

**BOARD OF CERTIFICATION OF OPERATORS
OF DRINKING WATER SUPPLY FACILITIES
POLICY FOR
TRAINING REQUIREMENTS TO SIT FOR EXAMS**

I. POLICY OBJECTIVES & APPROVAL REQUIREMENTS

This policy, developed by the Board of Certification of Operators of Drinking Water Supply Facilities (the Board), establishes criteria relative to training requirements that must be completed prior to an applicant being allowed to sit for a drinking water certification exam. The policy includes the following:

1. Training requirements to sit for exams
2. Implementation schedule
3. Approval of training courses

II. TRAINING REQUIREMENTS TO SIT FOR EXAMS

1. Training Requirements - Applicants must meet the following training requirements in order to sit for the drinking water exams:
 - a. VSS, D1, and T1 Exams – No requirements.
 - b. D2, D3 and D4 Exams – Satisfactory completion of Basic Distribution Training Course (Attachment 1).
 - c. T2 Exam – Satisfactory completion of Basic Treatment Training Course (Attachment 2).
 - d. T3 and/or T4 Exams
 - i. Applicants not holding T2 OIT or Full license - Satisfactory completion of Basic Treatment Training Course and Advanced Treatment Training Course (Attachment 2 and 3).
 - ii. Applicants holding a T2 OIT or Full license - Satisfactory completion of Advanced Treatment Training Course (Attachment 3).
2. Exemptions – The Board may waive the training requirements for any exam upon a majority vote by the Board.

III. TRAINING REQUIREMENTS FOR CERTIFICATE HOLDERS WITH EXPIRED LICENSES

1. A certificate holder who has not renewed his/her certificate prior to the date of expiration shall provide to the Board verification that they have complied with the renewal training contact hours (TCH) requirements.
2. Certificate holders who fail to renew their certificate or qualify for renewal within two years of the date that the certificate expired will be required to:
 - a. Complete the following training requirements to sit for the exam for the grade held:
 - i. VSS, D1, and T1 Exams – Provide to the Board verification that they have complied with the renewal training contact hours (TCH) requirements.
 - ii. D2, D3 and D4 Exams – Satisfactorily complete the Basic Distribution Training Course.
 - iii. T2 Exam – Satisfactorily complete the Basic Treatment Training Course.
 - iv. T3 and T4 Exams – Satisfactorily complete the Advanced Treatment Training Course.
 - b. Re-take and pass the exam for the grade held.

IV. APPROVAL OF TRAINING COURSES

Any individual or organization wishing approval to conduct a training course for water supply facility operators shall submit the following to the Board for review, at least ninety (90) days prior to the training program:

1. Accredited colleges or universities

- a. The name, address and telephone number of person(s) to contact regarding the training.
- b. The course outline that clearly demonstrates that the training course meets the curriculum requirements as outlined in Attachments 1, 2, and/or 3.
- c. Requirements for satisfactory completion of the training.
2. Organizations certified by the International Association of Continuing Education and Training Council (IACET)
 - a. The name, address and telephone number of person(s) to contact regarding the training.
 - b. The course outline that clearly demonstrates that the training course meets the curriculum requirements as outlined in Attachments 1, 2, and/or 3.
 - c. Requirements for satisfactory completion of the training.
3. Other individuals or organizations seeking approval by the Board
 - a. The date, location of the training and description of the training facility.
 - b. The name, address and telephone number of person(s) to contact regarding the training.
 - c. The course outline that clearly demonstrates that the training course meets the curriculum requirements as outlined in Attachments 1, 2, and/or 3.
 - d. A copy of the instruction material showing the skills and knowledge that the learner will be able to demonstrate following completion of the program.
 - e. A list of any audiovisual materials to be used, such as videotapes, slides, slide/tape presentation, films and overheads.
 - f. The name, address, and background information or resume of instructor(s) which shows the instructor's competence in the subject matter, understanding of the purposes and intended learning outcomes of the program, and ability to communicate the program content at an appropriate level.
 - g. The name and affiliation of a proctor, if a proctor is used. A proctor must be a person affiliated with and identified by an organization involved in the water supply related field. The organization must have an educational unit or arm which is recognized and/or approved by the Board for conducting training.
 - h. A copy of the certificate of completion being issued to the attendees containing but not limited to the following information:
 - i. attendees' name;
 - ii. name of course;
 - iii. course identification number;
 - iv. date the course was held;
 - v. name of the course instructor;
 - vi. name of the cosponsoring or sanctioning organization, if applicable; and
 - vii. name and affiliation of proctor.
 - i. The number of training contact hours (TCHs) to be issued (must be approved by Board).
 - j. A copy of all handouts or course material.
 - k. A written policy on maintaining records must be provided showing the record keeping criteria of the organization conducting the training and issuing credits towards operator certification renewal.
 - l. A copy of the evaluation form, which measures the quality of the training.
 - m. Requirements for satisfactory completion of the training must be established in writing. Participants should be informed of the requirements for satisfactory completion prior to their participation. The requirements must be based on a combination of performance and attendance. Attendance requirements must be at least 80 percent and shall be documented by attendance rosters or sign-in sheets. Only those who meet the specified requirements shall be deemed to have satisfactorily completed the training course.

V. SUBSEQUENT COURSES

Once the training course has been approved, the Board will issue a course identification number. The course information does not have to be resubmitted for subsequent sessions of that course provided that there are no significant changes in the course content. If there are significant changes

in the course content, they must be submitted to the Board for approval ninety (90) days in advance of any subsequent sessions of an approved course. The Board Chairman may waive the ninety (90) day requirement in situations as determined by the Chairman.

VI. TRAINING PRIOR TO BOARD APPROVAL

All training courses must be approved and issued a course identification number by the Board before the training can be offered. Training given prior to Board approval will not be accepted.

VII. TRAINING CONTACT HOURS (TCHs)

A certified operator taking a Board approved training course, as identified in this policy, shall be granted TCHs based on the number of hours of training being given.

VIII. REVOCATION OF APPROVAL

The Board may revoke any training approved at any time if it is the opinion of the Board that the training course no longer meets the criteria established in this policy.

IX. WAIVERS

The Board may waive any requirement of this policy in exceptional situations as determined by the Board. All waivers shall be included in the minutes of the Board. In order for an applicant to be eligible for a waiver from the training requirements to sit for exams, the applicant shall submit a written application that includes the following:

1. A written transcript that demonstrates the applicant meets the following education requirement:
 - a. A certificate of competency in water treatment technology or other related technical fields with courses in the physical and/or biological sciences (courses shall be in the areas of sanitary, civil, chemical or environmental engineering, public health, biology, chemistry, or other discipline acceptable to the Board); or
 - b. An Associate degree or two or more years of college with at least 50% of the courses (30 credit hours) in the physical and/or biological sciences (courses shall be in the areas of sanitary, civil, chemical or environmental engineering, public health, biology, chemistry, or other discipline acceptable to the Board); or
 - c. An Bachelors degree or four or more years of college with at least 25% of the courses (30 credit hours) in the physical and/or biological sciences (courses shall be in the areas of sanitary, civil, chemical or environmental engineering, public health, biology, chemistry, or other discipline acceptable to the Board).
2. Written documentation that the applicant meets the following experience requirements:
 - a. 2 years of full-time experience in a system with a classification equal to or greater than the Grade of the license which the applicant is seeking; and

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Paul S. Niman, Chairman
Board of Certification of Operators of Drinking Water Supply Facilities

ATTACHMENT 1

BASIC DISTRIBUTION TRAINING COURSE (Minimum of 35 classroom hours)

Description: This course has been designed to introduce anyone with a high school diploma or GED to the general concepts of drinking water distribution operations leading to certification as a grade D2, D3 or D4 operator or operator –in- training. Participants will learn the required information and critical thought processes that will enable them to understand what is needed to successfully operate and maintain a basic drinking water distribution system. When ever possible, a “hands-on” laboratory approach will provide an alternative to the traditional lecture and group discussion style class offerings. Discussion of each topic will be provided in a manner that will review basic distribution operations and proceed to provide detailed, in depth explanations of each distribution system task and/ or maintenance technique.

Curriculum:

Module 1:

The importance of public water system operations related to public health and safety

- a. The value of SAFE drinking water
- b. Ethics and drinking water system operation
- c. Code of Conduct – use and implementation
- d. Consequences of failure to properly operate your system

Module 2:

Drinking water system components from source to tap

- a. Understanding a “typical” groundwater and surface water system

Module 3:

Math, hydraulics and chemistry basics

- a. Use and application of formulas
- b. Flow and pressure
- c. Chemical properties and chemical solutions
- d. Chemical feed math

Module 4:

Regulatory requirements

- a. Operator certification requirements
 - i. Demonstration of experience and knowledge
- b. Safe Drinking Water Act concepts
- c. Sanitary surveys
- d. Contaminant groups
 - i. Most commonly violated contaminants
- e. Risks and health effects
- f. Public notification requirements

Module 5:

Distribution System Design and Components

- a. System demand and main selection
- b. Distribution system layout options
- c. Pipe material selection
- d. Installation of thrust restraints and thrust blocks
- e. Basic electrical components
 - i. Motors and generator
 - ii. Preventative Maintenance required
- f. Pumps and pumping
 - i. Groundwater system construction and operation
 - ii. Wellhead protection and well maintenance
 - iii. Understanding and troubleshooting pump problems
 - iv. Pumping Station O & M

- v. Pump types and preventative maintenance
- g. Reading, using and updating maps and blueprints
 - i. Interpreting system problems using blueprints
- h. Creation and writing of maintenance plans
 - i. Evaluating success of system maintenance
 - ii. Recommending main rehabilitation
 - iii. Systems flushing Program O & M
 - iv. Fire flow testing methods

Module 6:

Water main installation and repair methods and practices

- a. Leak detection methods and programs
- b. Utility notifications and excavation planning
 - i. Excavation Safety & OSHA Compliance
- c. Trenching and shoring design and methods
- d. Proper bedding and main placement
- e. Joining pipes and pressure testing
- f. External corrosion control techniques including cathodic protection
- g. Backfilling methods and materials
- h. Water main rehabilitation
 - i. New and traditional methods
- i. Preparing for and response to main breaks
- j. Disinfection goals in drinking water
 - i. Chlorine as a disinfectant
 - ii. Chlorine basics and breakpoint chlorination
 - iii. Disinfection by product challenges
 - a) Acceptable methods of distribution system disinfection
 - b) Other secondary disinfection methods
- k. Water main disinfection practices
- l. Service line tapping and repairs
- m. Installation of water main extensions
- n. Types of meters and installation (small and large)
- o. Meter testing procedures
- p. Meter installation and reading

Module 7:

- a. Cross connection surveys

Module 8:

- a. Backflow preventions and device uses

Module 9:

Monitoring finished drinking water quality

- a. Sampling methods and creating sampling plans
- b. Microbiological testing methods
 - i. Total coliform, E. coli
- c. Chlorine demand
- d. Disinfectant residual measurement
- e. Corrosion control measurement and treatment
 - i. pH, temperature, total alkalinity and hardness
 - ii. phosphate and silicate concentration
 - iii. Measuring fluoride concentration
- f. Iron and manganese measurement
- g. Lead and copper monitoring
- h. Turbidity measurement in distribution systems
- i. The importance of measuring temperature

Module 10:

Equipment Operation & Maintenance

- a. Chemical feed pumps and calibration
- b. Valves types and uses
 - i. Valve maintenance and operation
- c. Hydrant installation and maintenance
- d. Blowers and pneumatic devices
- e. Computer operations
- f. Using and maintaining SCADA, telemetry and data systems
- g. Basic GIS concepts and uses
- h. Alarms and controls

Module 11:

Water storage tanks types and components

- a. Tank disinfection and maintenance
- b. Cathodic protection and corrosion control (internal & external)
- c. Tank design issues and water quality troubleshooting
- d. Tank Sanitary Concerns and Security Issues

Module 12:

Operator Safety and Security

- a. Power tool uses and safety
- b. Chemical handling
- c. Personal protective equipment use
- d. Electrical safety and lock out- tag out
- e. Hazardous materials response
- f. Fire protection and safety
- g. Confined space entry
- h. OSHA regulatory requirements
- i. Facility security and protection
- j. Providing continuous service
- k. Emergency Response Planning and Implementation

Module 13:

Administrative responsibilities

- a. Oversee and complete compliance reporting
- b. Provide job training
- c. Develop and write standard operating procedures and maintenance plans
- d. Review and interpret data
- e. Provide budget data for services and inventory required
- f. Create and update safety programs and manuals
- g. Receive and respond to customer complaints
- h. Water Conservation

Module 14:

Passing the Operator Certification Exam

- a. What to expect on the exam
- b. Review of sample exam questions
- c. Taking the exam online: tips and suggestions

NOTE: Times of topic offerings have not been added since they will vary slightly based on the number of classes offered to complete the course. (e.g.: seven 6 hr. classes vs. fourteen 3 hr. classes).

ATTACHMENT 2

BASIC TREATMENT TRAINING COURSE (Minimum of 35 classroom hours)

Description: This course is designed to provide the student with the general concepts of drinking water treatment operations. Emphasis will be on proper chemical application, regulations, laboratory analysis, safety, and electrical/mechanical equipment. An introduction of topics covering hydrology, hydrologic cycle, potable water sources and use, treatment technologies, and administration, will be provided.

Prerequisite(s): High school diploma or GED; knowledge of basic mathematical principles.

Curriculum:

Module 1:

Review of math, hydraulics and chemistry basics

- a. Arithmetic review and calculator use
- b. Use and application of formulas
- c. Flow and pressure
- d. Chemical properties and chemical solutions
- e. Chemical feed math
- f. Volume, residence times, and CT

Module 2:

The importance of public water system operations related to public health and safety (emphasis on chemical addition)

- a. The value of SAFE drinking water
- b. Ethics and drinking water system operation
- c. Code of Conduct – Use and Implementation
- d. Consequences of failure to properly operate your system

Module 3:

Basic drinking water system components from source to tap

- a. Introduction of basic definitions used in profession
- b. Understanding a “typical” groundwater and surface water system
- c. Hydrologic cycle

Module 4:

Regulatory requirements

- a. Operator certification requirements
- a. Demonstration of experience and knowledge
- b. Definition of public water system, community and non-community water systems
- c. Safe Drinking Water Act concepts
 - i. Sanitary surveys
 - ii. Contaminant groups
 - a) Most commonly violated contaminants
 - iii. Risks and health effects
 - iv. Regulations
 - a) Subpart A - General definitions
 - b) Subpart B - Maximum contaminant levels
 - c) Subpart C - Monitoring and analytical requirements
 - d) Subpart D - Reporting and recordkeeping
 - e) Subpart E - Special regulations
 - f) Subpart G - National revised primary drinking water regulations: maximum contaminant level and maximum residual disinfectant levels
 - g) Subpart I - Control of lead and copper
 - h) Subpart J - Use of non-centralized treatment devices
 - i) Subpart O - Consumer confidence reports
 - j) Subpart Q - Public notification of drinking water violations

Module 5:

Source water evaluation and water quality monitoring

- a. Groundwater sources and wellhead protection
- b. Well construction, operation and troubleshooting
- c. Surface water collection
- d. Surface water contaminants and source protection

Module 6:

Common Drinking Water Treatment Schemes

- a. Simple chemical addition
 - i. pH adjustment
 - a) What is pH
 - b) What is Alkalinity
 - 1. Associated calculations
 - c) Link to corrosion control
 - ii. Softening and ion exchange
 - a) Water hardness problems
 - iii. Taste and odor: causes and control
 - iv. Fluoridation basics
- b. Conventional treatment and direct filtration
 - i. Primary Disinfection
 - a) Disinfection goals in drinking water
 - b) Chlorine as a disinfectant
 - 1. Chlorine basics and breakpoint chlorination
 - 2. Disinfection by product challenges
 - c) Ultraviolet radiation
 - ii. Coagulation
 - a) Primary Coagulation
 - b) Chemistry of coagulation
 - c) Rapid Mix
 - iii. Flocculation
 - a) Understanding the creation and need to produce quality floc
 - iv. Settling and sedimentation
 - a) Understanding types of setting
 - 1. Sedimentation
 - 2. Solids Contact Clarification
 - 3. Inclined Plate/Tube Settling
 - 4. Dissolved Air Floatation
 - v. Filtration and residuals handling
 - a) Basic filter operation and maintenance
 - 1. Slow sand filtration
 - 2. Rapid Sand filtration
 - 3. Direct filtration
 - 4. Basic membrane filtration
 - a. Cartridge filtration
 - b) Other Treatment Processes
 - 1. Iron and manganese sequestering/removal
 - 2. Aeration
 - a. Packed Tower
 - 3. Granular Activated Carbon
 - vi. Secondary Disinfection
 - a) Acceptable methods of distribution system disinfection
 - vii. Residuals
 - a) Introduction to discharge, disposal and handling, general knowledge:
 - 1. Discharge to lagoons
 - 2. Discharge to lagoons and then surface water

3. Land application
4. On-site disposal
5. Solids composting

Module 7:

Laboratory analyses of drinking water

- a. Sampling methods
- b. Microbiological testing methods
 - i. Total coliform, E. coli,
- c. Physical testing of drinking water
 - i. What is jar testing
- d. Chemical testing of drinking water
 - i. Chlorine demand
 - ii. Disinfectant residual measurement
 - iii. Corrosion control measurement and treatment
 - a)pH, temperature, total alkalinity and hardness
 - b)phosphate and silicate concentration
 - iv. Measuring fluoride concentration
 - v. Iron and manganese measurement
 - vi. Radionuclides

Module 8:

Equipment Operation & Maintenance

- a. Pumps and pumping
- b. Chemical feed pumps and calibration
- c. Pipes, valves and fittings
 - i. Basic electrical terms
- d. Motors and generators
- e. Computer operations and SCADA basics

Module 9:

Operator Safety and Security

- a. Review and Comprehend Safety programs and Manuals including the following topics:
 - i. Chemical handling and personal protective equipment use
 - ii. Electrical safety and lock out- tag out
 - iii. Hazardous materials response
 - iv. Fire protection and safety
 - v. Pathogen handling protection
 - vi. Confined space entry
 - vii. OSHA regulatory requirements
 - viii. Facility security and protection

Module 10:

Administrative responsibilities

- a. Oversee and complete compliance reporting
- b. Provide job training
- c. Develop and write standard operating procedures and maintenance plans
- d. Review and interpret data
- e. Provide budget data for services and inventory required
- f. Create and update safety programs and manuals
- g. Receive and respond to customer complaints
- h. Water Conservation

Module 11:

Passing the Operator Certification Exam

- a. What to expect on the exam
- b. Review of sample exam questions
- c. Taking the exam online: tips and suggestions

ATTACHMENT 3

ADVANCED TREATMENT TRAINING COURSE (Minimum of 35 classroom hours)

Description: This course is designed to provide the student with the advanced concepts of drinking water treatment operations. Operator will be equipped with ability to control process, not just basic understanding (e.g. being able to answer the 'why', not 'what' questions). Emphasis will be on effective filtration and reporting. Advanced topics on potable water sources and use, treatment technologies, laboratory, and administration will be provided.

Prerequisite(s): Introduction to Drinking Water Treatment

Curriculum:

Module 1:

Review of math, hydraulics and chemistry basics

- a. Use and application of advanced formulas
- b. Flow and pressure
- c. Filtration
 - i. Surface loading rates
 - ii. Headloss
 - iii. Yields
- d. Chemistry
 - i. Normality/Molarity
 - ii. Dilution calculations
- e. Chemical feed math

Module 2:

Review of the importance of public water system operations related to public health and safety (emphasis on filtration)

- a. The value of SAFE drinking water
- b. Ethics and drinking water system operation
- c. Code of Conduct – Use and Implementation
- d. Consequences of failure to properly operate your system

Module 3:

Regulatory requirements

- a. Advanced operator certification requirements
 - i. Demonstration of experience and knowledge
- b. Safe Drinking Water Act concepts
 - i. Subpart H - Filtration and disinfection
 - ii. Subpart K - Treatment techniques
 - iii. Subpart L - Disinfection residuals, disinfection byproducts, and disinfection byproduct precursors
 - iv. Subpart P - Enhanced filtration and disinfection
 - v. Contaminant groups
 - a) Emphasis on pathogens
 - b) SOC
 - vi. Risks and health effects
 - vii. Public notification requirements

Module 4:

Source water evaluation and treatment

- a. Algae control
- b. Chemical treatment (copper sulfate)
- c. Intake structure

Module 5:

Common Drinking Water Treatment Schemes

- a. Conventional treatment and direct filtration
 - i. Primary Disinfection
 - a) Disinfection goals in drinking water (concept of CT)
 - b) Chlorine as a disinfectant
 - 1) Types of chlorine and chlorine feed methods
 - 2) Chlorination safety issues
 - 3) Chlorine and breakpoint chlorination
 - 4) Disinfection by product challenges
 - c) Chlorine dioxide
 - 1) Production of chlorine dioxide
 - 2) Chemistry of production and by products
 - d) Ultraviolet radiation
 - 1) UV system operation and maintenance
 - e) Ozone and disinfection
 - 1) Ozonation methods and equipment O & M
 - 2) Ozone by products
 - ii. Coagulation
 - a) Particle destabilization and coagulant addition
 - b) Chemistry of coagulation
 - c) Primary and secondary coagulants
 - d) Coagulant and filter aids
 - e) Chemical mixing and coagulation
 - iii. Flocculation
 - a) Flocculator design and operation
 - iv. Settling and sedimentation
 - a) Settling design and operation
 - b) Sedimentation
 - c) Solids Contact Clarification
 - d) Inclined Plate/Tube Settling
 - 1) Dissolved Air Flootation
 - v. Filtration
 - a) Advanced filter operation and maintenance
 - 1) Slow sand filtration
 - 2) Rapid Sand filtration
 - 3) Direct filtration
 - 4) Membrane filtration
 - 5) Diatomaceous earth filters
 - vi. Residuals handling
 - a) Operation and associated calculations for:
 - 1) Discharge to lagoons
 - 2) Discharge to lagoons and then surface water
 - 3) Mechanical dewatering
 - 4) Land application
 - 5) On-site disposal
 - 6) Solids composting
 - vii. Secondary Disinfection
 - a) Acceptable methods of distribution system disinfection
 - b) Chloramination procedures and concerns

Module 6:

Laboratory analyses of drinking water

- a. Sampling methods for proper monitoring and lab reporting purposes
- b. Microbiological testing methods
 - i. Viruses and protozoa
- c. Physical testing of drinking water

- i. Turbidity measurement
 - ii. Performing Jar testing
- d. Chemical testing of drinking water
 - i. Measuring disinfection by products
 - a) TTHM and HAA5 measurement and control
 - ii. Total organic carbon and relationship to DBPs
 - iii. Aluminum
 - iv. Carbon Dioxide
 - v. Conductivity
 - vi. Settable Solids
 - vii. DO

Module 7:

Equipment Operation & Maintenance

- a. Pumps and pumping
 - i. Definitions and troubleshooting
- b. Chemical feed pump applications and calibration
- c. Pipes, valves and fittings
 - i. Basic electrical terms
- d. Motors and generators
- e. Blowers and pneumatic devices
- f. Computer operations and automated online instrument operations
- g. Working with and understanding SCADA systems
- h. Alarms and controls

Module 8:

Operator Safety and Security

- a. Create and Update Safety programs and manuals including the following topics:
 - i. Chemical handling and personal protective equipment use
 - ii. Electrical safety and lock out- tag out
 - iii. Hazardous materials response
 - iv. Fire protection and safety
 - v. Pathogen handling protection
 - vi. Confined space entry
 - vii. OSHA regulatory requirements
 - viii. Facility security and protection

Module 9:

Administrative responsibilities

- a. Oversee and complete compliance reporting
- b. Provide job training
- c. Develop and write standard operating procedures and maintenance plans
- d. Review and interpret data
- e. Provide budget data for services and inventory required
- f. Create and update safety programs and manuals
- g. Receive and respond to customer complaints
- h. Water Conservation

Module 10:

Passing the Operator Certification Exam

- a. What to expect on the exam
- b. Review of sample exam questions
- c. Taking the exam online: tips and suggestions