OCT ACADEMY
Class Description submittal to OESAC

Title: **Collection Operator Math, Grades III – IV**

☐ **New Class**, or ☐ **Class Renewal**

CEU Award requested: **1.4 CEUs**

OVERVIEW:
Advanced 2 – day upper level Grade 3 - 4 Collection Operator mathematics problems are exercises associated with operations work and supervisor knowledge requirements. They consist of representative Grade 3 - 4 process control and logic mathematics problems which may be encountered on Grade 3 - 4 State Collections operator examinations.

The mathematics compiled within the supporting COL – 99Grade III - IV classroom workbook for collection system operators has been arranged according to process unit. Word problems are presented together with multiple choice answers. Solutions are provided in Step-By-Step format with a summary of working formulas, unit process problems with written solutions, and chapter quizzes with solutions.

CLASS DESCRIPTION:

Session attendees learn that they need five (5) basic tools before they begin to solve typical plant and examination math problems at their candidate grade level. These tools are, as follows:

1. A written format for the successful solution of all wastewater math problems: the Step-by-Step Method.

2. How to properly use a basic scientific calculator.

3. A knowledge of conversions, units and simple diagramming.

4. A summary of working formulas broken down by unit process.

5. An understanding of algebraic concepts.

From the very beginning, instructors place great emphasis on the need for attendees to show all work in written form and to refrain from doing all the solution work in their heads.

OUTLINE:

An Outline of the chapter topics appears below. The manual contains far more material than can be covered during the one-day workshop, so it also serves as a self-study manual for further study.

1. The Step-By-Step Method
2. Using Your Scientific Calculator
3. Summary of the Key Formulas
4. Conversions and Diagramming
5. General Volume Problems
6. Population Equivalent.
7. Mass Pounds Problems.
8. Chlorine Dosage, demand and residual
9. Solutions & Solution Percentages
10. Velocity – Grit Channels
11. Hydraulics
12. Pumps
13. Slope and Grade / Rise over Run
14. Intercepting Sewer Storage and Detention Time
15. Excavation and Paving
16. Construction Cost and Performance.

DETAILED SUPPORTING PROBLEM DESCRIPTION:

Problem:

Determine the percentage (%) of solution created if 5.0 gallons of an 8.0% root control solution is added to an existing 3.0 gallons of a 5.0% root control solution in a chemical solution tank. Then, find the lbs per gallon after mixing.

	Part 1.	Part 2.
a)	8.0 %	0.667 lbs/gal
b)	6.7 %	0.600 lbs/gal
c)	6.9 %	0.58 lbs/gal
d)	None of the above.	

Ans:

This is called a 3 - Normal mixing equation and it's very handy on the job.

Part 1.

$(V_3C_3) = (V_1C_1) + (V_2C_2)$

$(8 \text{ gals}) \times (C_3) = (5.0 \text{ gal} \times 8.0\%) + (3.0 \text{ gal} \times 5.0\%)$

$(8.0) \times C_3 = 40 + 15$

$$C_3 = \frac{55}{8.0}$$

$$= 6.9\ \%$$

Part 2.

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$$\text{Lbs/gal} = \frac{\%}{100} \times 8.34 \text{ lbs/gal}$$

$$= \frac{6.9\ \%}{100} \times 8.34 \text{ lbs/gal}$$

$$= 0.069 \times 8.34 \text{ lbs/gal}$$

$$= 0.58 \text{ lbs/gal}$$

END

TIME PRESENTATION OUTLINE: (Sample two, eight (8) hour sessions)

Day One

8:00 a.m.	Summary of the Key Formulas
8:30 a.m.	Conversions
9:00 a.m.	Basic Volume Calculations
9:30 a.m.	Hydraulic Pipeline Calculations
10:00 a.m.	**Break 10 minutes**
10:10 a.m.	Pipeline Calculations Continued
11:15 a.m.	Solution Percentages
12:00 p.m.	**Lunch 30 minutes**
12:30 p.m.	Solution Percentages Continued
1:15 p.m.	Pumps & Pumping
1:45 p.m.	Totalizer Readings
2:50 p.m.	**Break 10 minutes**
3:00 p.m.	Slope or Grade Calculations
4:00 p.m.	**Break 10 minutes**
5:00 p.m.	Close

Day Two:

8:00 a.m.	Mass Calculations
9:00 a.m.	**Break 10 minutes**
9:10 a.m.	Dosage/Demand Residuals
11:00a.m	Diagramming
12:00 p.m.	**Lunch 30 minutes**
12:30 p.m.	Continuation of Diagramming
1:00 p.m.	Interceptor Server Storage
2:00 p.m.	**Break 10 minutes**
2:10 p.m.	Excavation & Paving
4:00 p.m.	**Break 10 minutes**.
4:10 p.m.	Quiz
4:45 p.m.	Answer Review
5:00 p.m.	Close