OCT WATER QUALITY ACADEMY
A US Government Funded Education Contractor
An ANSI/IACET Accredited School Nationwide
Class Description Submittal to OESAC

Title: Municipal Water Filtration

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

CEU Award requested: **0.7 CEUs/day**

FILTRATION PROCESS OVERVIEW:

Filtration is an important and active process in the natural treatment (purification) of surface and underground water, and is an essential unit process utilized under controlled conditions in municipal water treatment plants. Filters are highly efficient in removing suspended and colloidal materials from raw water. Clay, silt, tiny fragments of organic matter, and microscopic organisms are some of the common substances which cause Turbidity. Filtration treatment intends to remove turbidity, bacteria, algae, viruses and other microorganisms, oxidized iron and manganese; chemicals added in the pretreatment steps, and many other substances. Specific pathogens causing cholera, dysentery and typhoid are also removed.

CLASS DESCRIPTION:

The goal of water treatment is to obtain the greatest clarity, and the lowest possible turbidity, of filter effluent. As a result, it is important to produce a filter influent of maximum filterability, as well as, one with minimum turbidity to produce a finished water with 0.3 NTUs, or less. To accomplish the treatment goals, a great deal of attention should be given to the preparation of the water for maximum clarification utilizing the pre-treatment train of coagulation, flocculation, and sedimentation (clarification) at maximum performance levels

OUTLINE:

A short history of municipal filtration, Key Glossary terms, Key Surface and Ground water Filtration regulations, slow sand filters, rapid sand filters, mixed media filters, pressure filters and membrane filters.

Fig 1. Package Water Plant.

DETAILED SUPPORTING DESCRIPTION:

Municipal water filtration is a multi-stage process designed to purify water for safe human consumption by removing sediment, pathogens, and chemical contaminants. It typically involves coagulation/flocculation, sedimentation, sand/charcoal filtration, and disinfection via chlorine or UV light to meet EPA standards.

The following are the Key Stages in Municipal Water Filtration.

- **Pre-treatment & Screening:** Water from sources (lakes/rivers) passes through screens to remove large debris like sticks and leaves.
- **Coagulation and Flocculation:** Chemicals (like alum) are added to water to adjust the pH of the water and create positive (+) charges, neutralizing negative charges on dirt and particles. This allows the particles to bind together (flocculation), forming larger particles called "floc".
- **Sedimentation (Clarification):** Water moves to a settling tank where gravity causes the heavy floc particles to settle to the bottom, forming sludge that is removed.
- **Filtration (Filtration Process):** Clarified water passes through layers of sand, gravel, and frequently granular activated carbon to remove remaining dissolved particles, organic compounds, bacteria, and parasites.

Fig. 2 Pressure Filtration.

- **Advanced Filtration Options:** Some systems use advanced technology like **ultrafiltration** (membranes with tiny pores) or **reverse osmosis** (especially for recycling water) to remove smaller particles and contaminants.

Fig. 3 Reverse osmosis.

- **Disinfection:** A crucial final step to kill remaining microorganisms (viruses, parasites) using disinfectants like **chlorine**, chloramines, or **ultraviolet (UV) light.**

Fig. 4 Chlorine for disinfection.

- **Fluoridation & Stabilization:** Often, fluoride which is optional is added for dental health, and pH is adjusted to prevent corrosion in water pipes.

Purpose and Benefits
Municipal filtration, provided by each community's water treatment plant also can remove heavy metals, industrial solvents, and contaminants like PFAS, ensuring water meets EPA standards for safe consumption. These processes are essential for protecting public health and supporting sustainable water management.

OBJECTIVES:

- Students will learn the history of municipal water filtration, a summary of key terminology terms, Federal and State Water filtration regulations, the purpose of slow sand filters, the use of rapid sand filters and upflow filters, heavily used mixed media filters, pressure filters, and membrane filtration.

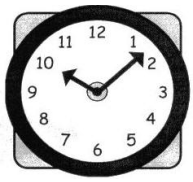
- Students will gain basic fundamental knowledge of all the topics listed in the outline above.

- Students will have the opportunity to interact with an experienced instructor to clarify information on municipal filtration where they lack knowledge and understanding.

- Students will be prepared for state operator examinations to increase licensure in their state of residence.

TIME PRESENTATION OUTLINE:

Day 1:



Start Time	End Time	Instructional Time	Allotted Break Time	Chapter/Discussion/Quiz
8:00am	8:50am	50 minutes	8:50am–9:00am	Introduction, History of Filtration.
9:00am	9:50am	50 minutes	9:50am–10:00am	Summary of Key Filter Glossary terms.
10:00am	10:50am	50 minutes	10:50am-11:00am	Federal and State Water Filtration Regulations.
11:00am	12:00pm	60 minutes	12:00pm-12:30pm	Slow sand filters.
12:30pm	1:20pm	50 minutes	1:20pm-1:30pm	Rapid Sand Filters.
1:30pm	2:20pm	50 minutes	2:20pm-2:30pm	Mixed Media filters.
2:30pm	3:20pm	50 minutes	3:20pm-3:30pm	Pressure filters.
3:30pm	4:30pm	60 minutes		Membrane filters.
		420 minutes		

6 sessions of 50 minutes of instruction and 2 sessions of 60 minutes of instruction equals 420 minutes. 420 minutes equates to 7 hours of instruction divided by 10 which is 0.7 CEUs.

END