ABC Testing
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Need-to-Know Criteria

Wastewater Treatment

Operator Class IV

A Need-to-Know Guide when preparing for the:

Wastewater Treatment Operator Class IV Certification Exam

WATER PROFESSIONALS INTERNATIONAL
The Associated Boards of Certification

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Before You Dive In…

What is the Need-to-Know Criteria?

This Wastewater Treatment Operator Class IV Need-to-Know Criteria was developed to assist operators in understanding the content that will be covered in the Standardized Wastewater Treatment Operator Class IV exam. A methodical and comprehensive international investigation was conducted to determine the most significant job tasks performed by wastewater treatment operators. The content covered on the exam represents the job tasks identified through this research as essential operator competencies, and is not limited to the practices of your system/facility. The following pages organize these job tasks into Content Areas and identify the amount of the test devoted to each area.

Is this Need-to-Know Criteria relevant to MY exam?

WPI offers a variety of standardized and customized exam services. This document is reflective only of the Standardized Wastewater Treatment Operator Class IV exam; older editions of the standardized exam and various customized exams are also administered by various certification programs. Please contact your certifying authority to determine whether they have implemented this exam for your program.

Pre-Test Questions

Your exam may include up to 10 extra questions that have not been used on previous versions of the exam. These are known as "pre-test" questions and allow WPI to gather valuable data about the new questions before they are included in future tests. Pre-test questions are unidentified and scattered throughout the exam so you will answer them with the same care in which you address scored questions. The pre-test questions are not included in your final score.

Exam Preparation Resources

Visit gowpi.org to access the Formula/Conversion Table administered with this exam, a list of approved references, information on purchasing study guides available from partner organizations, and more.

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Exam Content

The Wastewater Treatment Operator Class IV exam will test you on essential job tasks. These job tasks have been categorized into the Content Areas detailed in the following pages. The table displayed on Page 4 of this document summarizes the areas that are included on the exam, the number of test questions in each of these areas, the cognitive format of the test questions, and the number of calculation questions in each area.

Just as operator job duties vary in their complexity, so will the questions you are asked on the exam. Some will be simpler, whereas others will be more complex or cognitively demanding. The following two cognitive levels are used to describe the format of the questions you will encounter on this exam:

Recall – Tasks at this cognitive level typically require the simple recall or recognition of specific facts, concepts, processes, or procedures, with little to no problem-solving involved. You may be asked to identify, illustrate, recall, and/or recognize specific information. An example of a Recall type item follows:

Although the required contact time for chlorine to kill bacteria may vary depending on certain water characteristics, the typical industry standard is:

A. 15 minutes
B. 30 minutes
C. 45 minutes
D. 60 minutes

Application – Tasks at this level will involve some basic problem-solving, calculations, or the interpretation and application of data. You may be asked to calculate, categorize, classify, compare, differentiate, explain, specify, translate, and/or apply knowledge. An example of an Application type item follows:

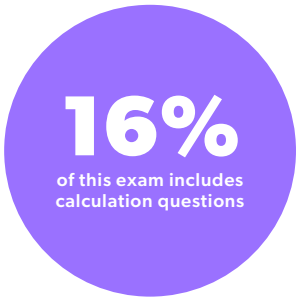
In the activated sludge process, some of the activated sludge MUST be wasted to:

A. increase digester gas production
B. prevent excessive solids build-up
C. prevent clogging of the sludge return line
D. prevent overloading of sludge return pumps

Units for Calculations – This exam requires numerical calculations. The number of calculation items is detailed in the Exam Content Outline below. WPI's standardized examinations are designed to be utilized in both the United States and Canada, therefore calculation items are presented in both US Standard units and Metric units. Each item is solvable in both units independently. The US Standard units will appear first in the question followed by the metric units in parentheses. An example of a Calculation item follows:

If a water reservoir 12 ft (4 m) in diameter has a static water level of 21 ft (7 m) what is the pressure on the bottom of the tank?

A. 6 psi (46 kPa)
B. 9 psi (69 kPa)
C. 12 psi (92 kPa)
D. 21 psi (161 kPa)



NUMBER OF QUESTIONS	CONTENT AREA	COGNITIVE FORMAT OF JOB TASK EXAM CONTENT
28	Equipment Evaluation, Maintenance, and/or Operation	06 22 07
42	Treatment Process Evaluation and Adjustment	07 35 04
15	Laboratory Analysis	07 08 00
15	Security, Safety, and Administrative Procedures	05 10 05
100	Total	

** Your exam may contain up to 10 extra unscored pre-test questions (see **Before You Dive** In for more details).*

Exam References

Each question on the standardized Wastewater Treatment Class IV Examination is referenced to widely accepted, peer-reviewed publications from California State University, Office of Water Programs, American Water Works Association, or the Water Environment Federation. A complete listing of references used for the development of this exam can be found on WPI's website at: https://www.gowpi.org/services/abc-testing/exam-references/

In order to assist with exam preparation, the table below provides both primary and secondary reference materials for each content area on this examination. Please note that exam questions may be referenced to any WPI approved source, however, the following matrix identifies the two most prominent sources in each content area.

NUMBER OF QUESTIONS	CONTENT AREA	PRIMARY REFERENCE	SECONDARY REFERENCE
28	Equipment Operation & Maintenence	CSUS Operation of Wastewater Treatment Plants, Volume 2, 8th Edition	WEF Wastewater Treatment Fundamentals 3 – Advanced Treatment
42	Treatment Process Evaluation and Adjustment	WEF Wastewater Treatment Fundamentals 1 – Liquid Treatment	CSUS Operation of Wastewater Treatment Plants, Volume 1, 8th Edition
15	Laboratory Analysis	CSUS Operation of Wastewater Treatment Plants, Volume 1, 8th Edition	WEF Wastewater Treatment Fundamentals 1 – Liquid Treatment
15	Security, Safety and Administrative Procedures	CSUS Operation of Wastewater Treatment Plants, Volume 1, 8th Edition	WEF Wastewater Treatment Fundamentals 1 – Liquid Treatment

Equipment Evaluation, Maintenance, and/or Operation

Preliminary treatment equipment

- Screening and grinding
- Bar screens
- Grit removal equipment (e.g., vortex, gravity)
- Flow equalization systems
- Microscreens

Primary treatment equipment

- Clarifiers/sedimentation basins

Secondary treatment equipment

- Aeration basins
- Aeration systems (e.g., blowers, surface aerators, diffusers)

Tertiary treatment equipment

- Filtration
- Media filtration (e.g., sand, anthracite, disc filter)
- Membrane filtration
- Microscreens

Disinfection equipment

- Chlorination (e.g., chlorine, hypochlorite, chloramine)
- Dechlorination (e.g., sodium bisulfite, sodium thiosulfate, sulfur dioxide)
- Ultra-violet (UV)
- Ozonation

Solids treatment equipment

- Dewatering
- Belt press
- Centrifuge
- Solids thickening equipment
- Dissolved air flotation (DAF)
- Gravity thickener
- Digesters
- Anaerobic digesters

Odor control devices (e.g., biofilters, scrubbers)

Pumps

- Centrifugal
- Positive displacement
- Peristaltic
- Diaphragm

Mixers

Chemical dosing equipment

Electrical and instrumentation equipment

- Motors
- Motor control center
- Field instrumentation (e.g., flowmeters, pressure sensors, level sensors)
- Online analyzers (e.g., DO, pH, ORP, turbidity, chlorine)
- SCADA and telemetry systems

Auxiliary power

- Generator

Ancillary equipment

- Air compressors
- Conveyors
- Valves
- Hoists and cranes
- Pipes and fittings

Treatment Process Evaluation and Adjustment

Preliminary treatment processes (e.g., screening, grinding, grit, flow equalization)

Primary treatment processes

- Clarification/sedimentation

Secondary treatment processes

- Suspended growth processes (activated sludge)
- Complete mix
- Extended aeration
- Nutrient removal processes (e.g., anaerobic/anoxic/aerobic)
- Membrane bioreactor
- Conventional activated sludge

Tertiary treatment processes

- Filtration processes
- Media filtration (e.g., sand, anthracite, disc filters)

Disinfection treatment processes

- Chlorination (e.g., chlorine, hypochlorite, chloramine)
- Dechlorination (e.g., sodium bisulfite, sodium thiosulfate, Sulfur dioxide)
- Ultra-violet (UV)
- Ozonation

Solids treatment processes

- Anaerobic digestion with cogeneration
- Anaerobic digestion without cogeneration
- Dewatering (e.g., presses, centrifuges, drying beds)
- Thickening (e.g., DAF, belt, rotary drum)

Solids disposal

- Land application
- Landfill

Effluent disposal

- Surface water discharge
- Reclaim/non-potable reuse

Chemical dosing

- Coagulation/flocculation
- Nutrient removal/enhancement
- Odor control
- pH adjustment

Laboratory Analysis

Follow laboratory Standard Operating Procedures (SOPs)

Collect samples for

- Bacteriological analyses
- Biological analyses (e.g., BOD, CBOD, WET)
- Chemical analyses (e.g., COD, nutrients, metals)
- Physical analyses (e.g., pH, temperature, DO, settleable solids)

Conduct

- Bacteriological analyses
- Biological analyses (e.g., BOD, CBOD)
- Chemical analyses (e.g., COD, nutrients)
- Physical analyses (e.g., pH, temperature, DO, settleable solids)
- Advanced analytical methods (e.g., metals, volatile organic compounds)
- Process control laboratory testing
- Required regulatory laboratory testing

Interpret data

- Bacteriological analyses
- Biological analyses (e.g., BOD, CBOD, WET)
- Chemical analyses (e.g., COD, nutrients, metals)
- Physical analyses (e.g., pH, temperature, DO, settleable solids)

Operate and maintain laboratory instrumentation (e.g., DO, pH, H2S, ORP)

Security, Safety, and Administrative Procedures

Adhere to safety procedures

Establish and/or update safety procedures

- Lockout/tagout
- Confined space
- Hazard communication
- Fall protection
- Spill response
- Chemical handling
- Emergency response
- Vulnerability assessments

Maintain safety equipment (e.g., gas detectors, eye-washes, safety showers, respirators)

Assist in the selection of equipment for use in wastewater processing

Complete operation and maintenance reports (e.g., daily, monthly, annual)

Complete required regulatory reports

Conduct routine security checks

Ensure compliance with all applicable regulations

Respond to customer service requests and complaints

Adhere to SOPs

Establish and/or update SOPs

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