

ADVANCED WATER OPERATIONS PART I

COURSE OUTLINE

45 HOURS MINIMUM

- A) Sources of water
 - Water cycle
 - Water sources
 - a. Surface
 - b. Ground
 - c. Other
 - Developing water Supply
 - a. Ground vs. Surface
 - b. Economics
 - c. Design Criteria
 - d. Regulations
 - Ground Water / Wells
 - a. Locating Source
 - b. Test wells
 - c. Development/Testing
 - d. Safe Yield/Quality
 - e. Production well design
- B) Characteristics of Water Sources
 - Physical
 - Chemical
 - Biological
 - Sanitary
- C) SDWA Standards
 - Primary
 - Secondary
 - Monitoring/Reporting Requirements
 - a. sampling
 - b. reporting
 - Compliance
 - a. Variances
 - b. Exemptions
 - c. Public Notification
 - Regulation Changes
 - new/proposed

D) Potable Water Sampling and Analysis

Sampling Requirements/Procedures

- a. Physical
- b. Chemical
- c. Microbiological
- d. Organics, Inorganics
- e. Radiological

Sample Collection, Preservation

Types of Samples

Volumes, Containers

Sample Point Selection

Chain of Custody

Analysis/Basic Methods

(For each group in list above)

Laboratory Procedures

- a. Accuracy
- b. Quality Control
- c. Records
- d. Reporting

Monitoring for Compliance/SDWA

Quality Control Monitoring

Laboratory hands-on sessions to become familiar with the basic testing procedures.

Laboratory Equipment

Labware

Instruments

Mid term exam

E) Water Treatment

Corrosion Control

Taste and Odor

Stabilization

F) Disinfection

Chlorination

- a. theory/purpose
- b. application
- c. break point method
- d. problems

Other Chemicals/Compounds

- a. Ozone
- b. Chlorine Dioxide

Application

- a. Pre-treatment
- b. Post-feed
- c. Alternatives
- d. THM reduction

Mathematics

- a. Demand
- b. Free
- c. Combined

Final Exam

Field Trips and Plant Tours will be scheduled during Part I.

Rev: November 1988

ADVANCED WATER OPERATIONS PART II

COURSE OUTLINE

45 HOURS MINIMUM

Surface Water Treatment

- A) Intakes
 - a. Intake Structures
 - b. Screens
 - c. Microstraining
 - d. Flow Measurement

- B) Aeration
 - a. Purpose
 - b. Types of aerators
 - c. Operation & Problems
 - d. Testing & Control

- C) Coagulation-Flocculation
 - a. Purpose
 - b. Chemical addition
 - c. Mixing
 - d. Operation & Problems
 - e. Testing & Control
 - f. Chemical Handling
 - g. Calculations

- D) Sedimentation
 - a. Purpose
 - b. Types of settling Basins
 - c. Operation & Problems
 - d. Testing & Control
 - e. Solids-Contact Clarifiers
 - f. Calculations

- E) Filtration
 - a. Purpose
 - b. Filter Construction
 - c. Filter Media
 - d. Pressure Filters
 - e. Diatomaceous Earth Filters
 - f. Operation & Problems
 - g. Testing & Control

Filtration Continued...

- h. Filter Rate
- i. Loss of Head
- j. Back Wash Procedure
- k. Startup
- l. Shutdown
- m. Operation Problems
- n. Residuals Handling
- o. Calculations

F) Softening

- a. Purpose
- b. Hardness
- c. pH
- d. Alkalinity
- e. Lime-Soda Ash Softening
- f. Removals-Chemical Reactions
- g. Recarbonation
- h. Testing & Control
- i. Ion Exchange Softening
- j. Process & Operation
- k. Backwash
- l. Regeneration
- m. Testing & Control
- n. Calculations

G) pH Adjustment-Corrosion Control

- a. Purpose
- b. Requirements
- c. Langelier Index
- d. Chlorine Residual
- e. Testing & Control
- f. Distribution Problems

H) Carbon Adsorption

- a. Purpose
- b. THM Control
- c. Taste & Odor

Mid Term Exam

Distribution System

- A) Construction Standards
 - a. System Design
 - b. Main Sizing
 - c. Valve & Hydrant spacing
 - d. Materials Selection
 - e. Valve Selection
 - f. Fittings
 - g. Pipe Laying-Trenching
 - h. Pressure-Leakage Testing
 - i. Disinfection
 - j. Calculations

- B) Pipe Tapping
 - a. Service Taps
 - b. Large Main Taps
 - c. Tap Procedures
 - d. Equipment Handling

- C) Valves
 - a. Purpose of valves
 - b. Selection of valves
 - c. Check valves
 - d. Altitude valves
 - e. Surge Relief valves
 - f. Pressure Reducing valves
 - g. Electric-Hydraulic valves

- D) Fire Hydrants
 - a. Purpose
 - b. Types
 - c. Location
 - d. Installation
 - e. Maintenance & Inspection

- E) Safety
 - a. Traffic Control
 - b. Trench Safety
 - c. Equipment Safety
 - d. Plant Safety
 - e. Confined Space Entry

- F) Storage Tanks
 - a. Purpose
 - b. Types of Tanks
 - c. Construction Materials
 - d. Requirements-Sizing
 - e. Inspection
 - f. Painting
 - g. Maintenance
 - h. Cathodic Protection

- G) Cross Connection Control
 - a. Regulations-Requirements
 - b. Definitions
 - c. Backflow-Backsiphonage
 - d. Approved Devices
 - e. Installation
 - f. Testing and Inspection
 - g. Public Health Significance

- H) Pumps and Motors
 - a. Types of Pumps
 - b. Application
 - c. Sizing Pumps and Motors
 - d. Controls
 - e. Maintenance of Pumps
 - f. Maintenance of Motors
 - g. Stand-by Power
 - h. Booster Station Requirements
 - i. Electrical Maintenance
 - j. Safety

- I) Instrumentation and Controls
 - a. Booster Stations
 - b. Tanks
 - c. System
 - d. Plant
 - e. Use of Records
 - f. Maintenance of Equipment

- J) Meters
 - a. Purpose
 - b. Sizing Meters and Services
 - c. Types of Meters
 - d. Installation
 - e. Maintenance
 - f. Testing
 - g. Complaints
 - h. Records

- K) Records
 - a. NJDEP Requirements
 - b. Operating Requirements
 - c. System Maps
 - d. Valve and Curb Stop Locations
 - e. Hydrant maintenance
 - f. Maintenance of Mains
 - g. Plant Maintenance
 - h. Pump and Motor Maintenance
 - i. Operation and Maintenance Manuals

- L) Public Relations
 - a. Complaints of Quality
 - b. High Bills
 - c. Pressure
 - d. Requests for test results
 - e. Newspaper Reporters
 - f. Public Speaking

Final Exam

Field Trips and Plant Tours will be scheduled during Part II.

Rev: November 1988