



*An Analysis of the Low Passing Rate of Public
Wastewater Operators taking the S Licensing
Examination*

*in the State of New Jersey
with Recommendations for Improvement*

Roadmap to Improvement

Association of Environmental Authorities
Annual Meeting and Conference
November 18, 2025
Robert C. Fischer, Sr. Director of Water Resources PS&S
Chairman NJWEA Long Range Planning Committee



Strategic Plan

2018 Revision

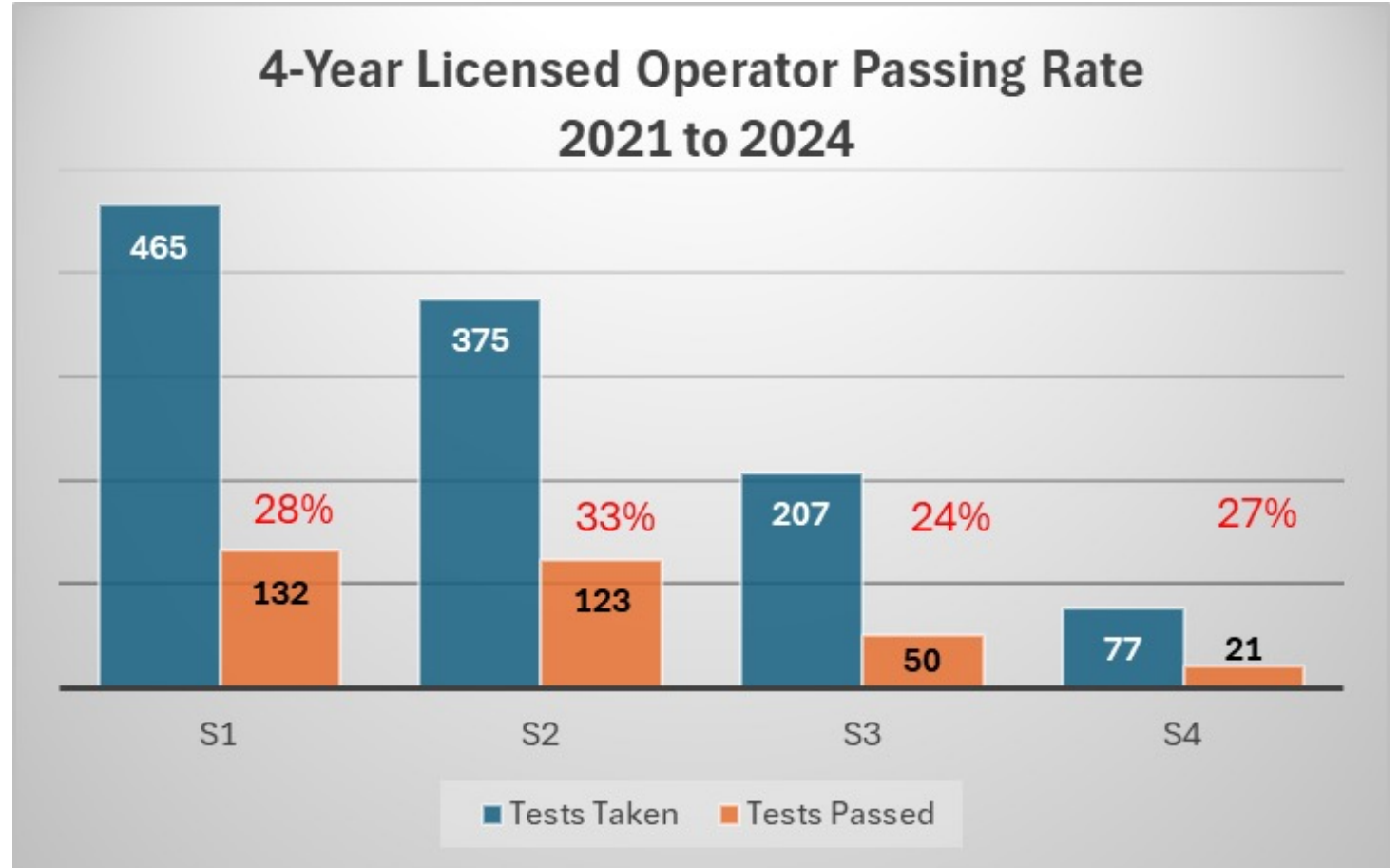


Top Priority of NJWEA Strategic Plan

***“Evaluate the Low Passing
Rate of S Licensed Operators
and Develop a Roadmap to
Improvement”***

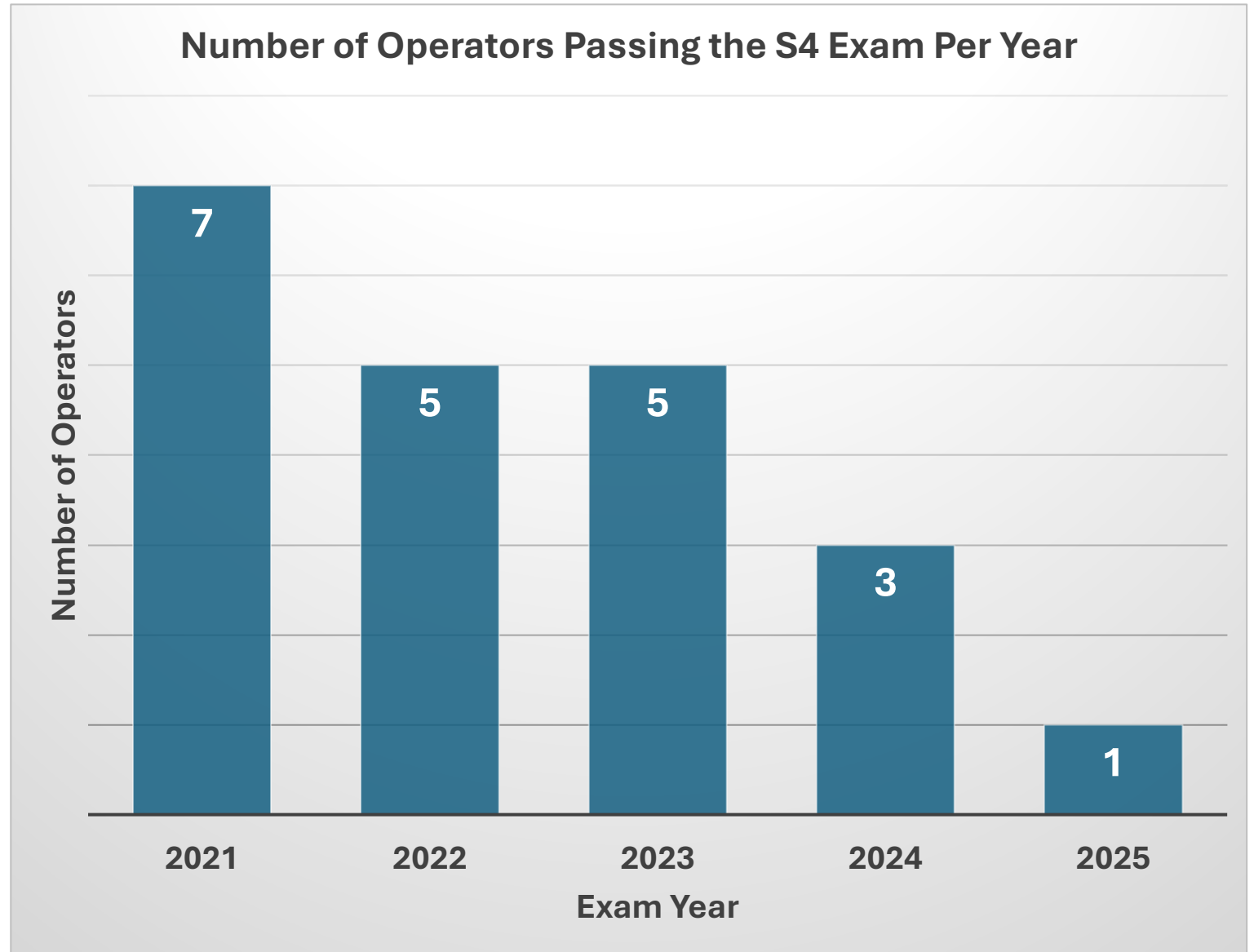
The Concern

- *The Passing Rate for All S Licensing Exams from Q1-2021 to Q4-2024 = 29%*
- *C-W-N-T average Passing Rate = 50-65%*



The Concern

*All S4 Licensing Exams
from Q1-2021 to Q2-2025*



The Sub Committee Charge

“Investigate the
Low Passing Rate
of S Licensed
Operators and
Develop Roadmap
to Improvement”

Robert Fischer, Senior Director, Water Resources, PS&S, Committee Chair

Lou Lambe, IPP/GIS Engineer, Passaic Valley Sewerage Commissioners

Joseph Pantalone, Vice President Wastewater, Atlantic County UA

Greg Burde, Independent Consultant, PSI Process

Joshua Palumbo, Wastewater Program Manager, Cape May County MUA

Brian Carey, Authority Engineer, Two Bridges Sewerage Authority

Thomas Greci, President, Environmental Compliance Monitoring , Inc.

Jennifer Marques, Laboratory Director, Passaic Valley Sewerage Commissioners

Jill Plesnarski, Administrator, Readington Lebanon Sewerage Authority

John Corkery, Independent Consultant, PSI Process/Pumping Services

Eric Reichert, Plant Manager, Rockaway Valley Regional Sewerage Authority

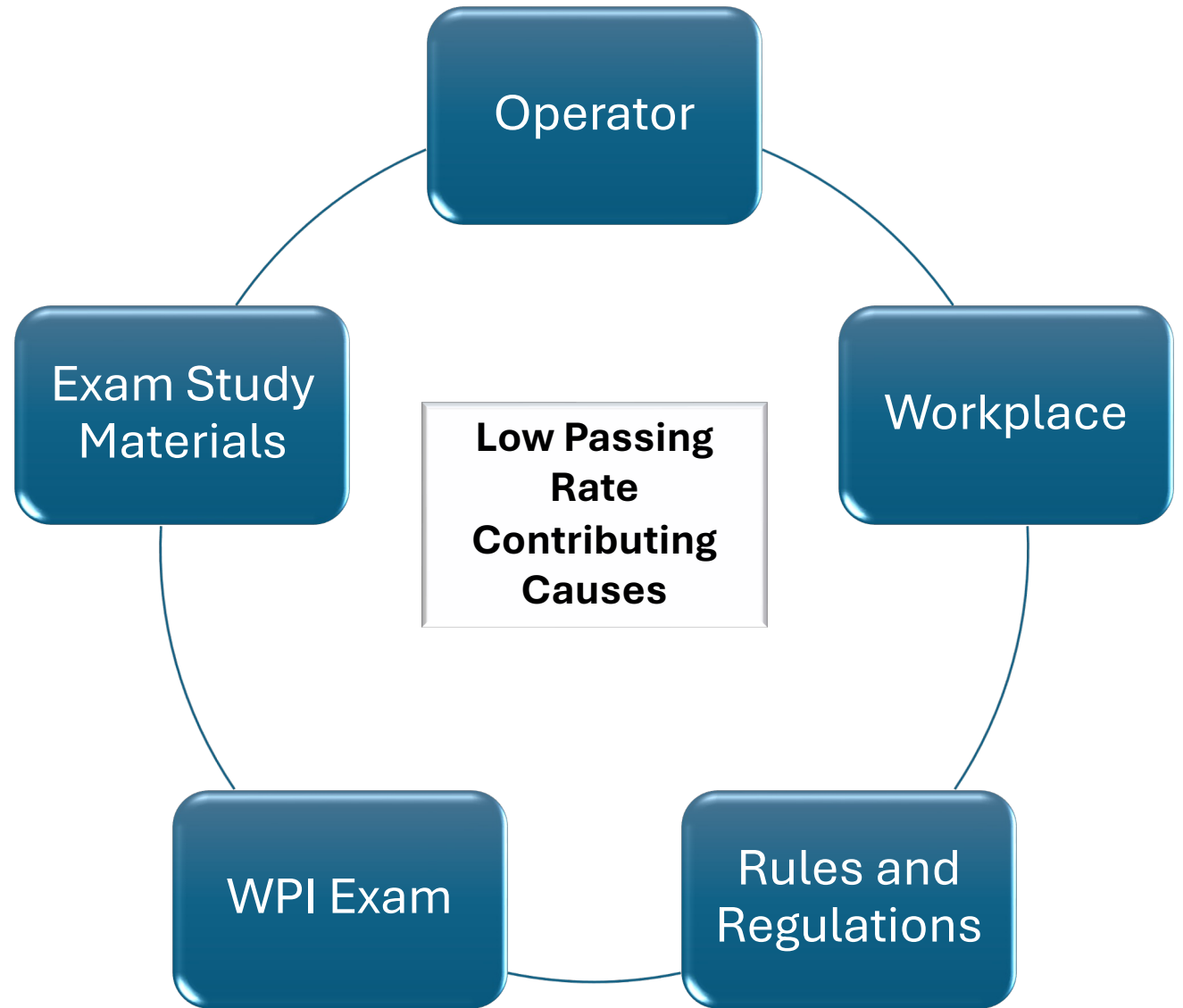
Carrie Ann Lyons, President, Lyons Environmental Services

Frank Pestana, Executive Director, North Bergen MUA

Jonathan Mannarino, Superintendent of Collections, Township of Middletown S.A.

Robert Genetelli, Superintendent, Northwest Bergen County Utilities Authority

The Root Causes

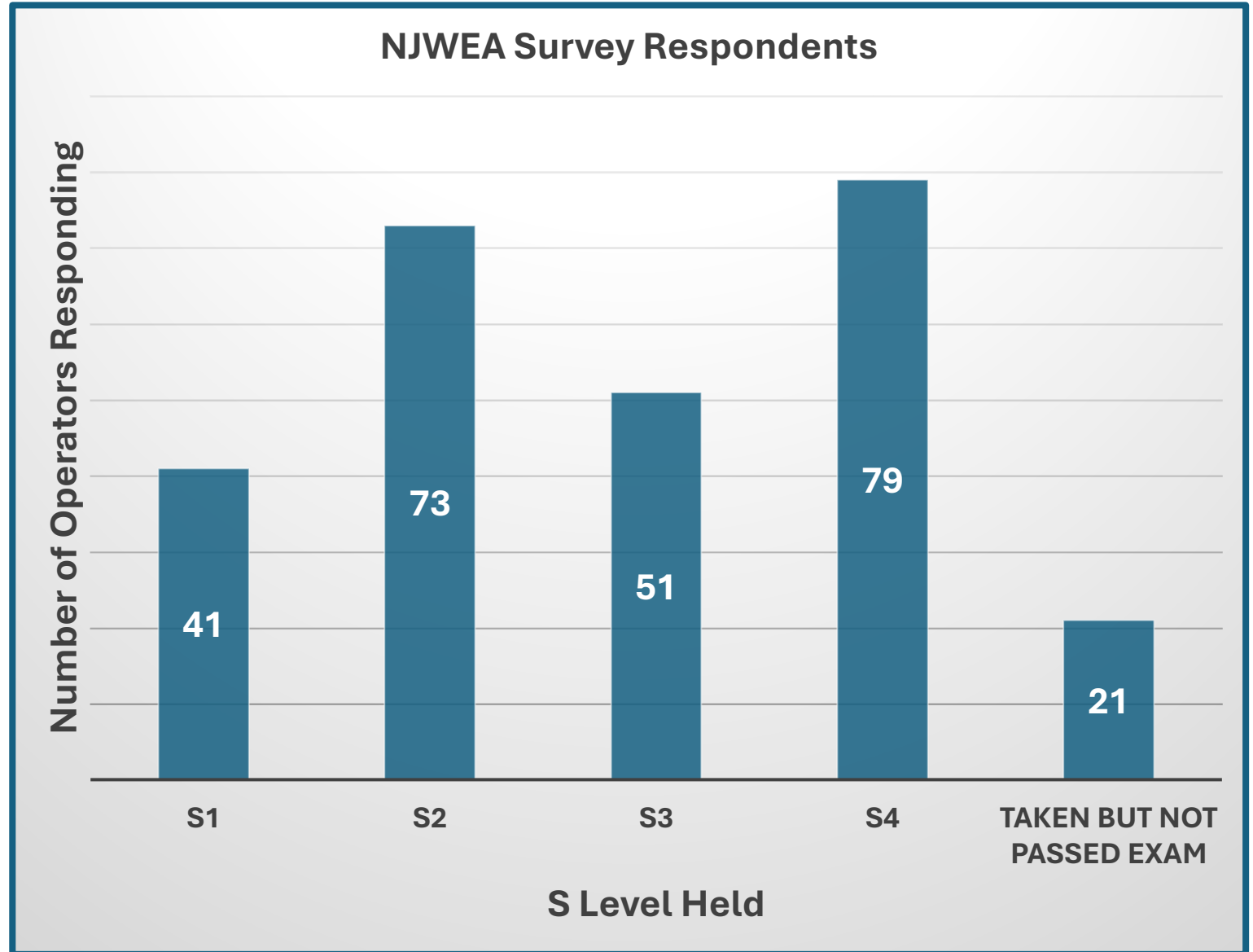


Investigative Findings I

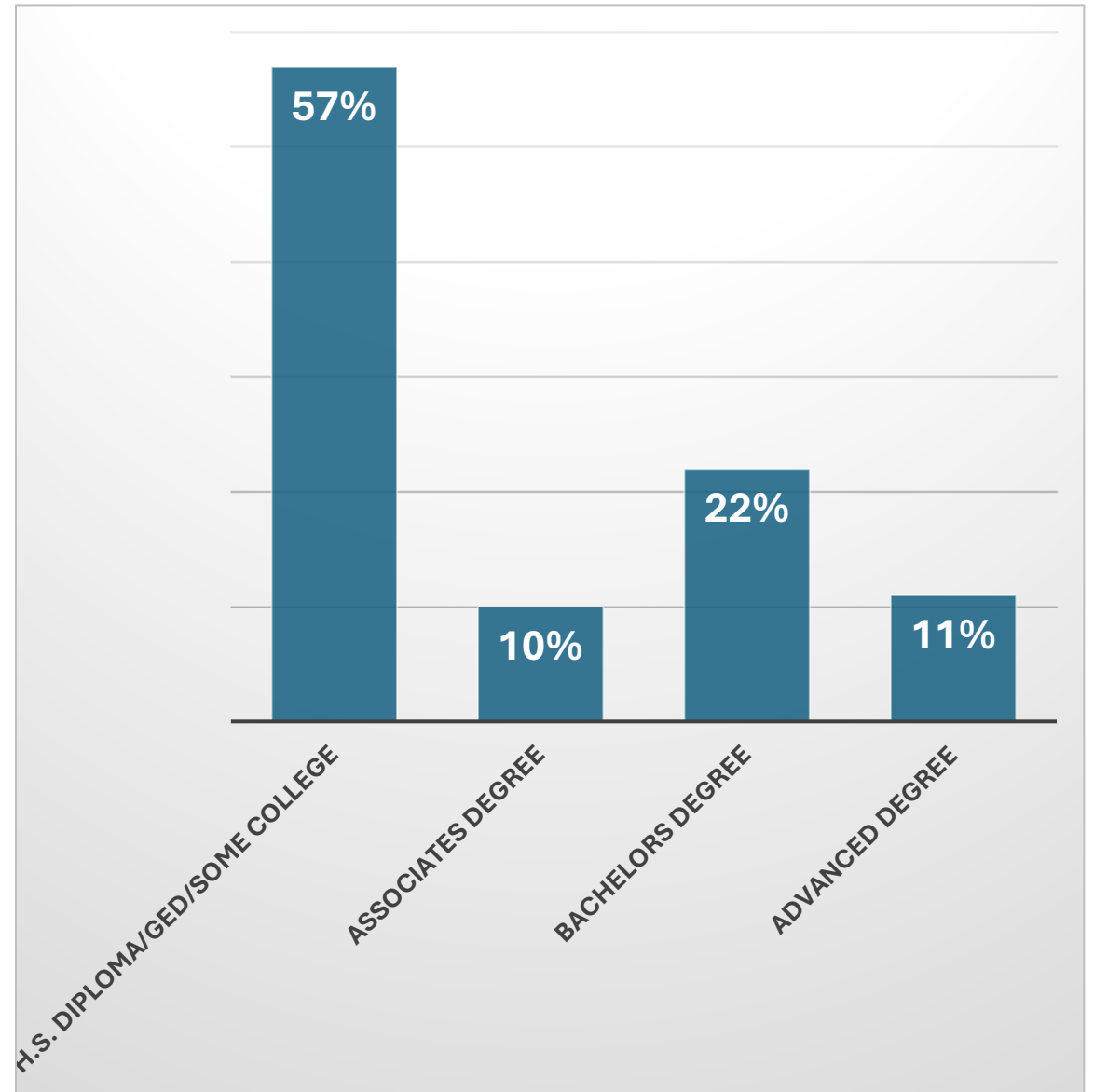
Operator
Survey – 265
Respondents



Distribution of Respondents

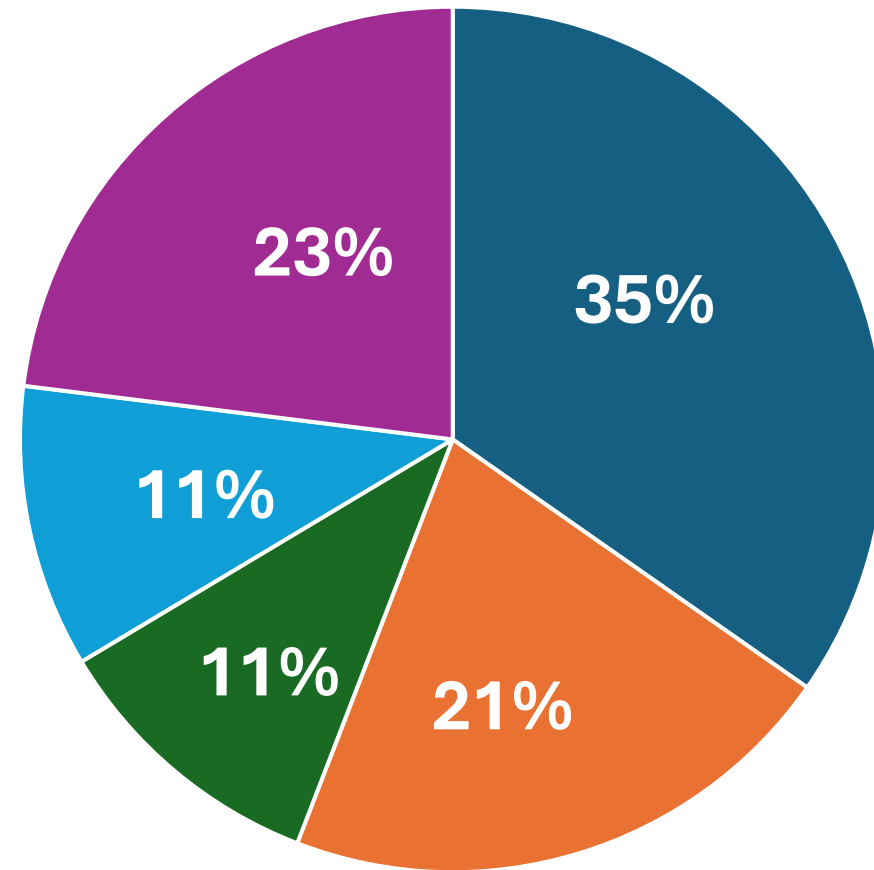


Education level of respondents



Distribution of Success Rate

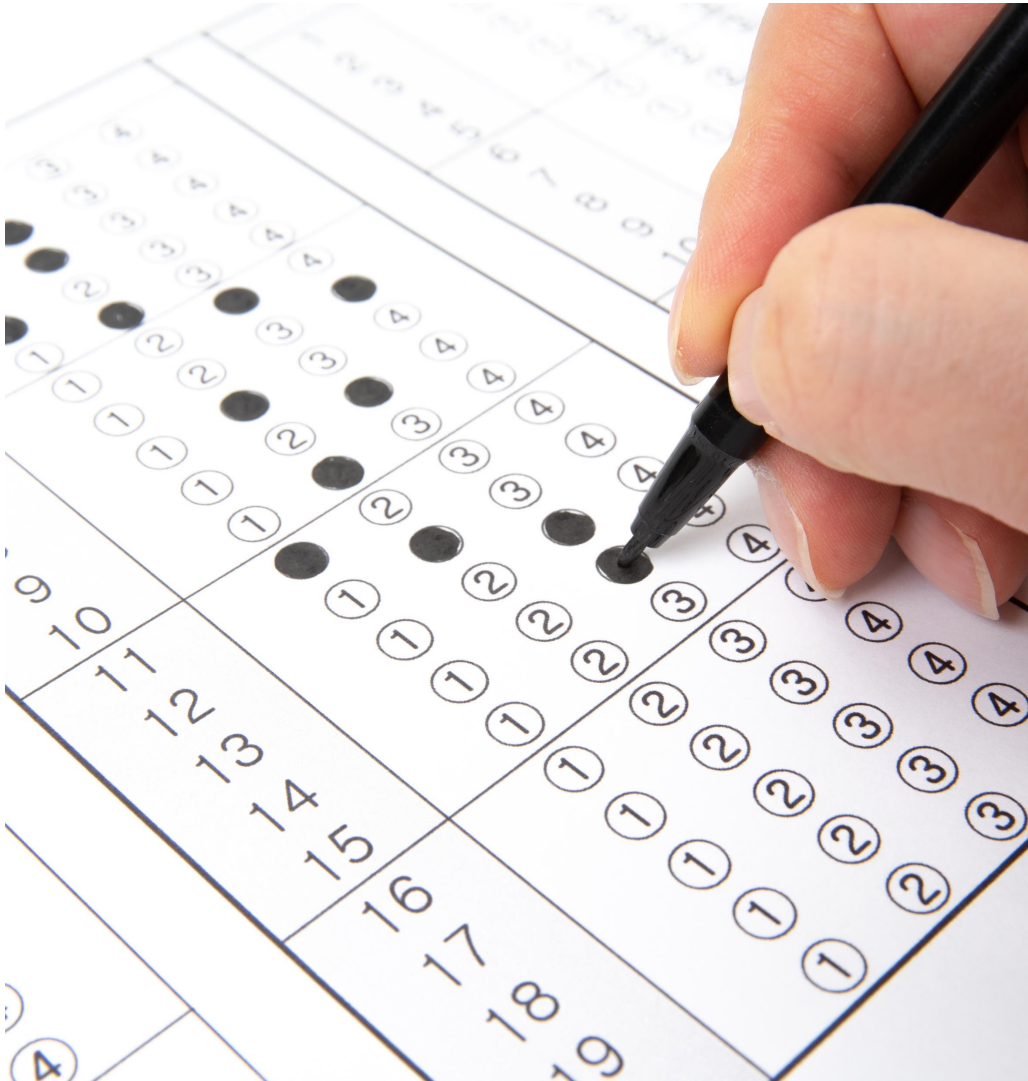
Number of times
respondents failed the S
exam



■ 0 ■ 1 ■ 2 ■ 3 ■ 4+

When Asked – “Why did you fail the last test”?

92% of respondents indicated a problem with the exam



When Operators were asked to “describe what it takes to pass the exam”?

62% indicated they needed to improve their studying, and get better job experience.



“What does it take to pass the S exam”?

The most common positive answers were:

“Dedicated study in multiple areas”

“Operations experience, math skills, reading comprehension”

“Plenty of Study Time”

“Study and on the job training”

“Knowledge of all different types of processes, even ones not at your plant”.

Root Cause



Average Operator does not commit enough time preparing for exam



Preparation time needs to be increased

Source: 2024 NJWEA Licensed Operator Survey of 265 Operators

25

Average Hours Operators Dedicate to Preparation for the S Examination

Most common answer
2-4 hours per week
4-8 weeks in advance of the exam

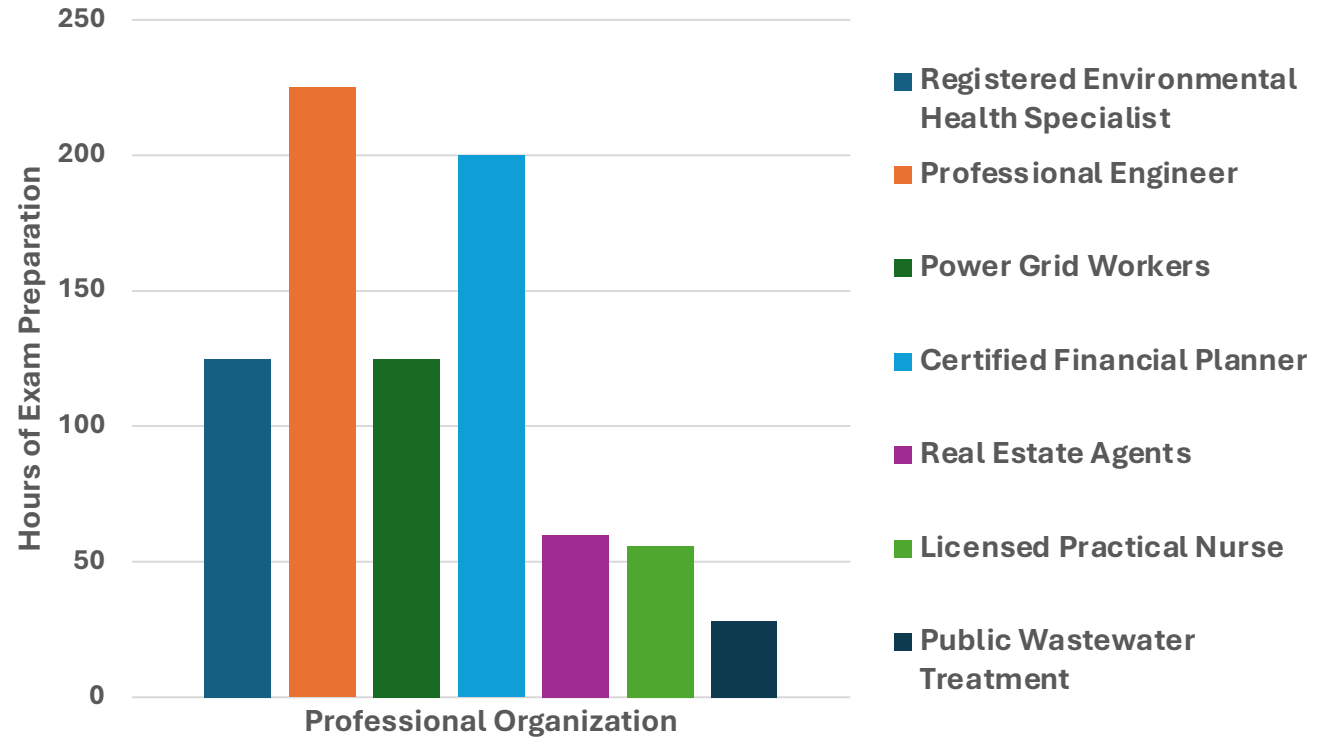



Study Commitment level versus exam success

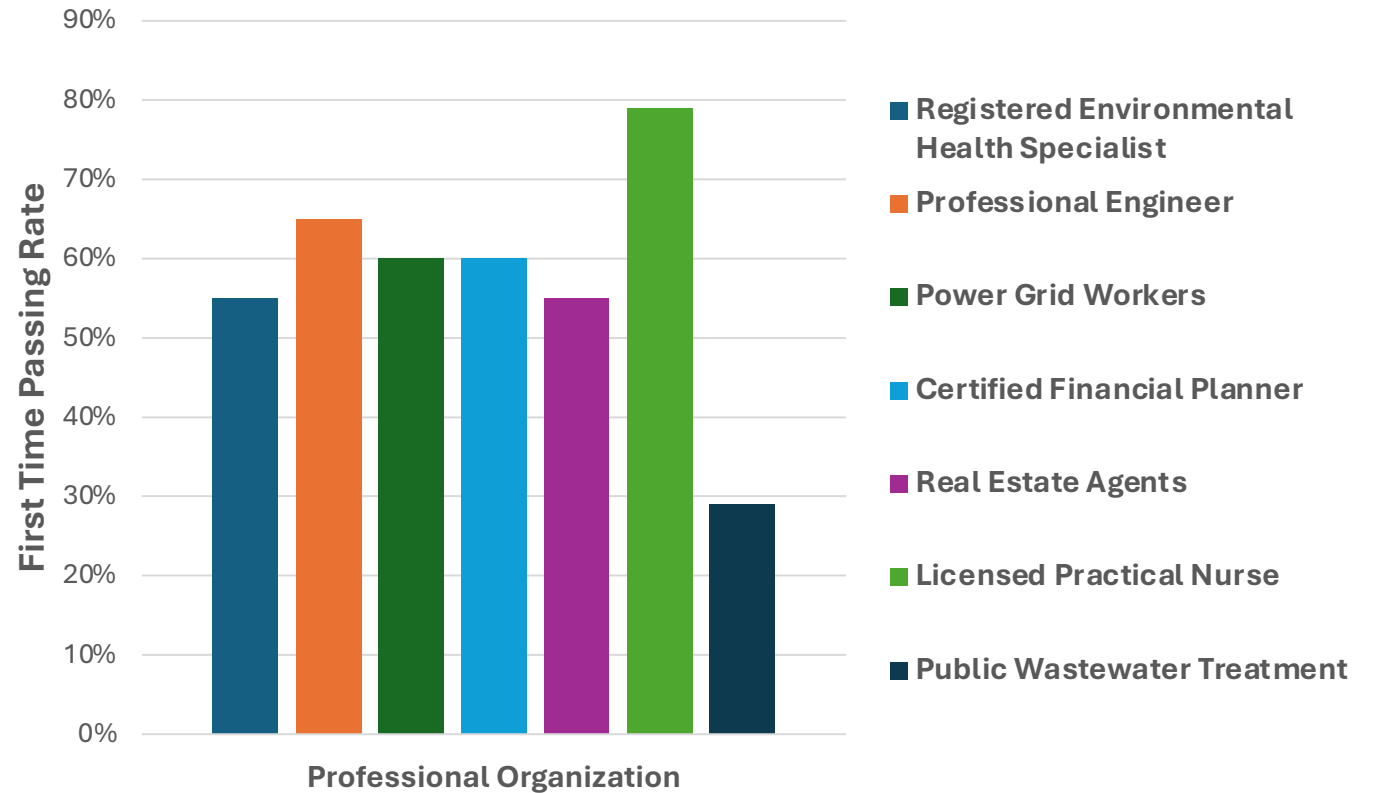


Weeks in advance Operator began study	Hours per week of operator study	% of operators who have never failed exam	
0-4	2-4	35	
4-8	2-4	39	
8-12	4-6	53	
>12	>6	70	

Hours of Preparation Compared to other Professional Certifications and Licensing Examinations



1st Time Passing Rate of Other Professional Certification and Licensing Examinations



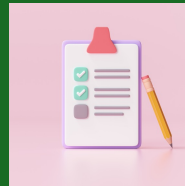
Determining the Baseline Study Target



Carnegie Rule : A traditional guideline for how much time students should spend studying outside of class



Other Professions



NJWEA Survey Findings

Roadmap Recommendation

Increase Exam Preparation to baseline of 90 hours

Adjust the 90-hour baseline on experience, years since last formal training, education level, understanding of wastewater process principals.

Begin 12 weeks in advance and spend 7 to 8 hours per week.



Investigative Findings II

The Materials of Study



Root Cause

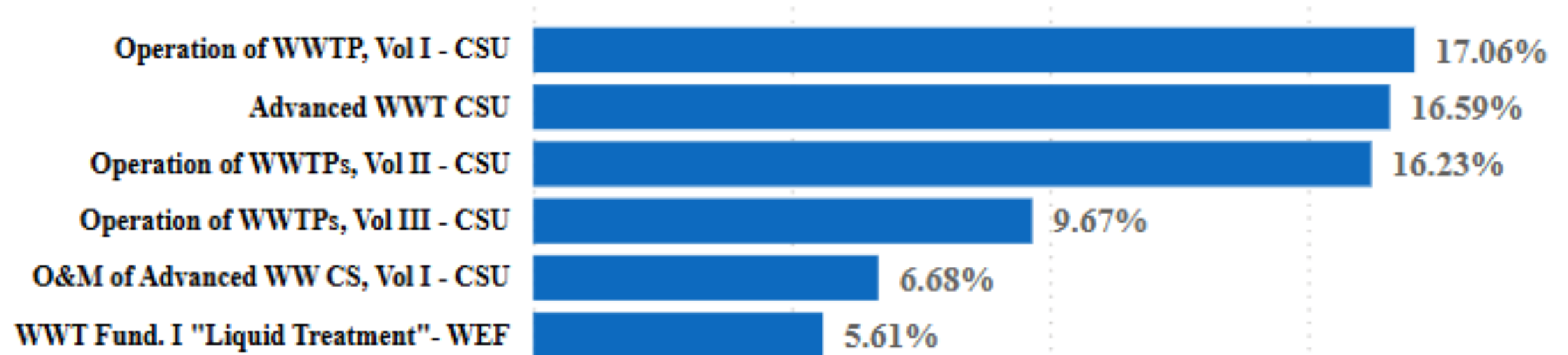


Operators need to be made aware of various study resources available to them



Both Printed and Online Resources are available and beneficial as study aids.

The Top 3 Study Materials Used to Prepare for Exams



The Materials of Study



56%
Percentage of
Operators unaware of
the New WEF
Fundamental Manuals
of Study

Online Study Apps



RoyCEU.com



WEF Skills Builder



AWWA OpCert Exam Prep
App

Printed Sample Exam Booklets with 100's of Questions



Operation of Resource Recovery Facilities
Study Guide



The WEF/ABC Wastewater Operators Guide to
Preparing for the Certification Exam



WEF/ABC Wastewater Laboratory Analyst's
Guide to Preparing for the Certification Exam



Wastewater Certification Review



Wastewater Operator Exam Prep - AWWA

Root Cause



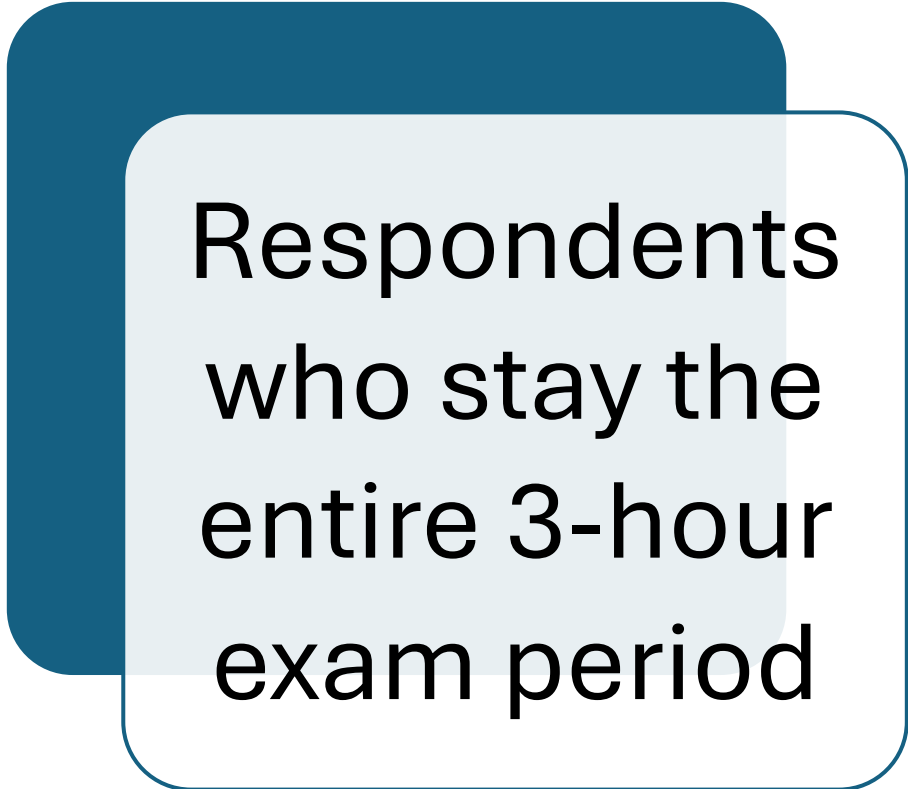
Many operators do not develop a robust study strategy or effective study techniques.



Proven techniques and an effective study strategy can improve scoring and become the difference between pass and fail

Test Taking Techniques

42%



Respondents
who stay the
entire 3-hour
exam period

The infographic consists of a dark blue rounded rectangle with a light blue rounded rectangle inside it. The text is centered within the light blue rectangle.

Test Taking Techniques

STAY TO THE END

ANSWER THE
EASY QUESTIONS
FIRST

THE ANSWERS
PROVIDE THE
FORMULA

FORM STUDY
CIRCLES

READ THE NEED-
TO-KNOW
CRITERIA

DEVELOP A
STUDY STRATEGY

Study Strategy Components



Outline the study strategy - assign hours – greater where weak – lesser where strong – manageable sections



Focus 30 and Focus 60 techniques



Take Chapter notes and re-write notes to condense



Supplement with active learning techniques practice exams, study circles, YouTube videos – flash cards



Rest and exercise breaks



Repetition

Roadmap Recommendations

If you have taken the Introductory and Advance Courses, begin studying with the WEF manuals

Use online practice tests

Use printed practice tests

Form Study Circles

Form a solid study strategy

Learn Effective Testing Techniques



Investigative Findings III

The Workplace



Root Cause



For many, wastewater facility training is focused on plant processes and safety only.



Facility training programs should expand to include process principals, basic calculations, biology, laboratory data review, utility management, etc.

The Workplace

The Survey of Authorities

A 13 Question Survey given to Authority leadership seeking feedback on employee education and training – mentorship – succession planning – incentive program and more .

Distributed and collected at the March 2024 AEA Conference

Incentive does not Seem to be the Problem

100% Facilities
that pay for
Introductory and
Advanced Course

94% Facilities
that provide payrate
or stipend increase
for license

76% Facilities
that pay for license
renewal fees

The Workplace

Licensed Operator Staffing

70%

Authorities who foresee
problems meeting NJDEP
Licensed Operator
Criteria in next 10 years.

66%

Authorities who believe
they are not adequately
staffed with licensed
operators now.

The Workplace

Percentage of licensed operators at plant is low

Approximately $\frac{1}{2}$ of the respondents report that less than 20% of their operators are licensed.

Approximately $\frac{1}{3}^{\text{rd}}$ of respondents report that less than 10% of their operators are licensed

The Workplace

Training –
Succession –
Mentorship –

70% of Respondents report not having a formalized training program in place

70% of Respondents report not having a formalized succession plan in place

70% of Respondents report not having a formalized mentorship program in place

The Workplace Training Program

1

Number of Authorities
who report using the
New WEF Manuals in
their training.

2

Number of Authorities
who report using the
California Manuals in
their training.

Roadmap Recommendations

Expand Training to Include WEF
Manuals

Operator Exchange Training
Program facilitated by NJWEA

Study Manual and Sample Test
Library at Plant



Investigative Findings IV

The WPI Exam



Root Cause



WPI Exam questions not all clear and precise– Need to Know Criteria is very general and confusing, too many references cited.



Improvements to eliminate confusion in exam questions and streamline NTK, cite fewer references.

Water Professionals International (WPI) – formerly ABC

Creates the
Examination

Does not promote or
sell their own prep
material

Promotes material
published by WEF
(Fundamentals of
Wastewater
Treatment)

Creates three-(3)
different types of
exam – Standardized –
Program Specific –
Customized Exams

NJ uses the
Standardize Exam

The WPI Exam

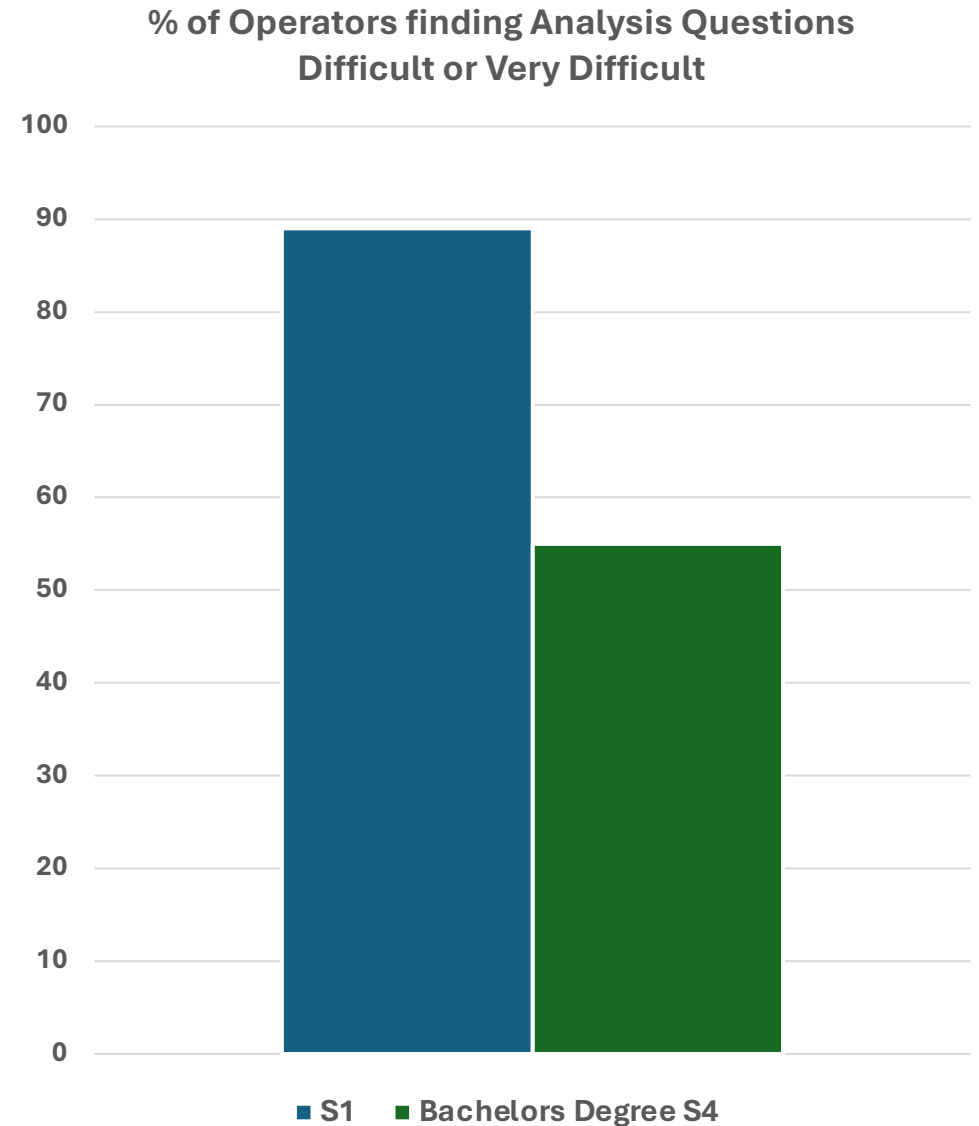
Cognitive Levels

Recall – what does the BOD test measure?

Application – what is the required Hp to pump 200 gpm against 25 total ft of head?

Analysis – multi step problem, fitting together of a variety of elements into a whole, you may need to judge, predict, use inductive or deductive reasoning, may contain irrelevant information.

- Analysis Cognitive Level Questions are the toughest
- Multi step
- Sometimes include irrelevant information
- 55% of college graduate S4's find the Analysis type questions difficult or very difficult



“What does it take to pass the S exam”?

The most common negative answers were:

“Make the questions easier to understand ”

“Test questions that reflect my plant processes”

“Easier questions”

“An engineering degree”

“Stop the Trick questions”

**Very Common
Operator Question:**

**What do I need to
study?**



WPI Reference Material Cited on their Website

Wastewater Treatment Operator Exam References

The following are approved as reference sources for WPI's standardized wastewater treatment operator examinations. Operators should use the latest edition of these reference sources to prepare for the exam.

California State University, Sacramento (CSUS) Foundation, Office of Water Programs

- *Operation of Wastewater Treatment Plants, [Volume I](#) and [Volume II](#)*
 - [Advanced Waste Treatment](#)
 - [Utility Management](#)
 - [Manage for Success](#)
-

Michigan State University

- [Supervisory Management in the Water/Wastewater Field](#)
-

Water Environment Federation (WEF)

- *[Operation of Water Resource Recovery Facilities, MOP 11](#)
- **[Safety, Health, and Security Standards for Water Resource Recovery, MOP 1, 7th Edition](#)
- ***[Activated Sludge and Nutrient Removal](#)
- ****[Wastewater Treatment Fundamentals](#)
- [Managing the Water and Wastewater Utility](#)

*This WEF text replaces the previous WEF title, *Operation of Municipal Wastewater Treatment Plants – Manual of Practice No. 11*

**This WEF text replaces the previous WEF title, *Safety & Health in Wastewater Systems, Manual of Practice No. 1*

***This WEF text replaces the previous WEF titles, *Activated Sludge: Manual of Practice OM-9*, and *Operation of Nutrient Removal Facilities*

****During the exam development process in 2017 & 2018, WPI's Subject Matter Expert volunteer exam item writers had the opportunity to evaluate and incorporate information from the first volume of the Water Environment Federation's *Wastewater Treatment Fundamentals* which at the time was set for release in August 2018.

Roadmap Recommendations

Operators should be very familiar with the
Need-to-Know Criteria

NTK should become streamlined and align with
the textbooks

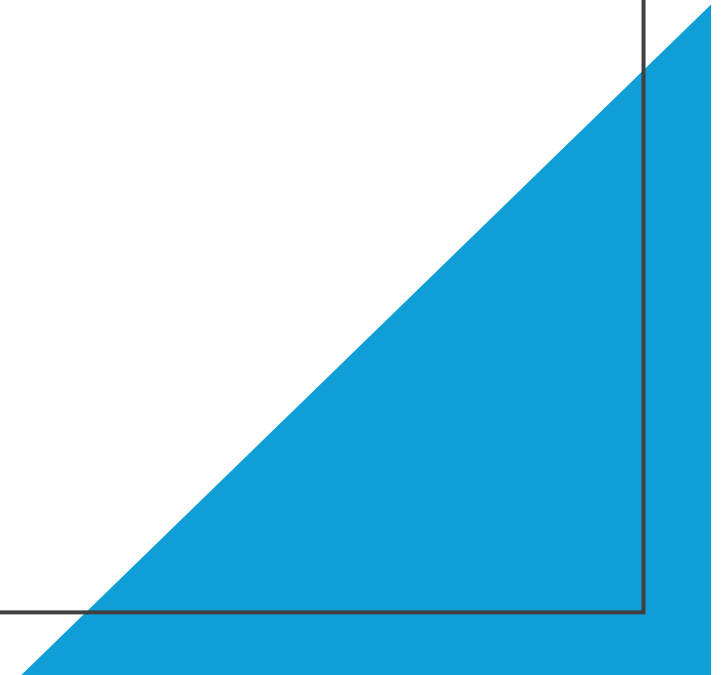
Analysis Questions should be reworded by
Subject Matter Experts

Number of References should be reduced





WPI Update



2025 Changes to the WPI Exam

Analysis Questions have been collapsed down to the application and recall cognitive level

Need to Know Criteria have been streamlined.

Test is graded on a curve

Investigative Findings V

NJDEP Rules and Regulations



Root Cause



DRC Creates unnecessary hurdle to obtaining top (S3/S4) licenses.

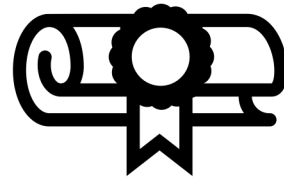


Modify DRC

**High School
Graduate**

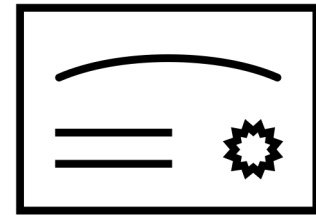


PE License



8 Years

S4 License



10 Years

Regulatory Hurdles

10-year mark to qualify for S4 exam is absolute minimum. For many it's a road too far. Pool of candidates is reduced.

Direct Responsible Charge definition limits the pool of S3/4 candidates.

DRC creates too many years without formal classroom training. No Coursework for 3 years at time of S3, 7 years at time of S4.

Instructors are not allowed to view the exam to ascertain appropriateness of their curriculum

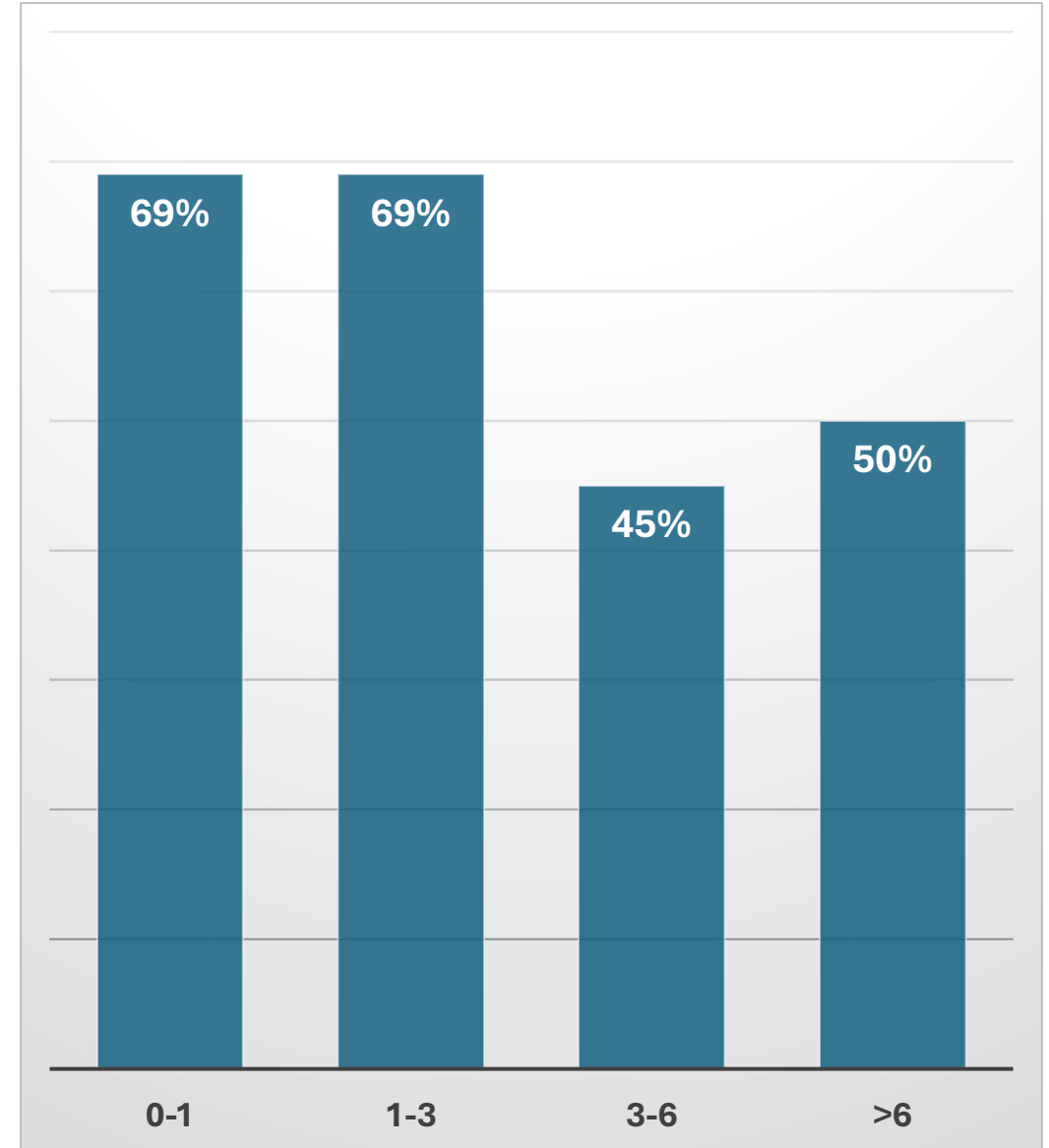
WEF manuals are very good source materials but are not approved by NJDEP for Intro and Advanced coursework.

Operator Exam

Years since last formal training and passing rate on last exam

Excludes S-4 (all S4's have passed their last exam)

Formal training = coursework of 2 or more months



Roadmap Recommendations

Allow operator to sit for S3/S4 immediately after S2, obtain OIT license – certified after DRC is gained.

Reduce DRC for S3 and S4.

Allow course instructors to view WPI exam under Non-disclosure agreement.

Authorize the use of WEF Fundamental Textbooks for Introductory and Advanced Courses

Adopt the 2025 version of the WPI Examinations.



The Roadmap to Improvement has been made possible by contributions from the following individuals.

Development of Operator Survey – Louis Lambe, Joseph Pantalone, Gregory Burde

Review of Examination Study Materials – Brian Carey, Thomas Grenci, Joshua Palumbo

Review of Examination Study Methods – Thomas Grenci, Jennifer Marques, Jill Plesnarski

Evaluation of State Regulatory Agencies, Member Associations and Water Professionals International - Johnatan Mannarino, Robert Genetelli, John Corkery, Louis Lambe, Robert Fischer, Frank Pestana

Evaluation of Workplace Practices – Eric Reichert and Carrie-Ann Lyons

Finally, the NJWEA wishes to acknowledge the assistance provided during the review and editing of this document, especially William Muszynski, Thomas Grenci, James Wancho and Lisa Oberreiter.

A hand with a light-colored sleeve cuff is pointing at a specific intersection on a dense, multi-colored transit map. The map features various colored lines (blue, red, yellow, green, purple) representing different transit routes. The background is slightly blurred, focusing attention on the hand and the map.

Questions?

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