



*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

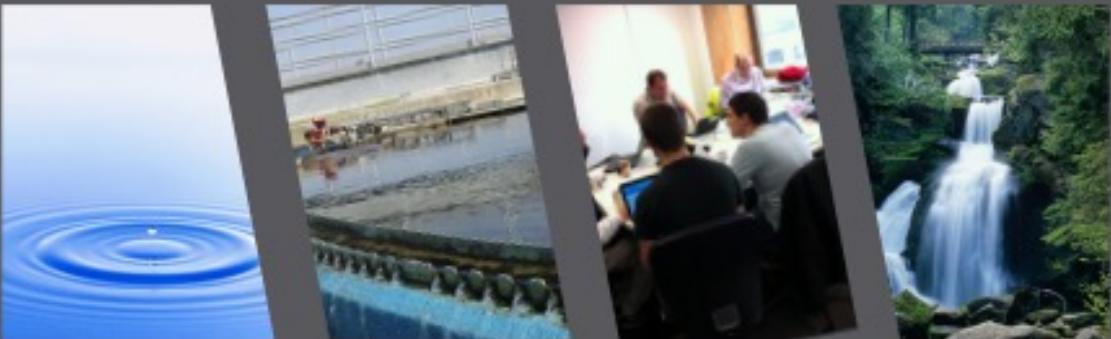
November 18, 2025

Robert C. Fischer, Sr. Director of Water Resources PS&S  
Chairman NJWEA Long Range Planning Committee



# Strategic Plan

2018 Revision

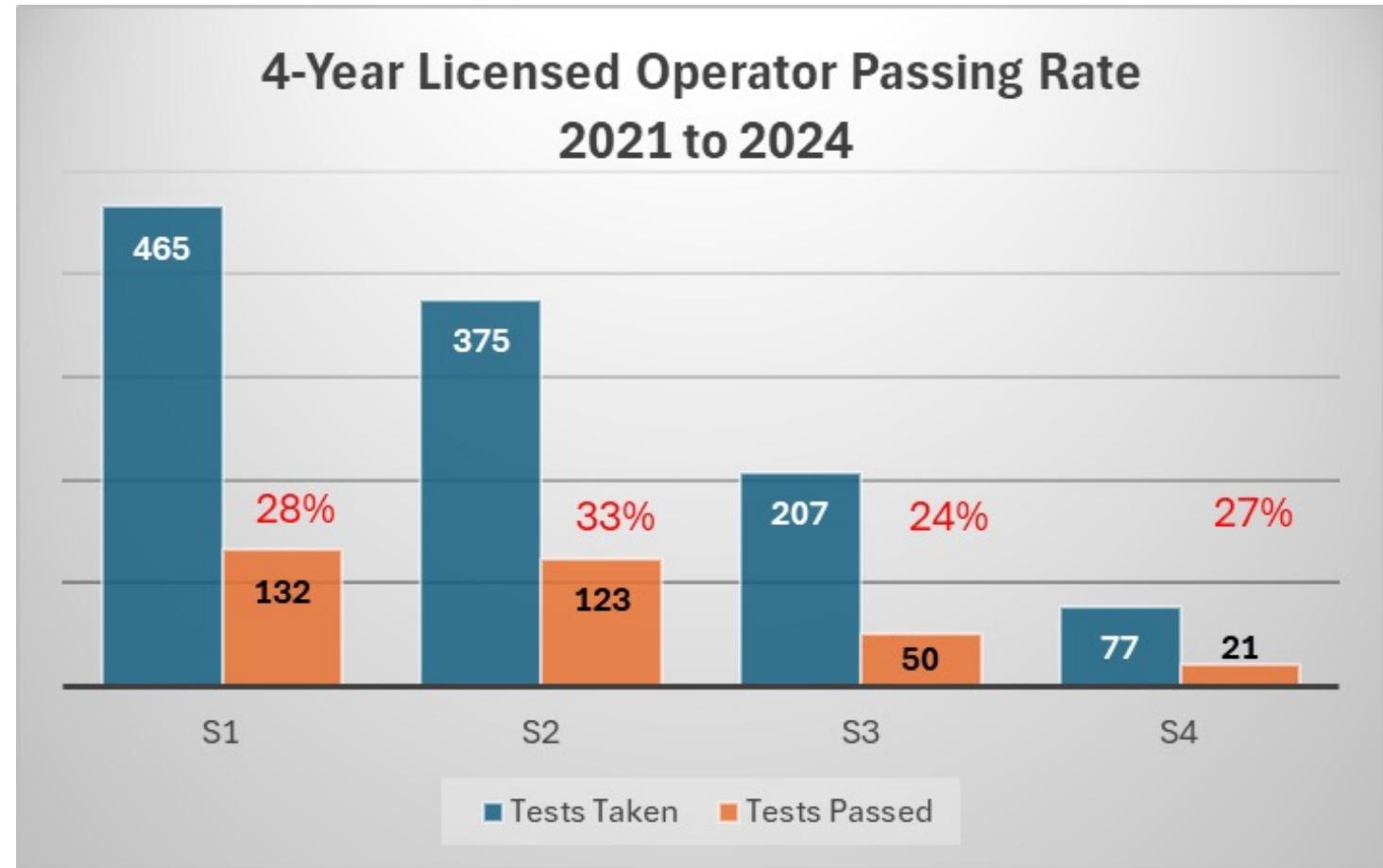


## Top Priority of NJWEA Strategic Plan

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

# The Concern

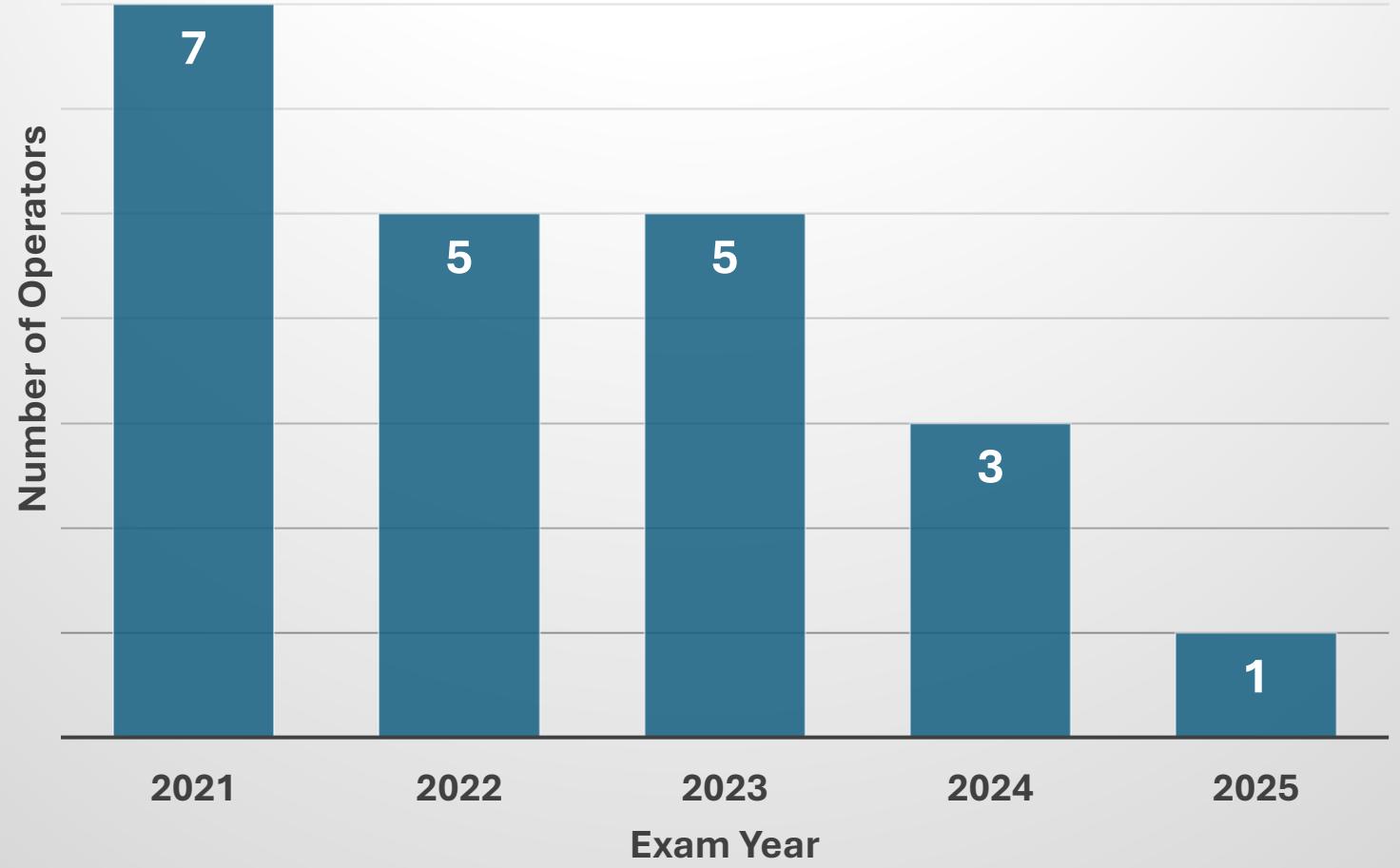
- *The Passing Rate for All S Licensing Exams from Q1-2021 to Q4-2024 = 29%*
- *C-W-N-T average Passing Rate = 50-65%*



# The Concern

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

**Number of Operators Passing the S4 Exam Per Year**



# The Sub Committee Charge

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

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

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

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Joseph Pantalone, Vice President Wastewater, Atlantic County UA

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Greg Burde, Independent Consultant, PSI Process

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Joshua Palumbo, Wastewater Program Manager, Cape May County MUA

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Brian Carey, Authority Engineer, Two Bridges Sewerage Authority

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Thomas Grenci, President, Environmental Compliance Monitoring , Inc.

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Jennifer Marques, Laboratory Director, Passaic Valley Sewerage Commissioners

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Jill Plesnarski, Administrator, Readington Lebanon Sewerage Authority

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John Corkery, Independent Consultant, PSI Process/Pumping Services

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Eric Reichert, Plant Manager, Rockaway Valley Regional Sewerage Authority

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Carrie Ann Lyons, President, Lyons Environmental Services

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Frank Pestana, Executive Director, North Bergen MUA

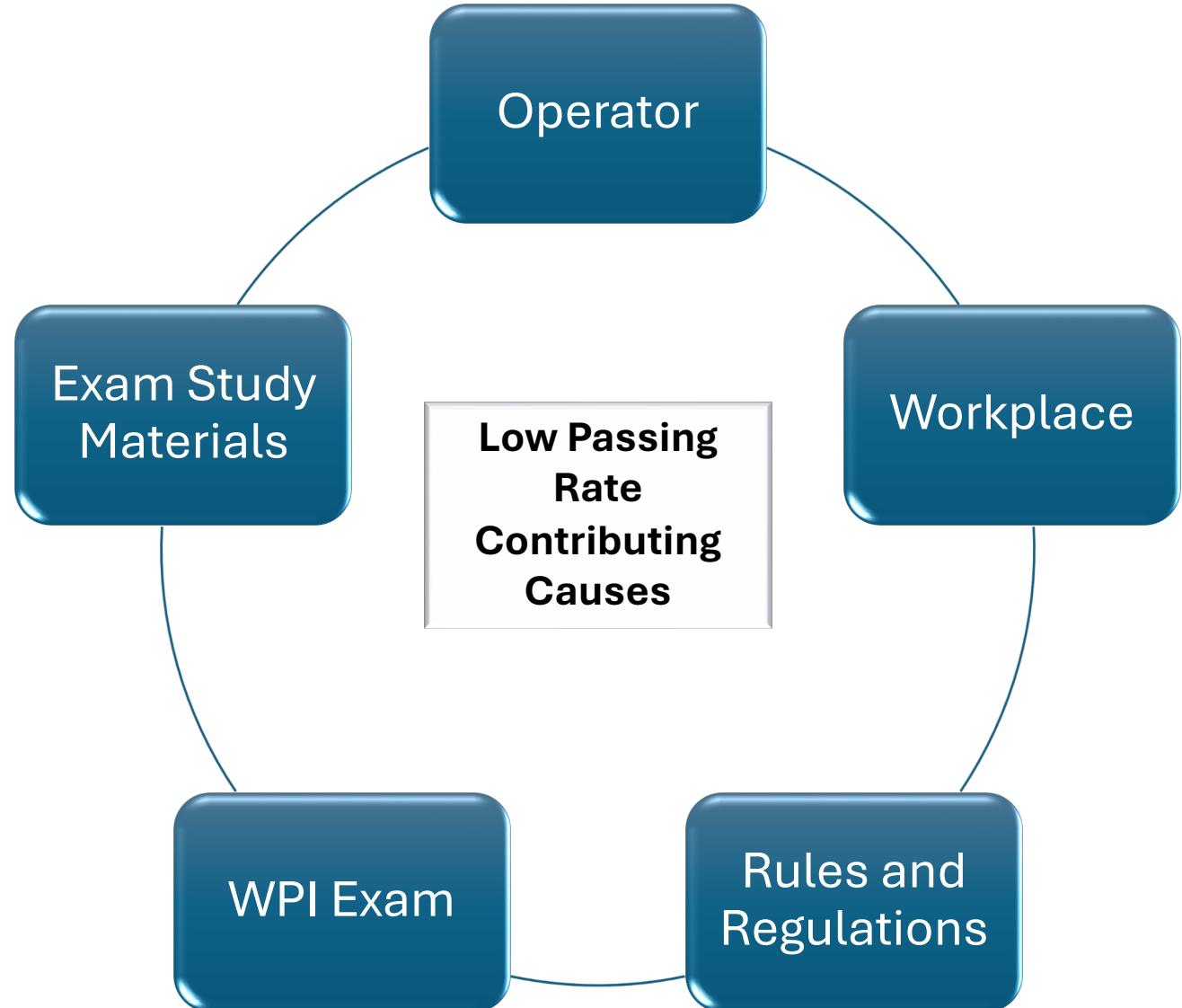
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Jonathan Mannarino, Superintendent of Collections, Township of Middletown S.A.

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Robert Genetelli, Superintendent, Northwest Bergen County Utilities Authority

# The Root Causes



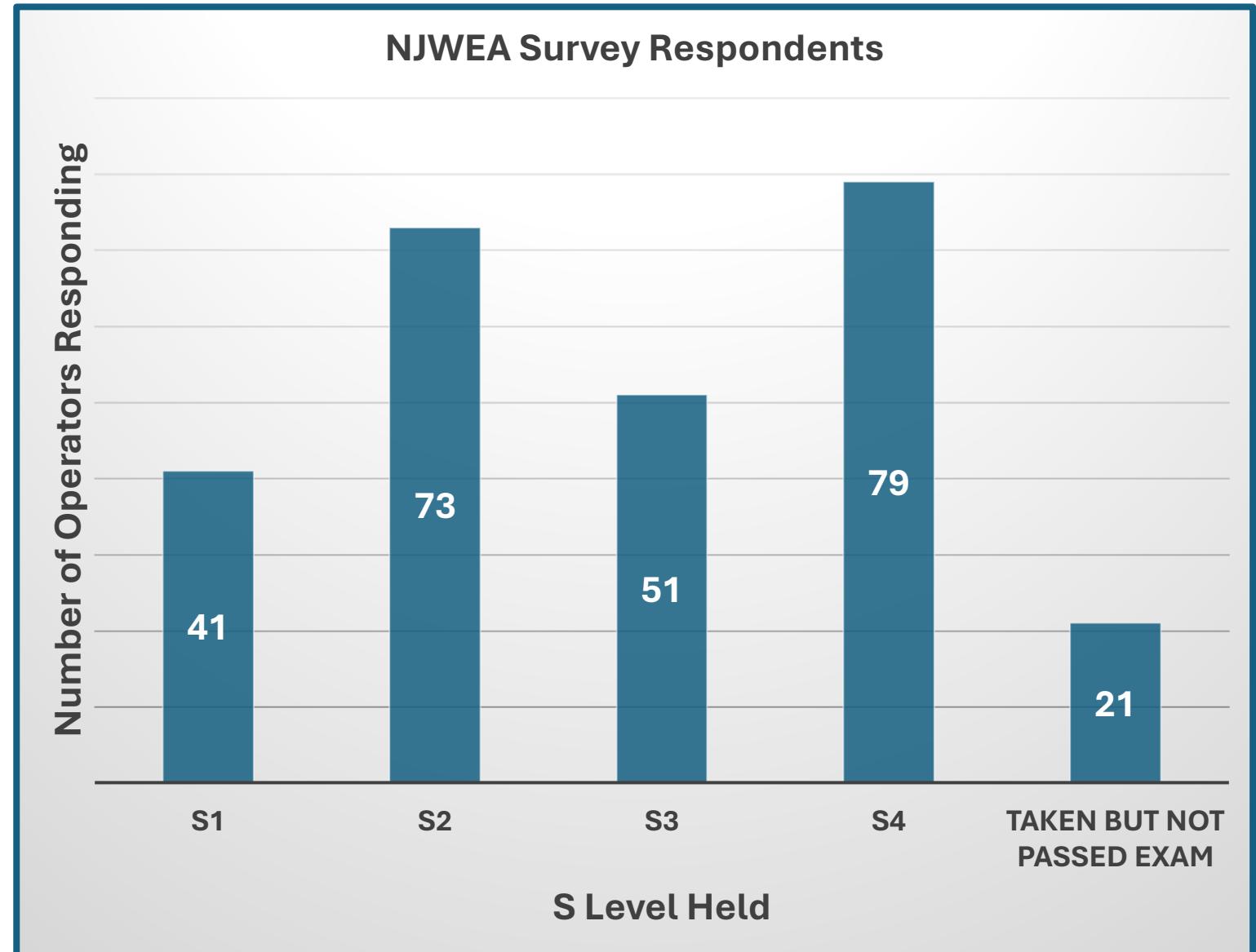
# Investigative Findings I

Operator  
Survey – 265  
Respondents

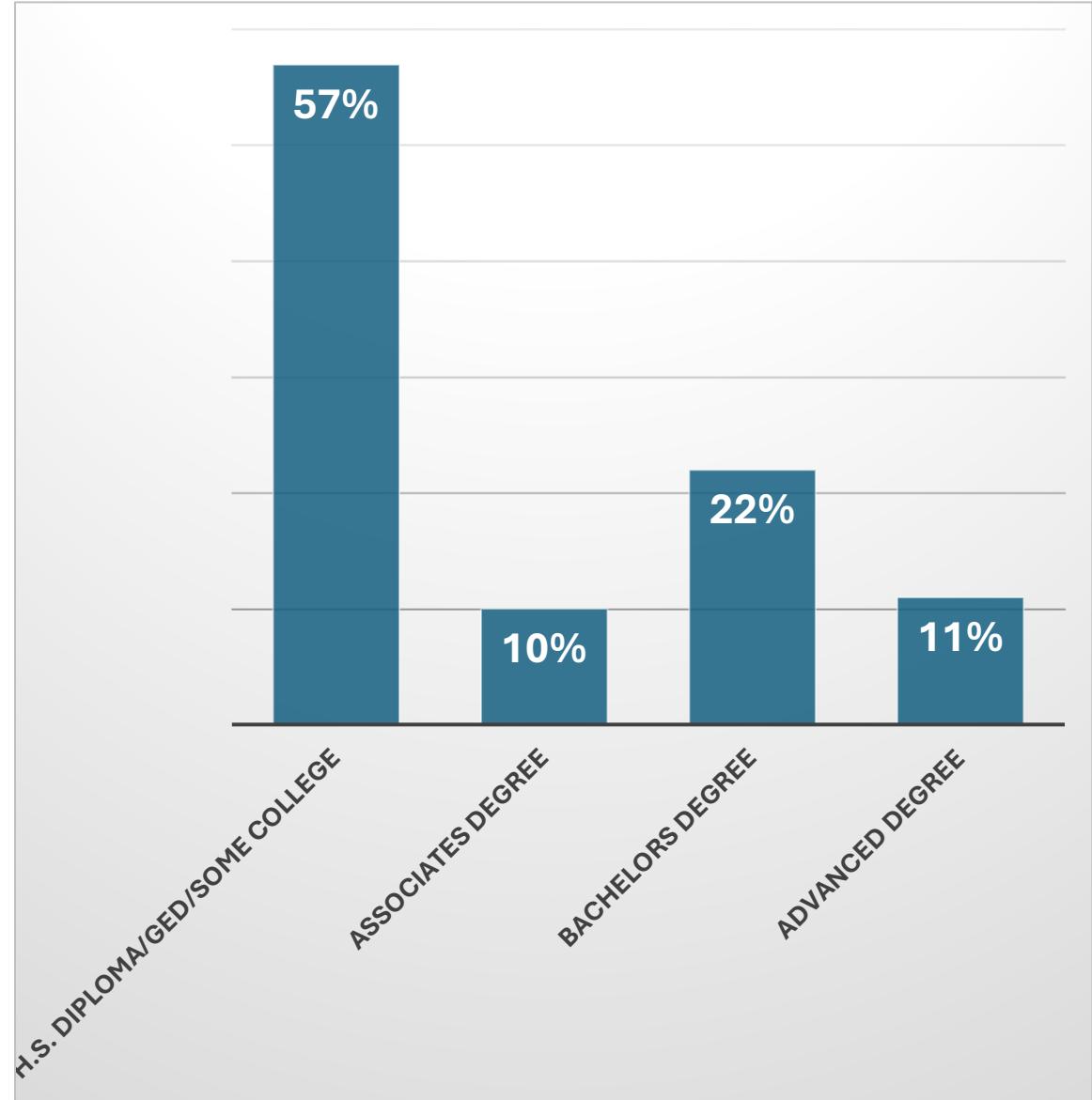
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# Distribution of Respondents



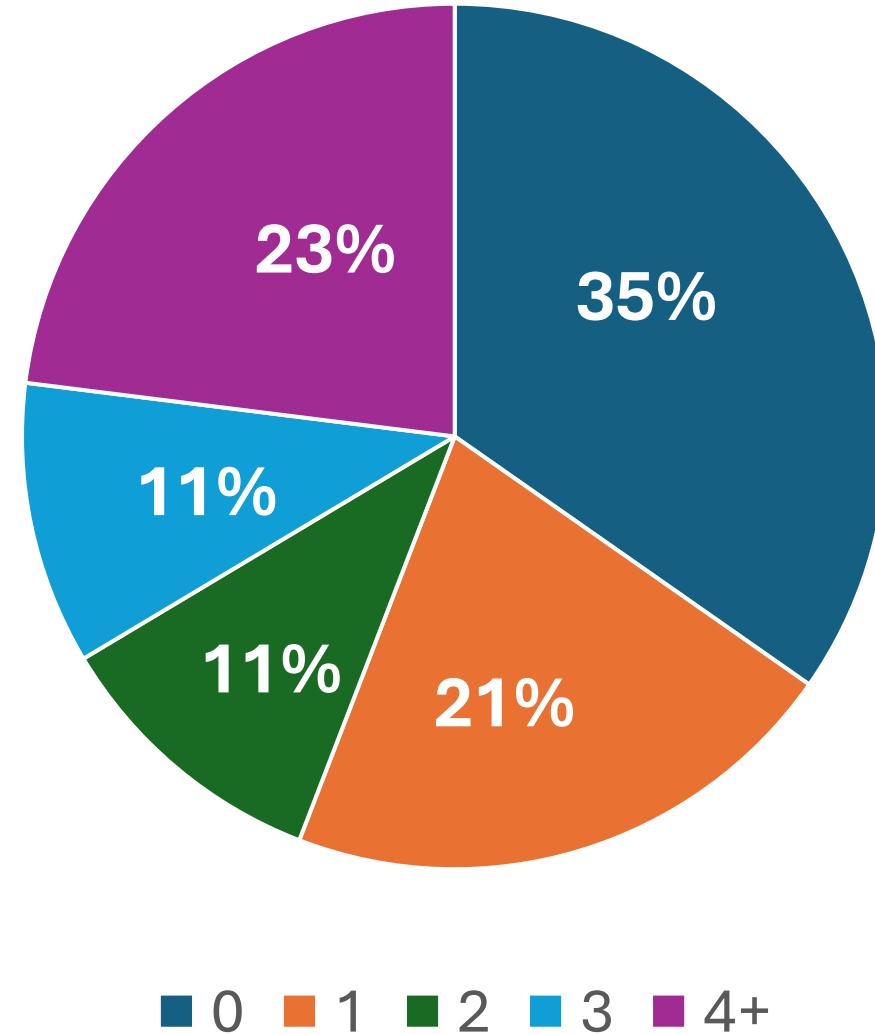
# Education level of respondents

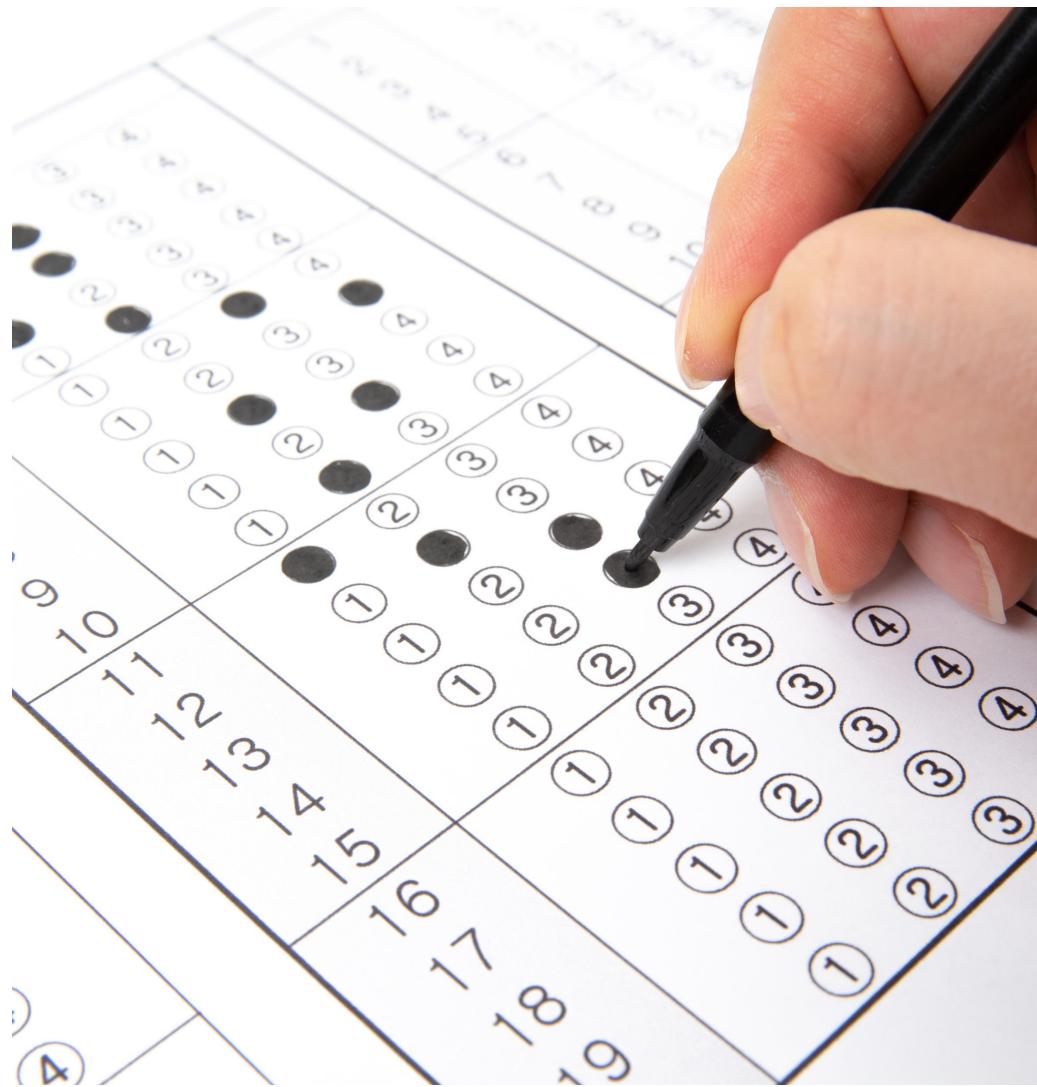


# Distribution of Success Rate

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Number of times  
respondents failed the S  
exam





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

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Most common answer

2-4 hours per week

4-8 weeks in advance of the exam

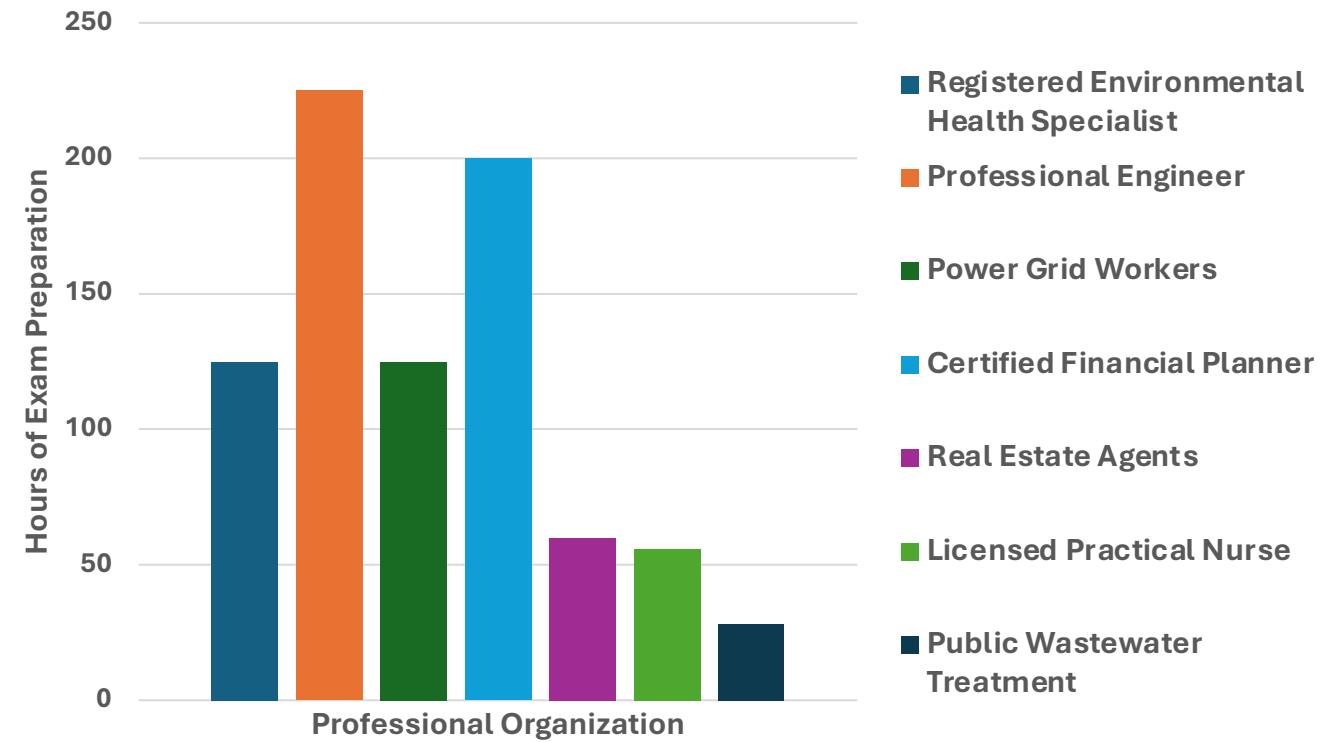


## Study Commitment level versus exam success



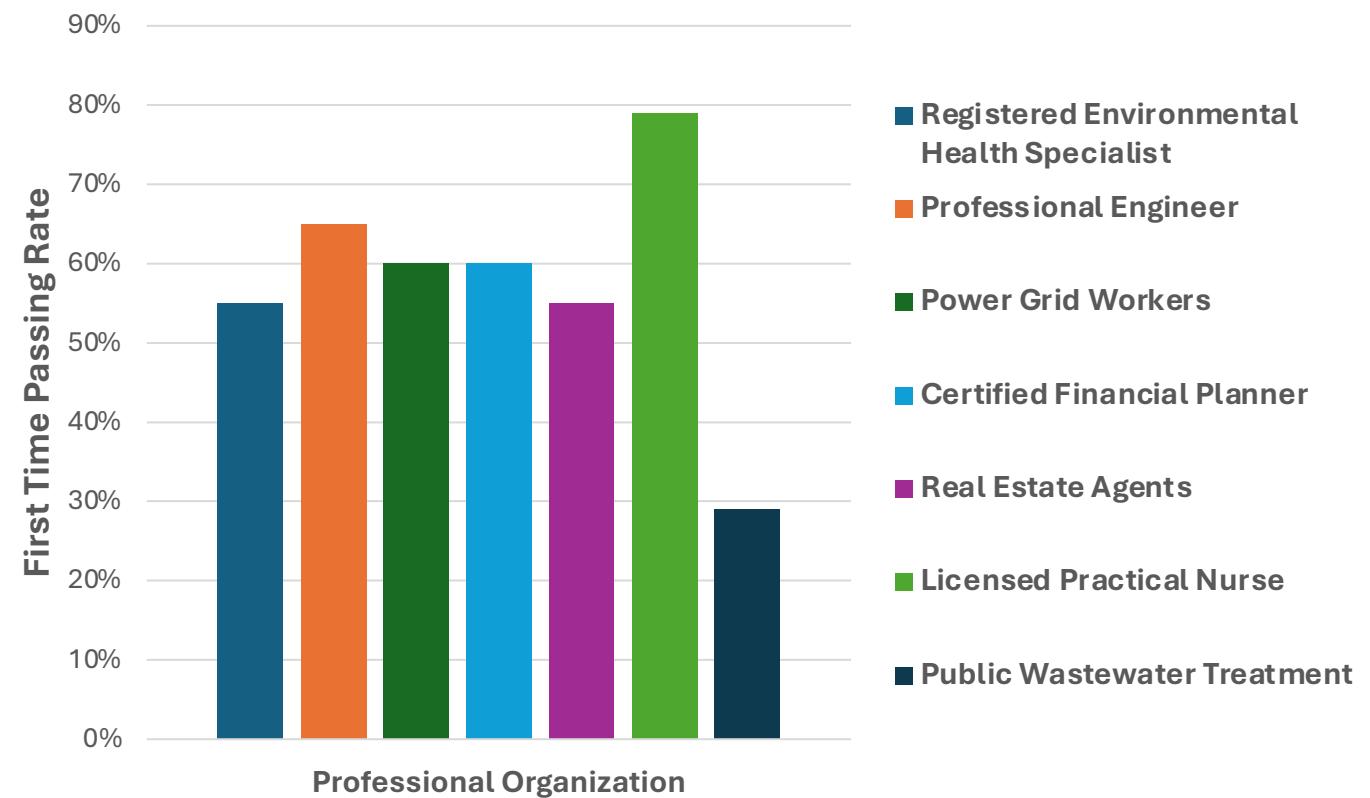
<b>Weeks in advance Operator began study</b>	<b>Hours per week of operator study</b>	<b>% of operators who have never failed exam</b>
0-4	2-4	35
4-8	2-4	39
8-12	4-6	53
>12	>6	70

# Hours of Preparation Compared to other Professional Certifications and Licensing Examinations



# 1<sup>st</sup> Time Passing Rate of Other Professional Certification and Licensing Examinations

— Professional Organization



# 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

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# Root Cause

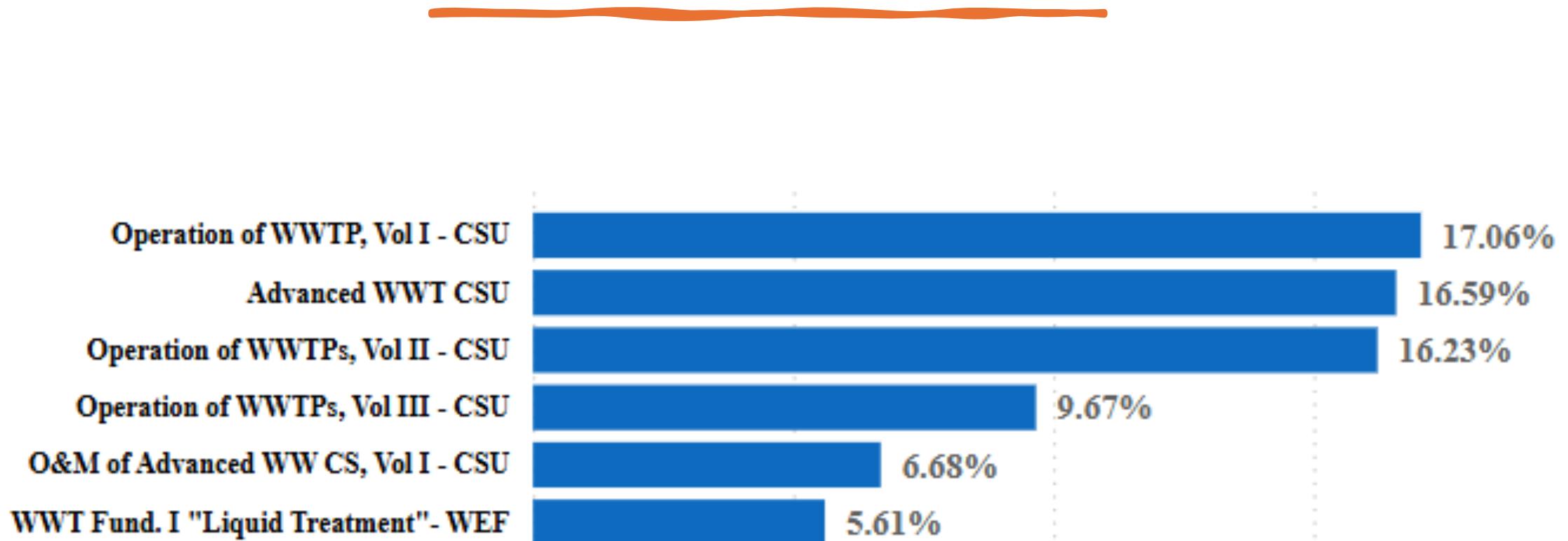


**Operators need to be made aware of various study resources available to them**



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

# 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

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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

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# 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  $\frac{1}{3}$  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

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# 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 Standardized Exam

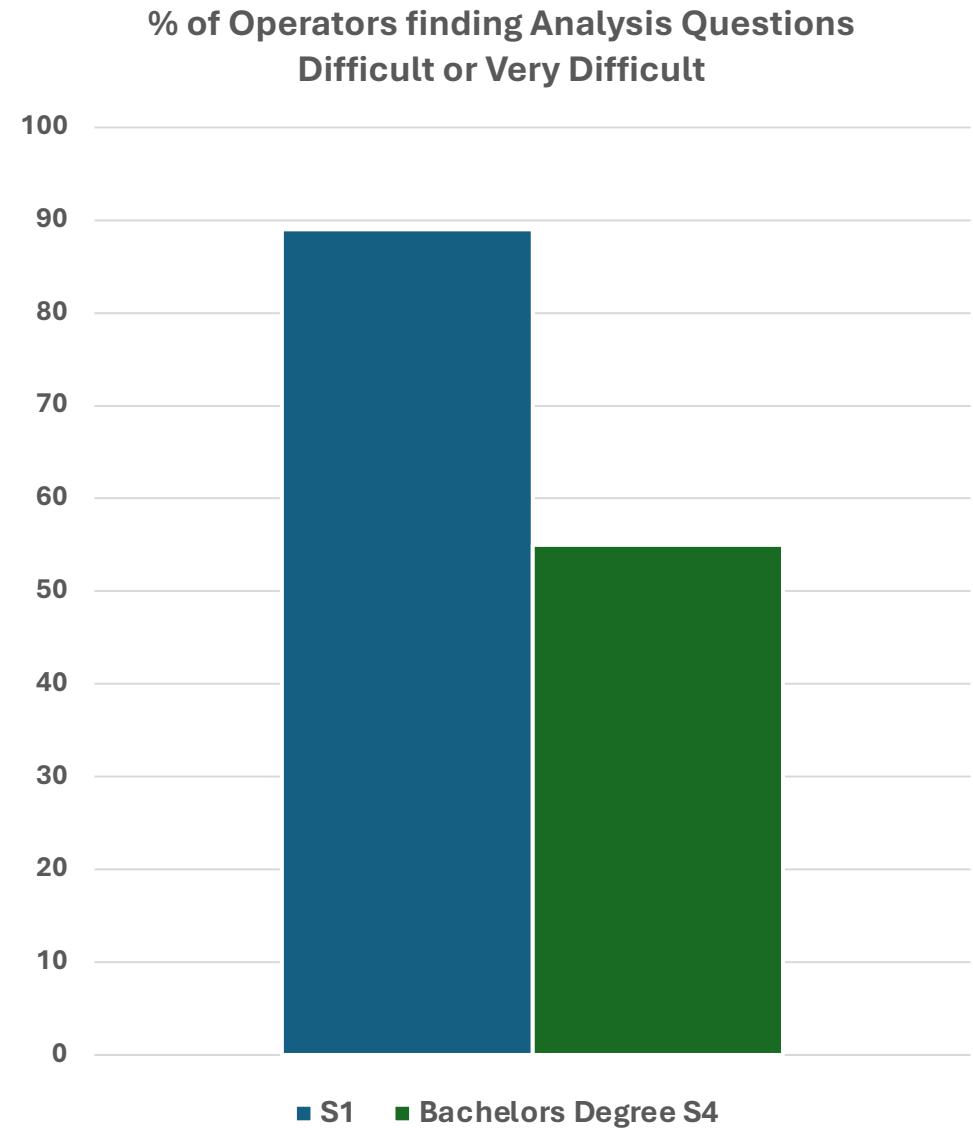
# The WPI Exam Cognitive Levels

Recall – what does the BOD test measure?

Application – what is the required  $H_p$  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.

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### [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](#)

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### **Michigan State University**

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

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## **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

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# Root Cause



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

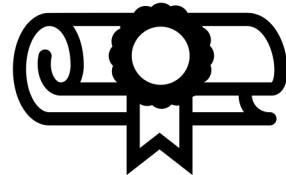


Modify DRC

**High School  
Graduate**

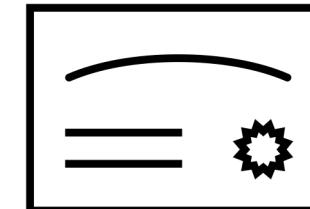


**PE License**



**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

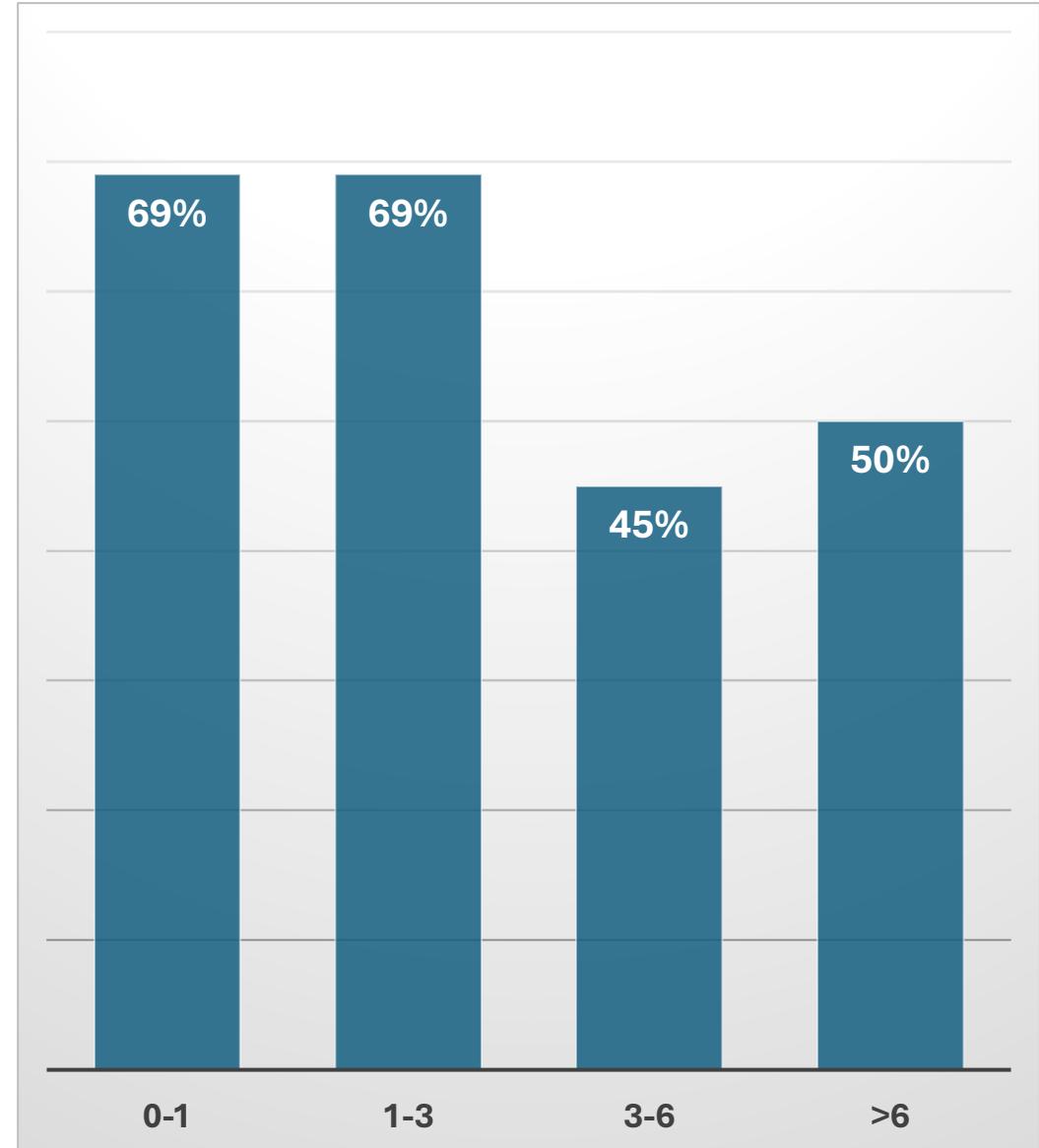
WEF manuals are very good source materials but are not approved by NJDEP for Intro and Advanced coursework.

# 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.

# Questions?

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