



# Need-to-Know Criteria

## Wastewater Collection

### Operator Class IV

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

Wastewater Collection Operator Class IV Certification Exam



The Associated Boards  
of Certification

*Superior Water Starts Here™*

# Before You Dive In...

## What is the Need-to-Know Criteria?

This Wastewater Collection Operator Class IV Need-to-Know Criteria was developed to assist operators in understanding the content that will be covered in the Standardized Wastewater Collection Operator Class IV exam. A methodical and comprehensive international investigation was conducted to determine the most significant job tasks performed by wastewater collection 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 Collection 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](http://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 Collection 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 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

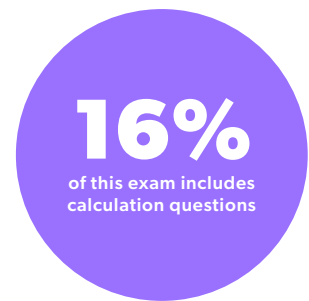
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## Exam Content Continued

 **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
<b>23</b>	Equipment Operation, Evaluation, and Maintenance	 <b>05</b>  <b>18</b>  <b>03</b>
<b>23</b>	Collection System Operation, Maintenance, and Restoration	 <b>04</b>  <b>19</b>  <b>05</b>
<b>16</b>	Lift Station Operation and Maintenance	 <b>03</b>  <b>13</b>  <b>01</b>
<b>20</b>	Collection System Monitoring, Evaluation, and Adjustment	 <b>05</b>  <b>15</b>  <b>00</b>
<b>18</b>	Security, Safety, and Administrative Procedures	 <b>03</b>  <b>15</b>  <b>07</b>
<b>100</b>	Total	 <b>20</b>  <b>80</b>  <b>16</b>

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

# Wastewater Collection Operator Class IV | Need-to-Know Criteria

## Exam References

Each question on the standardized Wastewater Collection 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
23	Equipment Operation, Evaluation, and Maintenance	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 2, 8th Edition	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 1, 8th Edition
23	Collection System Operation, Maintenance, and Restoration	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 1, 8th Edition	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 2, 8th Edition
16	Lift Station Operation and Maintenance	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 2, 8th Edition	No other references
20	Collection System Monitoring, Evaluation, and Adjustment	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 1, 8th Edition	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 2, 8th Edition
18	Security, Safety, and Administrative Procedures	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 2, 8th Edition	CSUS - Operation and Maintenance of Wastewater Collection Systems, Volume 1, 8th Edition



5 Recall

18 Application

3 Calculation Items

## Equipment Operation, Evaluation, and Maintenance

### Calibrate and operate air detectors/gas meters, flow meters portable or stationary, and blowers

#### Clean the collection system

- Hydraulic cleaning (e.g., balling, flushing, poly pigs)
- Jet rodding
- Blockage removal
- Rodding (e.g., hand and/or continuous)

#### Operate the following equipment

- Computers
- Heavy equipment (e.g., backhoe, mini-excavator, combination truck, etc.)

#### Evaluate and maintain the operation of equipment

- Inspecting
- Measuring temperature
- Reading charts
- Reading gauges
- Reading meters
- Maintenance records/logs

#### Evaluate and maintain the operation of electrical equipment

- Variable frequency drives (VFD's)
- Motor control centers
- Low voltage equipment (e.g., flow meters, float switch, PID controls, pressure sensors)

#### Inspect system using physical inspection (e.g., CCTV, dye and smoke testing, acoustic evaluation, visual, etc.)

### Rehabilitate and repair collection system

- Lift station (e.g., wet wells, fittings, and piping)
- Manholes (e.g., collar, risers, cone, barrel, invert)
- Sewer lines (e.g., pipe bursting, pipe lining, pipe repair, etc.)
- Taps (e.g., top hat, grouting, protruding laterals)
- Eliminate infiltration, inflow, and exfiltration

#### Inspect equipment or monitor operating conditions, meters, and gauges to determine load requirements and detect malfunctions of the lift station

#### Inspect the operation of equipment to determine malfunction

#### Perform system inspections (e.g., air release valves, inlets, manholes, outfalls, overflows, regulators, inverted siphons, sluice gates)

#### Perform preventative maintenance including repair, replacement, and installation of equipment

- Chemical feed systems
- Motors
- Pumps
- Valves
- Compressors
- Engines
- Gearboxes
- Generators
- Pneumatic and hydraulic systems
- Level sensing equipment



5 Recall



18 Application



3 Calculation Items

## Equipment Operation, Evaluation, and Maintenance

### Operate equipment and/or tools

- Aeration equipment and blowers
- Air compressors
- Backflow prevention devices
- Chain pull hoists and overhead cranes
- Chemical feed systems (e.g., chlorination)
- Pumps (fixed and portable, all types)
- Flushing unit (e.g., dumping water into the system)
- Hydrant operations
- Hydraulic equipment (e.g., jacks, press, compactor)
- Metal detectors and pipe locators
- Precision measuring instruments
- High pressure jetting
- Manhole guide rollers
- Samplers
- Testing equipment
- Fans (e.g., forced air, air extraction)



4 Recall



19 Application



5 Calculation Items

## Collection System Operation, Maintenance, and Restoration

Clean and maintain tanks (e.g., wet wells, chemical, holding)

Collect and document data from charts, gauges, and other instrumentation

Excavate wastewater lines

Use high pressure hydraulics to clean wastewater mains and lines

Inspect structures (e.g., manholes, vaults, wet wells for damage, trench cave-ins, and debris)

Interpret blueprints, GIS, and sketches of the system showing location and configuration of collection system components

Maintain all equipment (e.g., pumps, motors, chlorinators, chemical feeds) in accordance with SOP/OEM specifications

Maintain an inventory of chemicals and materials

Monitor panel board and adjust controls to regulate flow rates

Monitor CSO basin operations and functions and adjust as necessary

Operate pumping equipment during emergency bypass operations

Operate odor control devices and systems

Hydro excavation

Spot Repair (e.g., spot liner or replacement)

Line renewal (e.g., pipe bursting, cure in place pipe - CIPP, fold and form, etc.)

Update GIS and/or asset management (e.g., manhole location, GPS, pictures, etc.)

Identify and respond to system failures (e.g., SSO, collapsed pipes, pump failure, etc.)

Perform maintenance and inspection through the use of

- Hydraulic cleaning (e.g., nozzle selection, pipe size, grade, type of pipe, level of flow, etc.)
- Locating and inspection (e.g., CCTV, acoustic evaluation, visual, drone, etc.)



3 Recall



13 Application



1 Calculation Item

**Ensure that electrical devices (e.g., fuses, motors, relays, starters, etc.) are functioning properly**

**Ensure that electronic devices (e.g., alarms, controllers, gas detection, level detection system, telemetry – RTU's, SCADA, PLC's, control devices, etc.) are functioning properly**

**Ensure that devices (e.g., piping, pressure relief valves - compressors, water heaters, chemical addition, pumps, valves, wet wells/ vacuum valves - force mains, air relief, seals, air exchangers/exhaust fans, bar screens, etc.) are functioning properly**

**Adjust equipment (e.g., SCADA, VFD, PLC, control panel, etc.) to increase or decrease pumping capacity for proper flow**

**Perform calculations to ensure proper operations**



5 Recall



15 Application



0 Calculation Items

## Collection System Monitoring, Evaluation, and Adjustment

### Perform adjustments on the following components of the collection system

- Flow monitoring
- Force mains
- Gravity sewers
- Lift stations
- Manholes/cleanouts
- Measuring and control systems (e.g., PLC, SCADA, VFD, etc.)

### Analyze long-term collection system operations for defects

### Collect wastewater samples and perform field/laboratory tests and analyses

### Calibrate and adjust

- Atmosphere testers
- Supervisory Control and Data Acquisition (SCADA)
- Level and flow meters
- Variable Frequency Drives (VFD's)

### Check equalization basins and CSO structures

### Identify physical and/or abnormal characteristics of the wastewater

### Inspect pipe installation (e.g., grade, joints, bedding, backfill, pipe defects, pressure test)

### Follow the QA/QC program to ensure that incoming products meet specified requirements

### Monitor, evaluate, and adjust electric motors, pumps, and valves

### Repair and/or replace lines (e.g., force mains, combined sewer, sanitary sewer, storm drains, etc.)

### Review SCADA and revise settings as required

### Utilize wastewater analysis devices for chemical detection in collection systems (e.g., nitrate, hydrogen sulfide, pH, phosphorous, etc.)

### Monitor flow sensors



3 Recall



15 Application



7 Calculation Items

Analyze/estimate costs (e.g., equipment, material, power, fuel, staffing, etc.)

Analyze regulatory and compliance requirements

Authorize equipment repairs

Calculate cleaning and production rates

Compile technical and statistical data and prepare comprehensive written reports

Comply with all health and safety procedures and protocols

Conduct safety inspections

Configure traffic plans and set up signs for traffic control

Coordinate wastewater program activities with other divisions and outside agencies, contractors, and developers

Determine location of underground utilities (e.g., combined sewers, cross connections, cross bores, force mains, inlets, laterals, manholes, outfalls, sanitary sewers, laterals, etc.)

Determine shift schedules and assign work crews to ensure both daily and long-term continuity of operation

Develop operating and capital budgets

Develop preventive maintenance procedures

Develop safety procedures

Develop training programs (e.g., start-up and testing, SOPs, and technical documentation for operations)

Comply with safety standards and safety programs

Ensure compliance of discharge limits are in accordance with all applicable local, state, and federal regulations

Establish wastewater policies, procedures, and guidelines

Develop/implement a QA/QC program

Analyze system logs/records

Investigate various customer issues (e.g., sewer backup and/or odor complaints)

Maintain knowledge of regulatory permit requirements

Manage employee certification programs

Maintain knowledge of cost accounting and budget procedures and practices

Maintain records and file reports (e.g., internal, or regulatory requirements, etc.)



3 Recall



15 Application



7 Calculation Items

**Maintain knowledge of current regulatory requirements**

**Monitor status of customer work orders to ensure good customer service**

**Monitor work and job site conditions to ensure protection of workers, pedestrians, and vehicular traffic**

**Perform the following administrative activities**

- Safety/security evaluation and compliance
- Budget development
- Capital improvement plan development
- Operation and maintenance plan development
- Employee supervision and performance evaluations
- Employee hiring
- Planning and organization of work activities
- Record keeping and evaluation of data
- Responses to public complaints
- Report writing (e.g., federal, internal, state, etc.)

**Engage in the proper safety procedures for**

- Calibration of atmospheric testing
- Chemical spill responses
- Confined space entry
- Electrical grounding, hazards, and arc flash
- Fires (e.g., prevention, fire extinguishers)
- First aid
- Hazardous materials
- Infectious diseases/blood borne pathogen protection
- Lifting

- Lockout/tagout
- Personal Protection Equipment (e.g., respiratory protection, safety glasses, gloves, hard hats, fall protection)
- Shoring, trenching, and excavation
- Traffic control/work zone safety

**Prepare Emergency Response Plans (e.g., system failures, disasters, interagency assistance, etc.)**

**Perform facility safety audits**

**Prepare bid specifications**

**Purchase equipment**

**Train new operators**

**Review easement and right-of-way issues/problems**

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