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. Langlier 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