OPERATOR NEED-TO-KNOW
WATER PRODUCTION
CLASS 1

SKILL LEVEL REQUIREMENTS

A. Know the responsibilities of a small water system operator.
B. Know the hydrologic cycle, the sources of water and their physical, chemical and biological characteristics.
C. Know the potable water requirements as to quality, chemical and bacteriological.
D. Know the general water quality characteristics of surface water and groundwater supplies.
E. Know the types of pumps used and the relationship of capacity to head.
F. Know how to collect water samples both surface and from production facilities.
G. Understand basic mechanical and electrical principles as they apply to facilities of this type and class.
H. Know the sanitary and construction rules and regulations of water wells.
I. Know the sanitary considerations of watersheds.
J. Know the reasons for disinfection, methods of disinfection, test requirements and procedures.
K. Know the purpose of a well and intake structure, their similarities and differences.
L. Know the safe use, handling and storage of chlorine and other chemicals used in water production.
M. Know the AWWA and or NSF Standards for water treatment chemicals.
N. Know and understand the hazards of cross-connections and how to prevent them.
O. Know and understand drinking water quality standards as formulated by EPA, Health Department or other governmental agencies.
P. Know the various types of storage facilities and purpose.

MATH NEED TO KNOW

Converting of Standards
Area Calculations

OPERATOR NEED-TO-KNOW
WATER PRODUCTION
CLASS 2

SKILL LEVEL REQUIREMENTS

A. Know all skills required in lower class.
B. Know the problems and consequences of undesirable chemical, materials in drinking water.
C. Know how to select sampling points for chemical and bacteriological samples.
D. Know how to sample, preserve and transport samples.
E. Know what common nuisance organisms are, what problems they cause, and how to correct them.
F. Know how to operate a residual disinfection system, including the computation of material requirements.
G. Know the merits of various type of pumps and the basic parts of each.
H. Know and understand basic for screen size, materials used, and the use of gravel wall or gravel packed wells.
I. Know how to calculate well, lines and tank volumes and convert flow rates and pressure.
J. Know the basis for screen size, materials used, and the use of gravel wall or gravel packed wells.
K. Know the effect of land use on a watershed and water quality.
L. Know how to make emergency repairs or temporary replacement of equipment to provide continuous supply.
M. Know the safety features of properly designed chlorine equipment.
N. Know how to respond to a chemical release and how to remediate.
O. Know safety aspects of water production.
P. Develop customer relations program.

MATH NEED TO KNOW

Converting of Standards
Area Calculations
Volume Calculations – Circle & Square
Converting of Flow Rates
Velocity
Percent Calculations
Chemical Dosage (Simple)
Detention, Retention

OPERATOR NEED-TO-KNOW
WATER PRODUCTION
CLASS 3

SKILL LEVEL REQUIREMENTS

A. Know all skills required in lower classes.
B. Know how to determine adequacy of supply with partial failure to meet demands.
C. Know how to set up and carry out a preventative maintenance program.
D. Know how to measure water flows, calculate pump rates from flows on fill or withdrawal volumes.
E. Understand the principles and applications of instrumentation, controls and SCADA equipment which are common with such systems of this class.
F. Know how to select a pump from head/capacity curves and be able to interpret a pump performance curve.
G. Know the causes of decreased well production and how to determine the loss and how the loss may be corrected.
H. Know the sources of data on wells and water quality in various aquifers.
I. Know the problems caused by algae in and impoundment and methods of control.
J. Know the causes and effects of water hammer as they relate to production facilities.
K. Know how to calculate chemical dosage.
L. Know how to calculate pump work and horsepower requirements.
M. Know the requirements of OSHA and other safety regulatory agencies.
N. Know how to identify taste and odor problems and correct.

MATH NEED TO KNOW

Converting of Standards
Area Calculations
Volume Calculations – Circle & Square
Converting of Flow Rates
Velocity
Percent Calculations
Chemical Dosage (Simple)
Detention, Retention
Percent Strength of Solutions
Pump Capacity (Curves)
Horsepower and Cost
Pump and Motor Efficiency
Pumping Equipment Capacity Calculations

OPERATOR NEED-TO-KNOW
WATER PRODUCTION
CLASS 4

SKILL LEVEL REQUIREMENTS

A. Know all skills required in lower classes.
B. Know how to prepare and interpret pump performance curves from given test data.
C. Know the essential features and purpose of sanitary surveys of drinking water supply source.
D. Know the potential sources of groundwater pollution.
E. Know the potential sources of surface water pollution.
F. Know how to determine production cost and make cost reports.
G. Understand the basic principles and application of flow formula for orifices, venturi or weirs.
H. Know how to plan and carry out a watershed sanitation program.
I. Know how to measure evaporation and calculate the water loss from an impoundment.
J. Know the cause and effects of drawdowns, the influence on adjacent wells, and what should be done to minimize.
K. Know how to determine manpower requirements to provide continuous plant operations.
L. Know the consequence of contamination and spread of various diseases.
M. Know how to set up a safety program production facilities.
N. Know math skills needed for this level.
O. Know how to compute chemical requirements in production and cost.
P. Know how to calculate pumping heads and pumping cost.

MATH NEED TO KNOW

Converting of Standards
Area Calculations
Volume Calculations – Circle & Square
Converting of Flow Rates
Velocity
Percent Calculations
Chemical Dosage (Simple)
Detention, Retention
Percent Strength of Solutions
Pump Capacity (Curves)
Horsepower and Cost
Pump and Motor Efficiency
Pumping Equipment Capacity Calculations