Wastewater Treatment Examination Need to Know Criteria

The Ohio wastewater treatment examinations are designed to evaluate the ability of an examinee to operate a wastewater treatment facility in the state of Ohio. In order to successfully complete an examination, an operator must demonstrate a broad knowledge of the areas covered by this document. Due to the fact that a certificate allows an operator to be in responsible charge of any facility in the state with the same or lower classification, the exams may include technologies that are not used in each treatment plant but are commonly used at treatment plants throughout the state of Ohio. The Advisory Board of Examiners along with a number of interested party groups developed these criteria to serve as a study guide for each level of certification.

Class I Wastewater Examination Topics

1) Pollutants
   a) CBOD/BOD
   b) Total suspended solids (nonfilterable residue)
   c) Phosphorus
   d) Ammonia
   e) Fecal coliform
   f) pH
   g) Chlorine Residual

2) Safety
   a) Chemical
   b) Lockout/Tagout
   c) Confined Space
   d) Electrical
   e) Bloodborne Pathogens
   f) Personal Protective Equipment
   g) Housekeeping
   h) Slips, Trips, and Falls
   i) OSHA Requirements

3) Operation and Maintenance
   a) O & M Manual
   b) Pumps
      i) Types
      ii) Capacity vs Head Relationships
      iii) Control
   c) Preventive Maintenance
   d) Corrective Maintenance
   e) Electrical Usage
   f) Blower Performance
   g) Record Keeping
   h) Management System
   i) Collection System/Infiltration-Inflow

4) Treatment Theory
   a) Comminutors
   b) Screens
   c) Grit Removal/Trash Trap
   d) Extended Aeration Activated Sludge
   e) Aerated Lagoons
   f) Final Clarifiers
   g) Slow Sand Filters
   h) Disinfection (Chlorination, Dechlorination, Ultraviolet Light)
   i) Aerobic Digestion
   j) Sand Drying Beds
   k) Biosolids Disposal

l) Telemetry
m) Flow Measurement

5) Sampling and Sample Handling Procedures
   a) Grab sampling
   b) Flow proportional composite sampling
   c) Multiple grab sampling
   d) Sample holding times and conditions
   e) CBOD/BOD
   f) DO
   g) pH
   h) Suspended solids
   i) Fecal coliform
   j) Chlorine residual
   k) Oil & Grease

6) Laboratory
   a) Basic requirements-chemical
   b) Basic procedures-chemical

7) Regulations/Guidance
   a) Permit to Install
   b) NPDES Permit (Parts I, II, and III)
   c) Certified operator (OAC 3745-7)
   d) Sewer Use Ordinance
   e) Ten States Standards

8) Management
   a) Job Duties
   b) Financial Management
   c) Planning
   d) Reporting
   e) Communications
   f) Public Officials Relations

9) Math
   a) Suspended solids test
   b) CBOD/BOD test
   c) Organic loading
   d) Hydraulic loading
   e) Detention time (Hydraulic)
   f) Surface overflow rate
   g) Weir overflow rate

Class I Wastewater Examination Topics (Continued)

h) Velocity, flowrate, area
i) Concentration, flowrate, mass
j) Population equivalents
k) Percentages
l) Percent removals
m) Volumes and areas
n) Sludge flowrates, % solids, specific gravity, mass
o) Aeration requirements
p) Weighted averages
q) Unit conversions
r) Costs
s) SVI
t) Sludge age/MCRT

Class II Wastewater Examination Topics

1) Pollutants
   a) CBOD/BOD
   b) Total suspended solids (nonfilterable residue)
   c) Nitrogen compounds (Ammonia, Nitrites, Nitrates, TKN)
   d) Phosphorus
   e) Fecal coliform
   f) Heavy metals
   g) Toxicity
   h) pH
   i) Chlorine Residual

2) Safety
   a) Chemical
   b) Lockout/Tagout
   c) Confined Space
   d) Electrical
   e) Bloodborne Pathogens
   f) Personal Protective Equipment
   g) Housekeeping
   h) Slips, Trips, and Falls
   i) OSHA Requirements
   j) First aid/CPR

3) Operation and Maintenance
   a) O & M Manual
   b) Pumps
   c) Types
      I. Curves
      II. Control
   d) Preventive Maintenance
   e) Corrective Maintenance
   f) Electrical Usage
   g) Blower Performance
   h) Record Keeping
   i) h Management System
   j) Collection System (Infiltration-Inflow)
   k) Piping System Hydraulics

4) Treatment Theory
   a) Comminutors
   b) Screens
   c) Grit Removal/Trash Trap
   d) Primary Tanks
   e) Activated Sludge
   f) Aerated Lagoons
   g) Final Clarifiers

h) Nitrification
i) Phosphorus Removal(Chemical)
j) Rapid and Slow Sand Filters
k) Disinfection (Chlorination, Dechlorination, Ultraviolet Light)
l) Aerobic Digestion
m) Anaerobic Digestion
n) Sand Drying Beds
o) Biosolids Disposal
p) Telemetry
q) Flow Measurement

5) Sampling and Sample Handling Procedures
   a) Grab sampling
   b) Flow proportional composite sampling
   c) Multiple grab sampling
   d) Sample holding times and conditions
   e) CBOD/BOD
   f) DO
   g) pH
   h) Suspended solids
   i) Fecal coliform
   j) Chlorine residual
   k) Ammonia
   l) Phosphorus
   m) Oil & Grease
   n) Heavy metals
   o) Volatile organics

6) Laboratory
   a) Testing requirements-chemical
   b) Testing procedures-chemical

7) Regulations/Guidance
   a) Permit to Install
   b) NPDES Permit (Parts I, II, and III)
   c) Certified operator (OAC 3745-7)
   d) Reporting
   e) Sewer Use Ordinance
   f) Ten States Standards
   g) CSO/SSO
   h) Industrial Pretreatment/Local Limits

8) Management
   a) Organizational Structure

b) Job Duties
c) Financial Management
d) Planning
e) Reporting
f) Public Relations
g) Communications
h) Public Officials Relations
i) Personnel Management

9) Math
   a) Suspended solids test
   b) CBOD/BOD test
   c) Organic loading
   d) Hydraulic loading
   e) Detention time (Hydraulic)
   f) Surface overflow rate
   g) Weir overflow rate
   h) Velocity, flowrate, area
   i) Concentration, flowrate, mass
   j) Population equivalents
   k) Chlorine demand, dosage, residual
   l) Percentages
   m) Percent removals
   n) Volumes and areas
   o) Sludge flowrates, % solids, specific gravity, mass
   p) Weighted averages
   q) Unit conversions
   r) Costs
   s) SVI
   t) Sludge age/MCRT
   u) Solids loading rate
   v) Solids detention time
   w) Mass balances
   x) Volatile solids reduction
   y) Geometric means

Class III Wastewater Examination Topics

1) Pollutants
   a) CBOD/BOD
   b) COD
   c) Total suspended solids (nonfilterable residue)
   d) Nitrogen compounds (ammonia, TKN, nitrites, nitrates)
   e) Phosphorus (orthophosphates and polyphosphates)
   f) Fecal coliform (E. coli)
   g) Heavy metals (and cyanide)
   h) Toxicity
   i) Volatile organics
   j) Total priority pollutants
   k) pH
   l) Chlorine Residual

2) Safety
   a) Chemical
   b) Lockout/Tagout
   c) Confined Space
   d) Electrical
   e) Bloodborne Pathogens
   f) Personal Protective Equipment
   g) Housekeeping
   h) Slips, Trips, and Falls
   i) OSHA Requirements
   j) First aid/CPR
   k) Process Safety Management/Risk Management Plan keeping

3) Operation and Maintenance
   a) O & M Manual
   b) Pump
   c) Types
      i. Capacity vs Head Relationships
      ii Control
   d) Preventive Maintenance
   e) Corrective Maintenance
   f) Electrical Usage
   g) Blowers
   h) Types
   i) Control
   j) Record Keeping
   k) Management System
   l) Collection System (Infiltration-Inflow)
   m) Piping System Hydraulics

4) Treatment Theory
   a) Comminutors
   b) Screens

c) Grit Removal/Trash Trap
d) Primary Tanks
e) Activated Sludge
f) Aerated Lagoons
g) Trickling Filters/Roughing Filters
h) Final Clarifiers
i) Nitrification
j) Phosphorus Removal (Biological and Chemical)
k) Denitrification
l) Rapid and Slow Sand Filters
m) Disinfection (Chlorination, Dechlorination, Ultraviolet Light)
n) Aerobic Digestion
o) Sand Drying Beds
p) Biosolids Disposal
q) Telemetry
r) Flow Measurement
s) Anaerobic Digestion
t) Sludge Thickening
u) Sludge Dewatering
v) Alkaline Stabilization

5) Sampling and Sample Handling Procedures
   a) Grab sampling
   b) Flow proportional composite sampling
   c) Multiple grab sampling
   d) Sample holding times and conditions
   e) CBOD/BOD
   f) DO
   g) pH
   h) Suspended solids
   i) Fecal coliform
   j) Chlorine residual
   k) Ammonia/TKN
   l) Phosphorus
   m) Oil & Grease
   n) Heavy metals
   o) Volatile organics
   p) Toxicity

6) Laboratory
   a) Testing requirements and procedures - chemical and biological
   b) Basic procedures-chemical and biological
   c) Microscopic
   d) Biomonitoring

7) Regulations/Guidance
   a) Permit to Install
   b) NPDES Permit (Parts I, II, and III)
   c) 503 Requirements
   d) State land application of biosolids (OAC 3745-40)
   e) Certified operator (OAC 3745-7)
   f) Reporting
   g) Sewer Use Ordinance
   h) CSO/SSO
   i) Industrial Pretreatment/Local Limits
   j) Ten States Standards
   k) Storm Water (plant site)
   l) TMDL
   m) Water Quality Standards

8) Management
   a) Organizational Structure
   b) Financial Management
   c) Planning
   d) Reporting
   e) Public Relations
   f) Communications
   g) Public Officials Relations
   h) Personnel Management
   i) Vulnerability/Security
   j) Contingency Plan

9) Math
   a) Suspended solids test
   b) Total solids test
   c) Organic solids test (loss on ignition)
   d) CBOD/BOD test (Seeded)
   e) Organic loading
   f) Hydraulic loading
   g) Detention time (Hydraulic)
   h) Surface overflow rate
   i) Weir overflow rate
   j) Velocity, flowrate, area
   k) Concentration, flowrate, mass
   l) Population equivalents

m) Chlorine demand, dosage, residual
n) Percentages
o) Percent removals
p) Volumes and areas
q) Sludge flowrates, % solids, specific gravity, mass
r) Weighted averages
s) Unit conversions
t) Costs
u) SVI
v) Sludge age/MCRT
w) Solids loading rate
x) Solids detention time
y) Mass balances
z) Volatile solids reduction
aa) Energy requirements for heating sludge
bb) Energy value of digester gas
cc) Chemical concentrations
dd) Water, brake, and electrical horsepower/kW
ee) Pressure/head
ff) F:M
gg) Weir overflow rate
hh) Geometric means