions warrant.

PLAN PREPARATION GUIDELINES

An industrial conservation plan is a document describing a proposed conservation program in sufficient detail to give a conceptual representation of the water conservation practices to be employed and permit estimation of any water use reduction to be expected. The plan must encompass both long term and drought contingency measures. An industrial conservation plan should generally provide the following specific information: 1) background information identifying problems and establishing a conservation goal; 2) analysis of supply and demand management options; 3) selection of management options; and 4) any other pertinent information regarding water use.

General guidelines for the preparation of an industrial conservation plan include:

1. The following seven-step procedure shall be utilized in preparing a long-term industrial conservation plan:

   a. Identify problem/establish conservation goal;

   b. Assess potential of supply management;

   c. Analyze cost-effectiveness and impacts of management programs;

   d. Identify actions to minimize adverse impacts;

   e. Choose management program(s)/design the specifics of each management program;

   f. Evaluate and select hardware/software; and

g. Summarize conservation plan.

2. The following six-step procedure shall be utilized in preparing a drought contingency plan:

   a. Identify supply situation in relation to drought;

   b. Define goal and establish framework for sequential emergency measures;

   c. Assess supply augmentation options;

   d. Assess demand reduction options;

   e. Develop plan for sequential emergency measures; and

   f. Select water-saving hardware/software.

3. Industries may select appropriate options for meeting their conservation goals as individual circumstances dictate. However, all conservation plans must include metering of the raw water intake to the system in compliance with meter installation standards established by the Kansas State Board of Agriculture - Division of Water Resources and if applicable, the appropriate groundwater management district. An accounting of the discharge from the plant is also encouraged to provide a complete picture of the industry's water-use situation. Annual water use reports shall be provided to the Division of Water Resources.

PLAN REVISION, MONITORING AND EVALUATION

Once a conservation plan has been prepared and implemented, it is important that the plan be kept up-to-date. Also, the effectiveness of industrial conservation plans as-a-whole needs to be monitored and evaluated.

Following initial implementation of an industrial conservation plan, the plan should be revised, if necessary, to reflect changes in operating conditions or improvements in industrial water conservation practices which are feasible and practical to implement. Also, the agencies responsible for approval of industrial conservation plans should sample the effectiveness of such plans, particularly in those geographic areas (e.g. groundwater management district, river basin, intensive groundwater use control area etc.) experiencing or expected to experience water supply shortages or other water supply problems.