ADVANCED WASTEWATER OPERATIONS COURSE

(90 HOURS)

A. Administrative: (15 Hours)

1. Review of Rules & Regulations, NJPDES Permit
2. Filing Reports-DMR's, Sludge Reports, Lab. Certification, etc.
3. Preparing Monthly Reports on Plant Operation
4. Budgeting
5. Importance of Continuing Education-Attending Conferences, Seminars, etc.
6. Establishing Record Requirements and Record Keeping
7. Safety and P.E.O.S.H.A. Requirements
8. Toxic Catastrophe Prevention Act and Right to Know Act
9. Utility Management

B. Wastewater Sources & Characteristics Review (1 Hour)

C. Treatment Methods

1. Preliminary (3 Hours)
    a. Screening
        1. Types of Screens
        2. Function & Operation
    b. Comminutors, Grinders, etc.
        1. Function & Operation
        2. Maintenance
    c. Grit Removal Systems
        1. Mechanical Systems
            a. Function & Operation
            b. Design Criteria
            c. Maintenance
        2. Aerated System
            a. Function & Operation
            b. Design Criteria
            c. Maintenance
    d. Pre-chlorination & Pre-aeration

2. Primary Clarification (3 Hours)
    a. Function & Operation
    b. Design Criteria
    c. Operation Parameters & Problems
    d. Applied Mathematics
    e. Efficiencies

3. Secondary Treatment
    a. Trickling Filters and RBC's (5 Hours)
        1. Function & Operation
        2. Design Criteria
        3. Operation Parameters & Problems
        4. Applied Mathematics
        5. Process Control & Efficiencies

b. Activated Sludge Systems (8 Hours)
   1. Conventional
      a. Function & Operation
      b. Design Criteria
      c. Aeration Systems
      d. Operation Parameters & Problems
      e. Applied Mathematics
      f. Process Control

c. Modified Activated Sludge System (5 Hours)
   1. Contact-Stabilization, Step Aeration, Oxidation Ditches, etc.
      a. Function & Operation
      b. Design Criteria
      c. Operation Parameters & Problems
      d. Applied Mathematics
      e. Process Control

d. Clarification (3 Hours)
   1. Function & Operation
   2. Design Criteria
   3. Operation Parameters & Problems
   4. Applied Mathematics

*****TEST*****

D. Sludge Digestion and Solids Handling

1. Sludge Thickening Methods (3 Hours)
   a. Gravity, Flotation, Gravity Belt, Centrifuges
      1. Function & Operation
      2. Operation Parameters & Problems
      3. Applied Mathematics
      4. Process Control

2. Sludge Digestion
   a. Aerobic (3 Hours)
      1. Function & Operation
      2. Operation Parameters & Problems
      3. Applied Mathematics
      4. Process Control

   b. Anaerobic (9 Hours)
      1. Digestion Ranges – Psychro, Meso & Thermophilic
      2. Stages of Digestion
         a. Acid Production
         b. Acid Regression
         c. Intensive Digestion
      3. Methane Gas Equipment
         a. Gas Meters
         b. Waste Burners
         c. Pressure & Vacuum Relief Valves
         d. Manometers
         e. Flame Cells
         f. Others
      4. Design Criteria
      5. Operation Parameters & Problems
      6. Applied Mathematics

7. Process Control

3. Sludge Dewatering (3 Hours)
   a. Mechanical Methods
      1. Centrifuges
      2. Vacuum Filters
      3. Belt Press
      4. Others
   b. Drying Beds
      1. Construction
      2. Function & Operation
      3. Applied Mathematics
4. Sludge Disposal (4 Hours)
   a. Rules & Regulations
   b. Incineration
   c. Composting
   d. Land Application

E. Advanced Treatment

1. Stabilization Lagoons (2 Hours)
   a. Function & Operation
   b. Process Control

2. Nitrification and Denitrification (6 Hours)
   a. Function & Operation
   b. Design Criteria
   c. Operation Parameters & Problems
   d. Applied Mathematics
   e. Process Control

3. Phosphorus Removal (3 Hours)
   a. Function & Operation
   b. Design Criteria
   c. Operation Parameters & Problems
   d. Applied Mathematics
   e. Process Control

F. Disinfection (3 Hours)

1. Types
2. Methods of Application
3. Dechlorination
4. Operation

G. Field Trip (3 Hours)

H. Laboratory Analysis and Operational Control (8 Hours)

1. B.O.D.* and C.O.D.
2. Solids-Total*, Suspended*, Dissolved*
3. Ammonia
4. Total Kjeldahl Nitrogen
5. T.O.C.
6. D.O.*, pH*, Chlorine Residual*
7. Phosphorus

H. Laboratory Analysis and Operational Control (Cont'd)

8. Sludge Analysis
   a. Activated Sludge
   b. Digested Sludge
   c. Sludge Cake
9. Others

* Denotes actual test procedures and explanation how these tests Are performed for these parameters.

*****TEST*****

Note: 1. At least two (2) tests are to be administered for this course with a minimum Average of 70 for passing. Other tests or quizzes may be given at the Instructor's discretion.

2. Test required – Kerri Manuals for Wastewater Treatment Volume No. 1 and No. 2, and Advanced Treatment