

# **Kansas Class I Water Operator Need to Know**

**April 22, 2009**

---



Kansas Department of Health and Environment  
Division of Environment  
Bureau of Water  
1000 SW Jackson Street, Suite 420  
Topeka, KS 66612-1367

The Kansas Department of Health and Environment (KDHE) has compiled the following minimum knowledge expectations for water operators. The intent of this document is to identify those items which individuals are expected to comprehend in order to serve as water operators. This document is not intended to serve solely as a study guide for operator certification examinations. In order to pass a certification examination, an operator must possess knowledge gained through formal education and training as well as on-the-job experience.

# **Kansas Class I Water Operator Need to Know - Ranked by Priority Within Each Knowledge Area**

## **I. Chlorination/Disinfection**

- Knowledge of disinfection concepts and procedures (e.g., chlorine contact time, residual, demand, dosage)
- Knowledge of water-borne diseases
- Skill to replace chlorine cylinders and adjust gas chlorinators
- Knowledge of the pH/temperature relationship in the chlorine disinfection process
- Knowledge of the difference between disinfection and sterilization

## **II. Distribution & Pumping**

- Skill to detect water leaks
- Knowledge of pipe disinfection and de-chlorination procedures for new installations and repairs
- Skill to locate buried utilities and pipes
- Knowledge of Kansas One Call (e.g., 1-800-DIG-SAFE)
- Knowledge of pipe fittings and joining methods
- Skill to install and repair buried pipe
- Knowledge of piping materials (e.g., type and size)
- Knowledge of engineering drawings and maps
- Skill to inspect and/or replace pumps
- Knowledge of the different types of pumps (e.g., centrifugal, submersible, vertical turbines, positive displacement) and motor/pump combinations
- Knowledge of different types of pipe joints and restraint systems

## **III. Laboratory/Chemistry**

- Knowledge of water-related carcinogens
- Knowledge of laboratory equipment
- Knowledge of water aesthetics such as color, taste and odor, staining, and scale formation
- Knowledge of normal characteristics of water
- Skill to recognize abnormal analytical results
- Knowledge of source and finish water characteristics
- Knowledge of carbonate and non-carbonate hardness and other hardness-causing compounds
- Knowledge of normal chemical range
- Knowledge of laboratory techniques
- Knowledge of measuring instrument

#### **IV. Management, Source Water Protection & Cross Connection**

- Knowledge of cross-connection control and approved backflow methods and devices
- Skill to communicate verbally
- Knowledge of emergency plans
- Knowledge of potential causes and impact of system disasters
- Knowledge of watershed or well-head protection
- Knowledge of quality control/quality assurance practices
- Knowledge of potential causes and impacts of disasters in a facility
- Skill to coordinate emergency response with organizations
- Skill to assess the likelihood of a disaster occurring
- Skill to perform impact assessments (i.e, consequences of actions)
- Knowledge of local codes and ordinances
- Skill to organize information
- Knowledge of customer service and public participation process
- Skill to communicate in writing
- Skill to translate technical language into common terminology
- Knowledge of risk management
- Knowledge of technical, financial, and managerial practices
- Skill to write policies and procedures
- Knowledge of the principles of management

#### **V. Math**

- Skill to perform math function (e.g., addition, subtraction, multiplication, division, fractions, percentages, formulas, volume, area, detention time)
- Skill to adjust chemical feed rates
- Skill to calculate dosage rates
- Knowledge of the principles of measurement (e.g., flow, volume, area, velocity, performance, analytical)
- Skill to perform process control calculations
- Skill to measure chemical weight/volume
- Skill to perform laboratory calculations

#### **VI. Operations Groundwater**

- Knowledge of facility operation and maintenance
- Knowledge of system operation and maintenance
- Skill to discriminate between normal and abnormal conditions
- Knowledge of water treatment processes
- Skill to discriminate between normal and abnormal equipment conditions
- Knowledge of monitoring requirements
- Skill to perform general maintenance and repairs
- Knowledge of operation and maintenance practices
- Skill to use hand tools
- Skill to evaluate operation of equipment

## Class I Water Need to Know (continued)

- Knowledge of function of tools
- Skill to differentiate between preventative and corrective maintenance
- Knowledge of start-up and shut-down procedures
- Skill to maintain processes in normal operating condition
- Skill to diagnose, troubleshoot, evaluate, and adjust system components
- Knowledge of the proper application of chemicals
- Skill to evaluate facility performance
- Skill to prepare chemicals
- Knowledge of mechanical equipment
- Skill to order necessary spare parts
- Skill to monitor mechanical equipment
- Skill to adjust equipment
- Knowledge of monitoring instruments
- Knowledge of testing instruments
- Skill to follow written procedures
- Knowledge of the "point of entry"
- Skill to review reports
- Skill to evaluate and troubleshoot processes
- Skill to perform physical measurements
- Skill to diagnose/troubleshoot process components
- Knowledge of electrical principles
- Knowledge of water treatment design parameters
- Knowledge of flow measurement devices (e.g., Venturi, Pitot, flow meter)
- Knowledge of hydraulic principles
- Knowledge of well construction and maintenance
- Skill to monitor electrical equipment
- Knowledge of process control instrumentation
- Skill to calibrate instruments
- Knowledge of the principles of public relations
- Skill to interpret data

## **VII. Safety**

- Knowledge of proper chemical handling and storage
- Skill to operate safety equipment
- Skill to select safety equipment
- Skill to recognize unsafe work conditions
- Knowledge of personal protective equipment
- Knowledge of proper safety procedures
- Skill to identify potential safety hazards
- Skill to identify fire and safety hazards (e.g., electrical, chemical, traffic)
- Skill to demonstrate safe work habits
- Knowledge of safety regulations (e.g., OSHA, KDHR)
- Skill to interpret Material Safety Data Sheets

**VIII. Sampling, Recordkeeping Reporting & Regulatory**

- Knowledge of federal, state, and local regulations pertaining to water systems
- Skill to apply regulations
- Knowledge of proper sampling procedures
- Knowledge of the Safe Drinking Water Act
- Skill to report findings
- Knowledge of water-related professional ethics (e.g., reporting honest and accurate test results)
- Knowledge of reporting requirements
- Knowledge of the Safe Drinking Water Act
- Knowledge of primary and secondary drinking water standards
- Skill to determine what information needs to be recorded
- Skill to record information and data
- Knowledge of public notification requirements
- Knowledge of recordkeeping policies
- Knowledge of the regulatory inspection process
- Knowledge of the function of a recordkeeping system