

*2009 - 2010 Edition*



# Water Pollution Control Catalog

**Catalog of Classes for  
Wastewater Treatment Plant Operators,  
Laboratory Analysts Grades 1-2, and  
Collection System Operators**



A Non-Profit Educational Corporation

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*Water Quality Academy ... Picking up where WQCI left off!*



## A Message from WQA - Water Quality Academy

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# 3305

### INTRODUCTION

This is the first edition of OCT Water Quality Academy's Water Pollution Control class catalog which contains six (6) courses of instruction ranging from 36 - 92 hours of instruction; fifty (50) one (1) and two (2) day topics, three (3) workshops, and tutoring assistance. The new catalog is posted on our website: [www.octinc.com](http://www.octinc.com).

The wastewater courses, and classes within this educational catalog have been reviewed for compliance with California State Water Resources Control Board (SWRCB) Title 23, Chapter 9 – Operator Certification requirements, Sections 3685 and 13629. In Nevada, the wastewater classes are in compliance with NAS 445A.287 – 292.

OCT Water Quality Academy is a non-profit educational corporation established in 2007 that is an operating section of Operator Certification Training, Inc. which was founded in 1988, nearly 20 years ago.

Since 2001 OCT Academy has been an IACET Authorized Provider of Courses, Classes and Contact Hour classes and as such is authorized to provide CEUs. 10 contact hours is equal to 1.0 CEU. In compliance with IACET standards, OCT Academy maintains class participation records, and daily sign in sheets. Each operator is assigned an individual identification number utilizing his / her birth date. Transcripts of work completed can be provided upon request.

Wastewater courses are presented at OCT Academy or in-house at city or district WW Treatment Plants. Courses are formed for five (5), or more operators. Maximum enrollment is 20 operators. Contact the OCT Academy Director of Education for costs and scheduling. Course content has been presented and reviewed at SWRCB.

One (1) and two (2) day individual Wastewater class topics are presented at OCT Academy or in-house at city or district WW Treatment Plants. Maximum enrollment is 20 operators.

Each class day is awarded 6 contact hours of Continuing Education credit, or 0.6 CEU's.

Contact Customer Service for costs and scheduling.



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# OCT Course / Program Outline -Wastewater Treatment Plant Operators

## Beginning (Grade OIT, 1) Wastewater Courses / 60 - 96 Hours

**COURSE TITLE:** OIT, Basic Wastewater Course

**OPERATOR GRADES:** Recommended for Grades OIT, 1 WW, SWWS

**PREREQUISITE:** High School Diploma, or GED recommended

### **COURSE DESCRIPTION:**

This beginning course presents the basics of wastewater sources, characteristics, operations and regulations. The topics covered include biological treatment principles, process control, and descriptions of the operation of preliminary, primary, secondary, and tertiary treatment operations. Additionally, small scale ponds and lagoons, and other secondary process operations are presented. The course also includes an introduction to federal and state laws, rules and regulations that govern wastewater treatment operations.

**COURSE OBJECTIVES:** Upon completion of the course, the student will be able to:

1. Discuss why sanitary wastes must be treated before the liquids and solids are returned to the environment.
2. Describe the basic operations of a conventional wastewater plant, and the general classifications of wastewater.
3. Relate the basic unit processes; preliminary, primary, secondary, and tertiary treatment, disinfection / UV, effluent disposal as well as solids handling and disposal associated with the operation of conventional municipal wastewater plants.
4. Identify common wastewater plant equipment, definitions and abbreviations.
5. Learn standard plant engineering design parameters.
6. Identify the role and operation of wastewater collection systems and how they impact the operation of conventional wastewater plants.
7. Develop a basic understanding of D.O. maintenance, detention time and aerobic operations processes.
8. Identify and describe basic laboratory measurements, such as BOD, TSS; as stated in *Standard Methods* and how the tests are performed. Identify names of chemicals commonly used in wastewater analyses.
9. Learn the fundamentals of multiple secondary treatment process which include; lagoons systems, trickling filters, oxidation ditches, and activated sludge with secondary clarifiers.
10. Using algebraic formulas, solve basic wastewater math problems regarding volumes, pressure, dosages, chlorine demand / residual, overflow rates , removal efficiency, percentage pumping rate, solids concentration, detention time, hydraulic and organic loading rates, surface area, and SVI.
11. Demonstrate a basic understanding of hydraulics, friction loss, and the relationship between head and pressure.
12. Review and understand wastewater plant basic safety practices emphasizing confined spaces, chlorine gases, falling hazards, drowning, machinery, excavations, and electrical hazards. Review of worksite safety practices.
13. Study State Water Resources Control Board (SWRCB) regulations, and the Federal Water Pollution Control Act and Amendments (Titles 23 and 26).
14. Discuss the microbiological impact of bacteria, virus, and protozoa in wastewater.
15. Learn about basic instrument practice and SCADA systems.

**METHOD OF INSTRUCTION:** Lecture, workbook activities and multi-media.

**METHOD OF EVALUATION:** Quizzes are administrated at the conclusion of each chapter.

A final evaluation examination is administered at the end of the course.

### **COURSE CONTENT:**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Basic and Grade I Wastewater math             <ol style="list-style-type: none"> <li>a) basic process control algebraic formulas</li> <li>b) conversion factors</li> </ol> </li> <li>2. Conventional wastewater unit processes</li> <li>3. Basic wastewater laboratory practices</li> <li>4. California Title 23 and 26 WW Regulations</li> </ol> | <ol style="list-style-type: none"> <li>5. Conventional Wastewater treatment:             <ol style="list-style-type: none"> <li>a) Preliminary, primary and secondary formulas</li> <li>b) Basic microbiology of wastewater</li> <li>c) Plant equipment</li> <li>d) Wastewater collection systems</li> <li>e) Disinfection; Chlorine &amp; UV</li> </ol> </li> </ol> |
|---|--|





## Basic (Grade 2) Wastewater Courses / 60 - 72 Hours

**COURSE TITLE:** Intermediate Wastewater Course

**OPERATOR GRADES:** Recommended for Grade 1 operators WW, SWWS

**PREREQUISITE:** Grade I certification OR equivalent educational points

### **COURSE DESCRIPTION:**

This second course in wastewater operations deals with modes of operation, process control testing, operating strategies. Troubleshooting of the activated sludge process, aerobic and anaerobic sludge digestion, and solids handling systems (lagoons and land application) is emphasized.

**COURSE OBJECTIVES:** Upon completion of the course, the student will be able to:

1. Discuss why sanitary wastes must be treated before the liquids and solids are returned to the environment.
2. Describe the basic operations of a conventional wastewater plant, and the general classifications of wastewater.
3. Relate the basic unit processes; preliminary, primary, secondary, and tertiary treatment, disinfection / UV, effluent disposal as well as solids handling and disposal associated with the operation of a conventional municipal wastewater plants.
4. Identify common wastewater plant equipment, definitions and abbreviations.
5. Learn standard plant engineering design parameters.
6. Identify the role and operation of wastewater collection systems and how they impact the operation of conventional wastewater plants.
7. Develop a basic understanding of D.O. maintenance, detention time and anaerobic sludge.
8. Identify and describe basic laboratory measurements, such as BOD, TSS; as stated in *Standard Methods* and how the tests are performed. Identify names of chemicals commonly used in wastewater analyses.
9. Learn the fundamentals of multiple secondary treatment process which include; lagoons systems, trickling filters, oxidation ditches, and activated sludge with secondary clarifiers.
10. Using algebraic formulas, solve basic wastewater math problems regarding volumes, pressure, dosages, chlorine demand / residual, overflow rates , removal efficiency, percentage pumping rate, solids concentration, detention time, hydraulic and organic loading rates, surface area, and SVI.
11. Demonstrate a basic understanding of hydraulics, friction loss, and the relationship between head and pressure.
12. Review and understand wastewater plant basic safety practices emphasizing confined spaces, chlorine gases, falling hazards, drowning, machinery, excavations, and electrical hazards. Review of work site safety practices.
13. Study State Water Resources Control Board (SWRCB) regulations, and the Federal Water Pollution Control Act and Amendments (Titles 23 and 26).
14. Discuss the microbiological impact of bacteria, virus, and protozoa in wastewater.
15. Learn about basic instrument practice and SCADA systems.

**METHOD OF INSTRUCTION:** Lecture, workbook activities and multi-media.

**METHOD OF EVALUATION:** Quizzes are administrated at the conclusion of each chapter.

A final evaluation examination is administered at the end of the course.

### **COURSE CONTENT:**

1. Basic and Grade II Wastewater math.
  - a) basic process control algebraic formulas.
  - b) conversion factors.
2. Conventional wastewater unit processes.
3. Basic wastewater laboratory practices.
4. California Title 23 and 26 WW Regulations.
5. Conventional Wastewater treatment:
  - a) Preliminary, primary and secondary formulas
  - b) Basic microbiology of wastewater.
  - c) Plant equipment.
  - d) Wastewater collection systems.
  - e) Disinfection; Chlorine & UV.





# OCT Course / Program Outline -Wastewater Treatment Plant Operators

## Intermediate (Grade 3) Wastewater Courses / 60 - 100 Hours

**COURSE TITLE:** Intermediate Wastewater Course

**OPERATOR GRADES:** Recommended for Grade 2 WW Operators

**PREREQUISTE:** Grade 2 certification and / or equivalent educational points

### **COURSE DESCRIPTION:**

This course provides an in-depth study of process control and troubleshooting skills for different modes of the activated sludge operation; conventional, complete mix, plug flow, extended aeration, contact stabilization, and tapered aeration processes. A study of oxidation ditches F/M, MLSS, detention time and general operation is included as well as an emphasis on effluent filtration, nitrogen and phosphorous (BNR) removal.

**COURSE OBJECTIVES:** Upon completion of the course, the student will be able to:

1. Describe the objectives of a conventional wastewater plant, the priorities of wastewater plant, operations and the classifications of wastewater.
2. Explain the preliminary, primary, secondary, and tertiary treatment processes, disinfection / UV, effluent disposal and solids handling as well as the disposal associated with the operation of a conventional wastewater plant.
3. Identify common wastewater plant equipment, vocabulary and abbreviations.
4. Learn standard plant engineering parameters.
5. Define the role and operation of wastewater collection systems and how they impact the operation of conventional wastewater plants.
6. Learn how wet /dry weather collection system flows impact plant performance.
7. Identify and describe laboratory measurements, BOD and TSS as they are referenced in *Standard Methods*. Learn the protocol for the required basic tests that are performed.
8. Identify by name and chemical symbols of the chemicals commonly used in wastewater analyses.
9. Solve basic wastewater math problems using the Step-by-Step process control algebraic formulas including: efficiency and loading of solid thickening processes, digester loading, standard BOD test and calculations, polymer usage and feed, pressure, dosages, chlorine demand / residual, overflow rates, removal efficiency (%), activated sludge F/M ratio, MLSS, MLVSS, MCRT, pumping rate, solids concentration and sludge pumping rates, detention time, hydraulic and organic loading rates, flow velocity, surface area, overflow rates, nitrification, and SVI and SDI calculations.
10. Discuss process control, activated sludge process modifications, and tertiary treatment.
11. Reinforce O & M procedures for preliminary and primary treatment units processes, anaerobic sludge digestion and disinfection of wastewater with chlorine and / or UV.
12. Describe basic safety practices, and hazards encountered during wastewater plant operations and review worksite safety practices.
13. Describe State Water Resources Control Board (SWRCB) Regulations & the Federal Water Pollution Control Act Regulations as they relate to classification of wastewater treatment plants & operator certification.
14. Discuss microbiology; bacteria, virus, protozoa, filaments and process troubleshooting technology.
15. Study current SCADA and instrumentation practices.

**METHOD OF INSTRUCTION:** Lecture, workbook activities and multimedia presentations.

**METHODS OF EVALUATION:** Quizzes and reviews are administered at the conclusion of each chapter. An examination is administered at the end of each subject and a final examination is administered at the end of the course.

### **COURSE CONTENT:**

1. Intermediate Grade III Wastewater math.
  - a) Process control algebraic formulas and conversion factors.
2. Conventional wastewater unit Processes.
3. Wastewater laboratory practice.
4. California Title 23 WW Regulations.
5. Evaluation of wastewater unit processes, plant performance.
6. Basic Supervision.
7. Conventional Wastewater Treatment
  - a) Preliminary, primary, secondary & tertiary
  - b) Microbiology of wastewater.
  - c) Secondary treatment processes.
  - d) Wastewater collection systems.
  - e) Disinfection; Chlorine & UV.





## OCT Course / Program Outline -Wastewater Treatment Plant Operators

### Advanced (Grade 4 - 5) Wastewater Courses / Part A - 80 Hours / Part B - 80 Hours

**COURSE TITLE:** Advanced Wastewater Course

**OPERATOR GRADES:** Recommended for Grade s 4 - 5 Wastewater Operators

**PREREQUISITE:** Grade 3 or 4 Wastewater certification or equivalent educational points.

#### **COURSE DESCRIPTION:**

The Advanced Wastewater course reviews the basic process control and troubleshooting skills used in wastewater plants. The development of O & M procedures for preliminary, primary, secondary, tertiary, anaerobic sludge digestion, and effluent disinfection are studied. An advanced study of process control, activated sludge process modifications and tertiary treatment, requirements are emphasized. Good management practices are stressed including the study of energy management, safety program development and implementation, operator training, budget development and control and personnel practices.

**COURSE OBJECTIVES:** Upon completion of the course, the student will be able to:

1. Define the objectives and regulatory requirements of a conventional wastewater plant.
2. Describe the priority of operating a wastewater plant, and the classifications of wastewater.
3. Develop and explain unit processes including preliminary, primary, secondary, and tertiary treatment, disinfection / UV, effluent disposal and solids handling and disposal associated with the operation of a conventional wastewater plant and the characteristics of wastewater.
4. Troubleshoot common wastewater plant equipment.
5. Define wastewater terminology.
6. Explain standard plant engineering parameters; i.e. the range of standard plant engineering design numbers.
7. Identify the role and operation of wastewater collection systems and how they impact by the performance of a wastewater plant.
8. Identify and describe required laboratory measurements, BOD, BOD /nitrogenous, TSS; as referenced to *Standard Methods* and how the tests are performed.
9. Identify the names and symbols of the chemicals commonly used in wastewater analyses.
10. Using Step-by-Step process control algebraic formulas, perform mathematical equations in efficiency and loading of solid thickening processes, anaerobic digester loading, and heat values standard BOD test and calculations, polymer usage and feed, pressure, dosages, chlorine demand / residual, overflow rates, removal efficiency (%), activated sludge F/M ratio, MLSS, MLVSS, MCRT, pumping rate, solids concentration and sludge pumping rates, detention time, hydraulic and organic loading rates, flow velocity, surface area, overflow rates, nitrification, and SVI.
11. Discuss process control, activated sludge process modifications, tertiary treatment and digesters and their impact and necessary process adjustment changes that may be necessary in plant operations.
12. Refine O & M procedures for preliminary and primary treatment units processes, anaerobic sludge digestion and disinfection of wastewater with chlorine and / or UV; alternative disinfectants and their financial impact.
13. Reinforce the necessity of positive safety practices and the development and implementation of in service programs
14. Study State Water Resources Control Board (SWRCB) regulations, and the Federal Water Pollution Control Act.
15. Learn State regulations with regard to the classification of wastewater treatment plants & operator certification.
16. The influence of microbiology; bacteria, virus, protozoa, filaments and the troubleshooting process.
17. Review SCADA and instrumentation practices.

**METHOD OF INSTRUCTION:** Lecture, workbook activities and multimedia presentations.

**METHODS OF EVALUATION:** Quizzes and reviews are administered at the conclusion of each chapter. An examination is administered at the end of each subject. A final examination is administered at the end of the course.

#### **COURSE CONTENT:**

1. Intermediate Grade IV-V Wastewater math.
  - a) Process control algebraic formulas and conversion factors.
2. Conventional wastewater unit processes.
3. Wastewater laboratory practice.
4. California Title 23 WW Regulations.
5. Evaluation of wastewater unit processes, plant performance, management and supervision.
6. Basic Supervision.
7. Conventional Wastewater Treatment
  - a) Preliminary, primary, secondary & tertiary
  - b) Microbiology of wastewater.
  - c) Secondary treatment processes.
  - d) Wastewater collection systems.
  - e) Disinfection; Chlorine & UV.



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## OCT Course / Program Outline -Wastewater Treatment Plant Operators

### Collection Systems Operator Course / 36 Hours

**COURSE TITLE:** Collection Systems Operator Course

**OPERATOR GRADES:** OIT, 1, 2 and 3 COL

**PREREQUISITE:** High School Diploma or GED recommended.

#### **COURSE DESCRIPTION:**

This is a course of study for basic and intermediate level, collection systems operators. Operations personnel who complete this 36 hour course will learn the basic principles associated with the design, construction and the O & M of a municipal collection system. Operators will also learn how the operation of a collection system has a direct impact on the performance of a wastewater treatment plant.

**COURSE OBJECTIVES:** Upon completion of the course, the student will be able to:

1. Learn the glossary terms and components associated with the operation of collections systems.
2. Identify the types of sanitary sewer systems; gravity, combined systems, CWOs, commercial, industrial and force-main systems.
3. Learn to use utility maps to locate buried sewer lines, manholes. Identify manhole rim, flood level, and invert elevations.
4. Identify how to use engineering station information shown on plan and section view maps to identify direction of flow, location of manholes and sewer line sizes.
5. Learn alternative methods of sewer line cleaning; flushing, sewer rodding, vacuors, and other high velocity cleaning equipment. Root control through chemical and mechanical treatment is developed.
6. Learn the importance of TV inspections, reporting forms and record maintenance. Also, how field data can be used effectively to troubleshoot the sewer system.
7. Identify the need for utility locates before digging.
8. Learn how the impact of inflow, infiltration and exfiltration on the function of sanitary collection systems and the wastewater plants downstream.
9. Develop wet / dry weather flow information and sewer remediation.
10. Identify safety hazards when working in an excavation or confined space.
11. Learn the basic engineering parameters of constructing a sanitary collection system.
12. Realize the need to install collection system pipelines at design slope and grade to develop minimum scouring velocities in gravity systems.
13. Discuss the importance of collection system lift stations and the need to maintain aerobic conditions within a collection system at all times.
14. Solve basic and applied collection system math problems using Step-by-Step process control algebraic formulas, and conversions to solve for: volumes, lbs/day calculations, dosages, population equivalents, hydraulic loading, effluent disinfection, pump horsepower, slope and grade calculations, construction costs, velocity calculations and more.

**METHOD OF INSTRUCTION:** Lecture, workbook activities, multi-media., and field trips.

**METHOD OF EVALUATION:** Quizzes are administered at the end of chapter exercises. A final evaluation examination is administered at the end of the course.

#### **COURSE CONTENT:**

1. Design and construction of gravity collection systems.
2. Utility mapping, blueprints, and slope and grade.
3. Lift pump stations.
4. Operation & Maintenance of the collection system.
5. Inflow, Infiltration & Exfiltration.
6. Safety
7. Collection systems mathematics.
8. System components.





# OCT Course / Program Outline -Wastewater Treatment Plant Operators

## Water - Wastewater Pump Course / 36 - 42 Hours

**COURSE TITLE:** Pump Course

**OPERATOR GRADES:** Recommended for Grades OIT, 1, 2, 3, 4 WW, SWWS, WT, WD

**PREREQUISITE:** High School Diploma, or GED.

### **COURSE DESCRIPTION:**

This 36 hour program of instruction includes:

1) Pump theory, 2) Pump Repair and Maintenance 3) Hydraulic headloss in pumping systems, and 4) Pump station electrical systems. Pumping volumes, time, GPM, brakehorse power, cost of operation, headloss, calculations are presented, selection of pipe material, and energy losses sustained when water is pumped through valves and fittings is explored. Series and parallel pumping headloss, suction head, suction lift and the effect of atmospheric pressure are taught.

**COURSE OBJECTIVES:** Upon completion of the course, the student will be able to:

#### **Part 1. – Pump Theory**

1. Understand the basic theory and operation of centrifugal pumps and sewage ejectors, identify basic pump configuration, transformation of velocity head to pressure head, and the classification of pumps.
2. Discuss pump terminology and glossary terms.
3. Explore the types of centrifugal pumps, pump configurations of suction head and lift, and the effects of atmospheric pressure and series and parallel pumping installations.
4. Demonstrate a basic understanding of hydraulics, friction loss, and relationship between the system head curve and friction head.
5. Identify pump components and related nomenclature.
6. Build pump curves and complete pump horsepower math problems.
7. Discuss troubleshooting, and solve pump operating problems.

#### **Part 2. – Pump Repair and Maintenance**

1. Working with a factory instructor, troubleshoot and repair pumps.
2. Disassemble / assemble a working pump; identifying mechanical seals, packing glands, wear ring sets, bearings, and impellers.
3. Troubleshoot couplings, misalignment, sand cuts, and other damage.
4. The student will be able to identify excessive noise and bearing problems.

#### **Part 3. - Hydraulic headloss in pumping systems**

1. Develop an understanding of hydraulics, and friction loss
2. Identify energy, hydraulic lines, and velocity head.
3. Describe the concept and importance of Net Positive Suction Head Available (NPSHA).

#### **Part 4 - Pump station electrical systems.**

1. Review the components of electrical control systems; motor control panels, contacts and motor starter controls, three phase power, float switches, fuses, overload protection and varied switches, flow switches, and electro-mechanical devices (solenoid switches).
2. Discuss basic electrical diagrams, power system, control systems, and operation descriptions.
3. Learn the fundamentals of small electrical motors; maintenance problems and electrical troubleshooting measures.

**METHOD OF INSTRUCTION:** Lecture, workbook activities, audiovisual aides. And hands-on work.

**METHODS OF EVALUATION:** Quizzes and reviews are administrated between chapter subjects. A Multiple Choice examination is administered at the end of each subject for measure, and a final examination is administered at the end of the course.

### **COURSE CONTENT:**

- |   |  |
|---|--|
| 1. Basic pump theory & operation.       | 7. Hydraulic Head Loss in pumping systems. |
| 2. Pump terminology and glossary terms. | 8. Net Positive Suction Head.              |
| 3. Types of water – wastewater pumps.   | 9. Available Net Positive Suction Head.    |
| 4. Pump mathematics.                    | 10. Pump station electrical system.        |
| 5. Pump components.                     |  |
| 6. Pump repair & maintenance.           |  |



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## OCT Course / Program Outline -Wastewater Treatment Plant Operators

### Wastewater Management Course (Grade 4 - 5) / 60 - 72 Hours

**COURSE TITLE:** Wastewater Operations Management

**OPERATOR GRADES:** Recommended for Wastewater Utility Managers and Supervisors Grades 3, 4-5.

**PREREQUISITE:** Successful completion of Basic and Intermediate level Wastewater Courses.

#### **COURSE DESCRIPTION:**

This Wastewater Operations Management Course is designed for Grade Level 3, 4-5 Wastewater Managers and Supervisors. Course topics will include: Principles and Operations of Wastewater Utility Management, the Sciences of Wastewater, Wastewater Mathematics Grades 3, 4-5, Utility Fiscal Management and State and Federal Regulations.

**COURSE OBJECTIVES:** Upon completion of the course, the supervisor managers will be able to:

1. Describe the the role and responsibilities of a wastewater operator, supervisor and manager.
2. Display a knowledge of sound financial planning practices and controls for wastewater utilities.
3. Discuss operations and maintenance standards, policies and procedures related to wastewater facilities.
4. Articulate a positive understanding of Environmental health legislation and procedures related to the Federal "Clean Water Act" and California Title 23 Regulations.
5. Relate Customer Service, Emergency Planning and Crisis Communication Skills and practices.
6. Present with clarity the formulas, conversions and mathematical calculations utilized in Wastewater Utility Operations.

**METHODS OF INSTRUCTION:** Lecture, written, oral practicum, and multimedia presentation.

**METHODS OF EVALUATION:** An essay and oral final examination is given and peer evaluated at the completion of the course.

#### **COURSE CONTENT:**

1. Wastewater Utility Management
  - a) The Management Process
  - b) Governance and Governing Board Relationships
  - c) Organization, Structure and Change
  - d) Leadership
2. Financial Management
  - a) Funding and funding alternatives
  - b) Accounting and Budgeting
  - c) Management Controls
3. Wastewater Plant Operations
  - a) Preliminary, primary, secondary and tertiary unit operations
  - b) Plant efficiency by process unit
  - c) Biological nutrient removal (BNR)
  - d) Effluent discharge
  - e) Biosolids removal and discharge
4. Regulations
  - a) Federal Clean Water Act Codes
  - b) California title 23 Regulations
  - c) Human resources Requirements
5. Emergency Planning
  - a) Wastewater Plant Security
  - b) Crisis Communication
  - c) Emergency Preparedness Planning
6.
  - a) Loading Rates
  - b) Detention and Retention Calculations
  - c) Efficiency and Percent Calculations
  - d) Pumping Calculations
  - e) Chemical Dosage
  - f) Sludge Digestion, Dewatering and Disposal
  - g) Laboratory Calculations





## Wastewater Treatment - Class Titles and Descriptions

### Wastewater Treatment Operations Topics

#### **Activated Sludge**

This class includes a review of activated sludge process fundamentals, process variations, biological nutrient removal, process control measures and monitoring of DO, pH, and other essentials. It also includes process control troubleshooting tables, application of chemicals and selected process control math problems. Quizzes appear at the end of each chapter to review the work presented.

**GR. 2, 3, 4            WW**

#### **Activated Sludge Troubleshooting**

This class deals with modes of operation, process control testing, operating strategies and troubleshooting of the activated sludge process. Use of F/M, MCRT, OUR and microscopic examination of process control of activated sludge plants are covered. Wastewater organism wall charts are utilized in course of presentation. Essay questions and multiple choice quizzes are offered.

**GR. 2, 3, 4            WW**

#### **Backflow/ Cross Connection**

Procedures and practices for maintaining and managing a backflow/ cross connection program, which will reduce the risk to public potable water supplies. Learn about backflow and back siphonage, as well as, many other related causes of cross connection dangers to drinking water systems. Review the types of prevention measures possible, identify the devices and assemblies recommended to prevent backflow, recommended installation practices and recommended cross connection control programs. Learn the benefits of having solid safety practices, and the health and legal aspects of having an active backflow / cross connection program for your community.

**GR. OIT, 1, 2, 3, 4, 5      WW, COL, SWWS**

#### **Basic Hydraulics for Water / Wastewater Operators**

Information on basic water hydraulics, properties of fluids and resulting force from elevation are presented in this class. Pipes and piping and the Hazen-Williams "C" factor theory are integrated into flow testing, thrust block sizing and open channel flow discussion.

**GR. 2, 3, 4, 5            WW, COL, SWWS**

#### **Basic Wastewater Process Control**

This is a quick review for wastewater operators interested in improving their process control methods in the plant. The emphasis is on making the right process control decisions to meet discharge requirements and conserve resources.

**GR. OIT, 1, 2, 3, 4      WW, SWWS**

#### **Biological Nutrient Removal (BNR)**

This class is designed for advanced (tertiary) wastewater treatment operators. Forms of nitrogen and phosphorous, their characteristics in biological treatment systems, techniques for their removal from the waste stream, sampling, and analysis in BNR plants, and plant operation will be discussed. Simple process control and mass balance problem solving will be studied.

**GR. 3, 4      WW**

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)



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## Wastewater Treatment - Class Titles and Descriptions cont.

### Competent Person

This one day class reviews competent person objectives, and responsibilities. It reviews safety standards for trenches and excavations as part of 29 CFR. through the 1989 upgrades. By definition, a “competent person” is one who is capable of identifying existing or predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt / immediate action and implement corrective measures to eliminate them. Type A, B and C soils are identified and compressive strengths. The workbook provides an excavation checklist as well as excavation standards. and various types of shoring.

**GR. OIT, 1, 2, 3, 4 WW, SWWS**

### Design Criteria and Standards

This class presents the standard engineering parameters used in the design of most conventional wastewater plants and systems. Once an operator understands the engineering data typically used to design standard conventional plants, he or she will have an overall better understanding of plant operation principals. The design criteria and conventional engineering standards are identified for preliminary, primary, secondary treatment processes (ponds & lagoons, trickling filters, and activated sludge), anaerobic digesters, gravity thickeners, DAF units, centrifuge thickening, heat treatment and incineration, vacuum filters, drying beds, sludge characteristics, chlorine disinfection and de-chlorination, tertiary filters, and chemical dosages.

**GR. OIT, 1, 2, 3, 4 WW, SWWS**

### Effluent Disinfection Using both Chlorine and UV

The microbiology of common waterborne diseases, E. coli and fecal coliforms are major indicators of pollution. The microbiology of disease causing pathogens; bacteria, virus, and protozoa which must be inactivated before plant effluent is returned to the environment is covered in this class. Also discussed is chlorination theory, properties and chemistry: the importance of breakpoint chlorination and the relationship of dosage / demand / residual, to inactivation of disease causing pathogens. UV has become an alternative method of disinfection. De-chlorination practices utilizing sulfur dioxide, Vitamin C, and other chemicals are introduced which assist in protecting the environment.

**GR. OIT, 1, 2, 3, 4, 5 WW, COL, SWWS**

### Electrical Fundamentals for Water – Wastewater Operators

Circuitry basics, electromagnetism, inductance and capacitance are included in this study of electricity in water and water operations. The class will also focus upon power and control system components, reading electrical diagrams, electrical measurements and troubleshooting electrical problems.

**GR. OIT, 1, 2, 3, 4 WW, COL, SWWS**

### Glossary Terms, Definitions and Plant Equipment, Chemicals, Treatment Processes

This basic information is a starting point for entry level personnel as well as all other wastewater treatment plant operating personnel. The class will focus on the definitions of conventional wastewater plant processes, abbreviations, plant equipment; identify necessary laboratory tests, chemicals used, and learn standard glossary definitions.

**GR. OIT, 1, 2, 3 WW, SWWS**

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)





## Wastewater Treatment - Class Titles and Descriptions cont.

### **Instrumentation and SCADA**

Basic instrumentation; measurement devices, pressure, flow and levels are all important in the basic design and operation of a water system. Study these and analytical instruments, controls, SCADA, communications and troubleshooting technologies in this “hands-on”, class.

**GR. OIT, 1, 2, 3, 4 COL, WW, SWWS**

### **Land Application of Biosolids**

This class reviews the methods, rules and regulations for land application of municipal sludge. The material includes parameters for land application of processed sludge and appropriate application rates; agricultural use, forests, land reclamation and dedicated disposal sites. The class reviews fertilizer value, composting, soil enhancement, site life and planning a sludge application program. Other topics that are discussed include; spreading, spraying, soil injection, irrigation, slope limitations, minimum depths to groundwater, and soil permeability. Current 503 federal regulations are also discussed.

**GR. 1, 2, 3, 4 WW, SWWS**

### **Maps, Record Keeping and Vulnerability**

Comprehensive, sectional, arterial and grid maps are invaluable to maintaining a system that can readily identify important locations for leaks, pressure zones, valves and hydrants. Accurate records that are used for legal compliance as well as the rapid retrieval of data and information serve as the foundation for maintaining a facility that is safe and secure from negative influences. Discover how vulnerable your facility is to vandalism, natural occurrences and the threat of terrorism.

**GR. OIT, 1, 2, 2, 4, 5 WW, SWS, COL**

### **Mechanical Maintenance Technologist**

Skills in operation, maintenance and troubleshooting of pumping systems are developed. Positive displacement and centrifugal pumps are covered. Application of basic hydraulic concepts and use of pump curves are stressed. Troubleshooting of pumps and lift pump stations is included. Topics include types of pumps, identification of pump parts, disassembly and assembly of pumps, pumping system measurements and lubrication. O & M of chemical feeders is also presented.

**GR. OIT, 1, 2, 3, 4 WW, SWWS, COL**

### **Nitrification / De-Nitrification**

The degree of oxidation of nitrogen is indicative of the degree of treatment obtained. The two- step conversion of ammonia nitrogen to nitrite and nitrate by Nitrosomonas bacteria and then to nitrate by Nitrobacter bacteria is referred to as nitrification.

De-nitrification is the removal of nitrogen and returning it to the atmosphere by placing nitrates and nitrates in an environment which is depleted of free oxygen. In this anoxic, or anaerobic environment bacterial activity removes oxygen from these compounds and releases nitrogen back into the atmosphere.

**GR. 2, 3, 4 WW, SWWS**

### **Oxidation Ditch**

An oxidation ditch is a modified activated sludge biological treatment process that utilizes long solids retention times (SRTs) to remove biodegradable organics. These are “race track type” reactors are built in single or multi-channel configuration within a ring, oval, or horseshoe shaped basin. Oxidation ditches are typically complete mix systems, and are essentially a modification of a completely mixed activated sludge system used to treat wastewater from small communities up to 1.0 MGD. This system can be classified as an extended aeration process and is considered to be a low loading rate system. Supporting math includes F/M, BOD loading, detention time, sludge age and solids added.

**GR. OIT, 1, 2, 3, 4 WW, SWWSGR. OIT, 1, 2, 3 WW, SWWS,**

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## Wastewater Treatment - Class Titles and Descriptions cont.

### **Pump Motor Control Systems**

This class includes a review of the components in Electrical Control Systems, Motor Panels, Contacts and Motor Starter Controls. Review of Basic Electrical Diagrams, Power Systems, Control Systems, and Operator Descriptions. Learn the Fundamentals of Small Electrical Motors and troubleshooting measures.

**GR. 1,2, 3, 4, 5**                      **WW, COL, SWS**

### **Ponds and Lagoon Systems**

The study of facultative wastewater ponds and lagoons includes a study of a facultative lagoon glossary, biological concepts, water quality and operating tests, the operation of aerobic and aerated lagoons to include organic loading, BOD, grit removal, design loading, the role of green algae, oxygen, and nutrient, the role of photosynthesis and daylight operation, operating modes, and lagoon mathematics; OLR, acres, detention time, surface area, daily hydraulic loading, and evaporation and percolation rates. A summary of operating characteristics is presented. Effluent water quality parameters and reuse for discharge systems is presented.

**GR 1-3**                      **WW, SWWS**

### **Safety - Cave-in Protection, Confined Space Entry and more**

Cave-in protection, the confined space entry rule, fall protection, lock-out/ tag-out safety, handling and storing chemicals, hazardous materials, CPR and basic first aid are all addressed in this one day water industry based training.

**All Grade Levels**            **WW, COL, SWWS**

### **Sequencing Batch Reactors**

SBRs represent another form of activated sludge treatment. This class reviews double, three and four basin reactor systems. The class discusses the design and operation of these units. SBR process control math problems in F/M, MLSS, retention time, pounds wasting, decant flow rates and more are reviewed. Ammonia-nitrogen reactions, oxygen uptake reactions, and nitrification / denitrification will be discussed.

**GR 2-4**                      **WW, SWWS**

### **Sludge Digestion –Aerobic Digesters**

Aerobic digestion is the biochemical stabilization of wastewater sludge in open and closed tanks based in the principle that without adequate external food sources, biological cells will consume their own cellular material. Aerobic digestion is accomplished in several process modes; batch, continuous, pre-thickening, and aerobic digestion, and is used as an extension of the activated sludge process. This process is dependent on the presence of DO to function properly.

**GR 2-4**                      **WW, SWWS**

### **Secondary Wastewater Process**

This newly class provides a more in-depth review of secondary wastewater processes. It includes; Bacteria in the Ecosystem, Growth and death of bacteria, Trickling filters, Activated sludge, Anaerobic digesters, and a complete Glossary of terms. Quiz questions are featured at the end of each section.

**GR 1-3**                      **WW, SWWS**

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)





## Wastewater Treatment - Class Titles and Descriptions cont.

### Sludge Digestion – Anaerobic Digesters

Anaerobic digestion is a treatment process which converts a portion of the volatile solids and other organic matter in the sludge to methane and carbon dioxide gases in the absence of oxygen. Digesters operated in the mesophilic and thermophilic ranges results in a net reduction in the quantity of solids and volume of sludge which require disposal. Destruction of pathogenic organisms is also accomplished and the final stable, innocuous sludge can be used as a soil conditioner or fertilizer. Supporting math includes VS loading, detention time, digester loading, volatile solids reduced, volatile acids / alkalinity ratio, gas production and more.

**GR 2-4                      WW**

### Solids Handling, Sludge Dewatering and Disposal

Sludge solids are presented in seven (7) parts. Sludge conditioning, sludge thickening and stabilization which includes pathogen reduction, dewatering / drying, incineration, sludge disposal, and digester gas utilization. The primary objective of sludge conditioning is to increase particle size. The class discusses the difficulty in dewatering activated sludge wastes and the need for conditioning chemicals. Some of the typical conditioning methods utilized include gravity thickeners, DAF units, centrifugal and gravity belt thickening.

### GR 2, 3, 4              WWSmall Wastewater Systems

This is a class of instruction for small wastewater plant operators who serve communities of less than 3,300 people. The material covered includes an introduction to small wastewater operations, wastewater generation and characteristics of wastewater, the collection system, small package wastewater plants and treatment design, lift stations, treatment process selection, process deficiencies, sludge disposal, and effluent disinfection. A wastewater laboratory class is recommended as a companion class.

**GR. 1-2              SWWS**

### Trickling Filter Operations

The function of a trickling filter is to remove dissolved organics and finely divided organic solids from domestic and commercial wastes. This is a fixed film process that relies on the biological activity of a zoogeal mass. Organic materials are biologically oxidized to form a more stable material. BOD must be reduced by 85% or more. Wastewater is applied to a variety of filter media including rock, plastic media, or honeycomb plastic material to reduce BOD to meet water quality goals. The operating characteristics include standard, intermediate, high, and roughing rate units. Organic loading rates are based on per 1,000 cubic feet of media. Recirculation ratios are utilized to lower the strength of the wastewater applied and to produce a better effluent quality. Trickling filters experience a wide variety of operational problems from ponding to filter flies. The problems are identified and solutions presented to seven (7) of the most common problems.

**GR. 1, 2, 3, 4              WW, SWWS**

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## Wastewater Treatment Laboratory - Class Titles and Descriptions

### Wastewater Treatment Laboratory Topics

#### **Advanced Laboratory Practice**

This class builds on the fundamentals taught in Basic Laboratory Practice (a prerequisite to this class) and further explores more advanced laboratory practices. Heavy emphasis on QA / QC procedures using EPA methodologies for advanced instrumentation is taught. Completion of a Basic Water Chemistry class is strongly recommended.

**GR. 3-4 LS, WW**

#### **Alkalinity - the Monitoring Tool for Water and Wastewater Process Control**

This laboratory sciences class explores alkalinity monitoring as a process control method. Operators will learn how to predict operational results by performing simple on-site alkalinity tests for coagulation, corrosion control, pH adjustment and others. A review of coagulation chemistry equations relating to iron and aluminum coagulation salts and the formation of flocs included.

**GR. 1, 2, 3, 4 LS, WW, SWWS**

#### **Basic Chemistry for Wastewater Treatment Plant Operators**

This class covers the structure and classification of matter, valences, chemical formulas, and equations, solutions, acids, bases and salts. Also includes the chemistry of treatment processes and practical dosage problems with math reinforcement problems and quizzes. A review of chemistry involved in the operation of wastewater treatment plants. A companion topic to Polymers and Coagulants / Jar Testing - Chemical Feeding.

**GR. 1, 2, 3, 4 LS, WW, SWWS**

#### **Basic Laboratory Practice**

This class will provide the students with a comprehensive review of environmental chemistry and microbiology particular to the water treatment industry. Lab personnel will learn the methods to perform the following test procedures for: chlorine residuals, break-point chlorination, turbidity, temperature, acids vs. bases, chlorides, iron, manganese, dissolved oxygen, fluorides, nitrites & nitrates, coliform and heterotrophic bacteria, and basic laboratory safety measures.

**GR. 1 - 2 LS, WW, SWWS**

#### **Basic Wastewater Treatment Laboratory Testing**

This class will cover process control testing completed in a laboratory to support the daily operation of a wastewater treatment facility. Procedures to be covered in the class include: organism identification, filaments and protozoa organisms, MLSS, MLVSS, TS, SS, SVI and SDI, oxygen uptake rates (OUR), secchi disks, and settling rates. Particular attention will be given to proper methods for collecting and handling samples.

**GR. 1 - 2 LS, WW, SWWS**

#### **Laboratory Record Keeping**

Maintenance of daily records and importance of log entries. This includes spill notifications, sample recording and analysis of laboratory data. Basic laboratory exposure and training on major wastewater concepts as well as the use of a PC computer to maintain records.

**GR. 1 - 2 LS, WW, SWWS**

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)





## Wastewater Treatment Laboratory - Class Titles and Descriptions cont.

### **NPDES Testing Laboratory**

Covers lab tests needed to complete the NPDES discharge monitoring report (DMR). Tests include: pH, dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), carbonaceous biochemical oxygen demand (CBOD) as well as tests for total suspended solids, total and fecal coliform, ammonia nitrogen, and chlorine residual. Other topics to be presented include: chemical oxygen demand (COD), use of specific ion electrodes and spectrophotometers, laboratory records, reports, and quality assurance data.

**GR. 1-2 LS, WW, SWWS**

### **Polymers, Coagulants, Jar Testing, and Chemical Feeding**

This class is specifically designed to increase the working knowledge of water and wastewater treatment plant operators. Operators will learn to make up jar stock solutions, evaluate the result of dosage changes, and learn the advantage / disadvantage of a variety of coagulant salts, coagulant aids, and polymers. They will learn how jar testing can aid in proper corrosion control, polymer feed, disinfection, and other applications.

**GR. 1-4 WW, SWWS**

### **Sanitary Microbiology for Wastewater Treatment Plant Operators**

This class includes an outline of study in four (4) major topics; identification of basic organisms, organism classification, activated sludge organisms, and process applications. A full workbook and a set of color slides of commonly identified organisms are presented. A good basic class for operators of activated sludge plants. Also includes fundamental microbiology, and study of the microbiology of wastewater related to secondary treatment processes, oxidation ponds, lagoons, trickling filters, oxidation ditches, trickling filters, activated sludge, digesters, and disinfection with chlorine or UV.

**GR. 1-4 LS, WW, SWWS**

## **Wastewater Treatment Laboratory Certification Reviews**

### **WW Laboratory Analyst 1 and 2**

This one day basic level review class will outline questions regarding; laboratory safety, sampling, identification of laboratory equipment and use, glassware cleaning methods, data and records, dilution techniques, temperature, pH, chlorine residual, solids tests, DO, BOD, alkalinity, hardness, jar tests, turbidity, coliform bacteria tests (total, E. coli and fecal), COD, volatile acids, breakpoint chlorination and staining of bacteria.

**GR. 1 - 2**

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## Wastewater Treatment Mathematics Class Titles and Descriptions

### Wastewater Treatment Plant Mathematics

All OCT Academy mathematics classes are Algebraic Formula based. Process control algebraic formulas are separated into process unit blocks for ease in selection and presentation of complete written solutions.

#### **Advanced Wastewater Treatment Mathematics, Grades 3-4-5**

This class is designed for advanced grade 3-4-5 level operators. The process control calculations provide solutions to the math problems using the Step-by-step method, algebraic formulas, and conversions. Problems used emphasize the activated sludge process, sludge conditioning, anaerobic digesters, primary and secondary clarifier operations, tertiary filtration; effluent disposal and disinfection.

**GR. 3-4-5 WW**

#### **Basic Mathematics for Wastewater Operators**

The basic level mathematics class is designed to acquaint wastewater operators with the most commonly used mathematical problems encountered in the water industry. The following types of calculations are done to develop confidence and accuracy: distance, area, circumference, perimeter, gauge and meter calculations, flow rates, volume and conversions.

**GR. OIT, 1 WW, COL, SWWS**

#### **Wastewater Treatment Mathematics, Grades 1-2**

This class is designed for entry, and immediate level operators. The process control calculations provide solutions to math problems using the Step-by-step method, algebraic formulas, and conversions. Problems used include calculations related to volumes, grit channels, pumps, clarifiers, lagoon systems, trickling filters, basic activated sludge processes. Problems related to anaerobic digesters, tertiary filtration, sludge conditioning, effluent disposal and disinfection are also presented.

**GR. OIT, GR. 1-2 WW, SWWS**

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)





## Wastewater Operations - Supervisor Management

### Wastewater Operations: Supervisor - Management

#### **Operations Management**

The specifics of operating and maintaining a productive water plant provide the foundation for this advanced utility operations management class. Discussion focuses on the most current and cost effective equipment and technology available in our industry. Also emphasized are aligning work unit goals and operations to facilitate cost effective and time saving use of personnel and equipment.

**GR. 3-5 WW, COL**

#### **Wastewater and Collections Supervisor**

Presents the administrative aspects of public utilities including organization, decision-making, coordination, state and Federal regulations, and public relations. Additionally, personnel management topics include recruiting, training, evaluation, promotion, staff morale, and grievances. The class reviews the need for safety programs, the implementation of safe working conditions, actions and attitudes.

**GR. 3-4-5 WW, SWWS, LS**

### Wastewater State & Federal Regulations

#### **Water Pollution Control Act**

The Federal Water Pollution Control Act, popularly known as the Clean Water Act, is a comprehensive statute aimed at restoring and maintaining the chemical, physical and biological integrity of the nation's waters. Through Congress, the rights of the primary responsibilities and rights of the states to prevent, reduce and eliminate pollution and implement the NPDES discharge permit program under the Act. The class covers the goals of the Clean Water Act as well as findings/policies, selected definitions, research and related programs, aquatic sediment, waste treatment management plans and grants, construction grants, loans, effluent limits and water quality standards.

**GR. OIT, 1, 2, 3, 4, 5 WW, SWWS**

#### **503 Sludge Regulations**

The 503 regulations establish standards which consist of general requirements, pollutant limits, management practices, and operational requirements for the final use and disposal of sewage sludge generated during the treatment of domestic sewage in a treatment works. This class will learn the Standards which are included in this part of the 40 CFR regulations for sewage applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator. It also includes pathogen and alternative vector attraction reduction requirements for sewage sludge applied to the land or placed on a surface disposal site. Permits are required under 40 CFR parts 122, 123 and 124, or an approved state program.

**GR. OIT, 1, 2, 3, 4, 5 WW**

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## Wastewater Treatment Certification Review Class Titles and Descriptions

### Wastewater Treatment Certification Review Classes

#### **Wastewater Treatment Certification Review Grades 1-2**

This class reviews basic wastewater concepts which includes the following: pretreatment of wastewater, primary treatment in a clarifier, secondary biological treatment in lagoons, trickling filters, and activated sludge. The class also reviews sludge digestion, solids handling, pumping and maintenance, effluent chlorination and disinfection through the use of over 250 typical wastewater examination questions.

**OIT, GR. 1-2 WW, SWWS**

#### **Wastewater Treatment Certification Review Grades 3**

This class offers a host of wastewater essay questions and problems designed for advanced grade 3 operators. Supervision and management questions are also included. Completion of a Wastewater Utility Operations or Utility Management class is strongly recommended.

**GR. 3 WW**

#### **Wastewater Treatment Certification Review Grades 4 - 5**

This class offers a host of wastewater essay questions and problems designed for advanced grade 4 - 5 operators. Supervision and management questions are also included. Completion of a Wastewater Utility Operations or Utility Management class is strongly recommended.

**GR. 4 - 5 WW**

#### **Wastewater Treatment Certification Review, Grades 4 – 5 Essay Reviews**

A variety of questions and essay materials are reviewed for Grade 3, 4, and 5 WW operators. The following is a list of the categories reviewed: Interceptors and wet-well pumping, preliminary treatment, plant loadings, primary treatment, trickling filters, activated sludge, nitrification, de-nitrification, biological nutrient removal, ponds and lagoons, physical and chemical treatment, chlorination, de-chlorination, ultra violet disinfection, sludge thickening, anaerobic sludge digestion, sludge dewatering, odor control and laboratory practices.

**GR. 4, 5 WW**

#### **Wastewater Treatment Technology Review**

This class provides basic instruction in the design and operation of conventional multi-unit wastewater treatment plants by process unit. Instruction is provided in engineering design calculations, expected unit performance, the Clean Water Act, and the operations principles of primary clarifiers, secondary lagoon and mechanical plants, activated sludge, secondary clarifiers, anaerobic digesters, sludge conditioning and effluent disposal.

**GR. 1, 2, 3, 4 WW, SWWS**

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)





## Collection Systems Operator Class Titles and Descriptions

### Collection Systems Operator Certification Review & Math Classes

#### **Certification Review for Collection System Operators Grades 1-3**

This class reviews system components, utility mapping, design and construction, pipe bedding, inflow / infiltration / exfiltration principles, lift pump stations, O & M line cleaning; flushing, rodding, balling, high velocity equipment, and manholes rehabilitation, hydraulic practices, and safety (excavation, confined space and gases). As a major part of this review class for certification testing, basic math calculations are done regarding, volumes, velocity, hydraulics, pumping, and conversions.

**GR. 1-3 COL, SWWS**

#### **Certification Review for Collection System Operators Grades 3-4**

An advanced test preparation class which focuses upon process utility management situations, written completion exercises, system O & M principles of components, utility mapping, design and construction, pipe bedding, inflow / infiltration / exfiltration principles, lift pump stations, O & M line cleaning practices, and safety (excavation, confined space and gases). Math formulas, problems and solutions are presented throughout the math presentation. There is heavy emphasis on slope and grade problems. Safety, design and construction specifications and regulations are also reviewed for testing reinforcement and readiness.

**GR. 3 - 4 COL**

#### **Operations and Maintenance for Collection System Operators**

The operation and maintenance of municipal wastewater collection systems class focuses on the history of collection systems, identification of sewage system components, utility mapping, system maintenance and troubleshooting, specifications and construction design, diagrams and safety. This class explores new trends and technology in collection system maintenance and operations.

**OIT, GR. 1, 2, 3, 4 COL, SWWS**

#### **Mathematics for Collection System Operators, Grades 1-2**

The solution of entry and intermediate level collections math problems are all completed using the Step-by-step method, algebraic formulas, and appropriate conversions. Problems emphasized include pipeline volumes, excavation, hydraulics, and pump problems. Velocity, slope & grade, interceptor sewer, excavation & paving and construction costs and performance are all included in this class for grade 1-2 Collection System Operators.

**GR. 1-2 COL, SWWS**

#### **Mathematics for Collection System Operators, Grades 3, 4, 5**

This is the advanced class in wastewater collections. Once again, the solutions advanced grade level collections math problems are all completed using the Step-by-step method, algebraic formulas, and appropriate conversions. Problems emphasized include pipeline volumes, excavation, hydraulics, and pump problems. Population equivalents, grit channel and velocity, excavation & paving, and construction costs and utility management math essay questions are all included in this class for grade 3-4 Collection System Operators.

**GR. 3-4 COL, SWWS**

#### **Maintenance & Mechanical Mathematics**

A course of study that includes; using units of measurement, calculating areas, volumes, rates, costs and solving common maintenance problems. Math problems are presented within each section, and chapter quizzes provide additional learning experiences.

**GR. OIT, 1, 2 COL, SWWS**

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## Wastewater Treatment Operations - Workshops

### Workshops

#### **Certified Pump Technologist (4 Days)**

This is a very comprehensive four (4) day class designed to provide an in-depth learning experience for all operators who work with, or maintain, pumps within a treatment plant, distribution system or collection system.

The **first two (2) days** of the program concentrates on foundation theory of operating centrifugal pumps; pump terminology, pump hydraulic fundamentals, correcting cavitation problems, troubleshooting tips. The workbook contains over 250 typical water or wastewater examination multiple choice questions. An answer key is included at the end of each chapter.

The remaining **two (2) days** is a “hands on” program working with a major pump manufacturer of municipal pump products. This portion of the program concentrates on pump problem solving, repair, and maintenance practices. Pumps and pump parts in the classroom are identified, disassembled, and then re-assembled under the direction of a factory instructor. It’s the “**real thing**” and leads to certification as a **Certified Pump Technologist** upon satisfactory conclusion of the program and receiving a passing score of 70% on the final examination.

**GR. 1 – 4      WW COL, SWWS,**

#### **Instrumentation and SCADA (2 days)**

This class is designed for water – wastewater personnel and related to the **Basic Wastewater Process Control** class. Operators gain a basic understanding of the operation and functions of a variety of instruments used throughout water and wastewater systems to measure and record flow, pressure, levels, and many other necessary measurements. The class reviews basic layouts, the operation of individual systems, and troubleshooting. The SCADA class reviews analytical instruments, controls, SCADA, and communications.

**GR. 1-4      WW, COL, SWWS**



### **BASIC COMPUTER SKILLS Class Titles & Descriptions**

#### **PC Operation Skills**

PC computers are used extensively throughout the water – wastewater industry. This class focuses on operation skills, logging in and out, using email, and using the Internet. The software programs operators will learn include; Microsoft Word, and Excel. Operators will learn to fill out electronic work orders, and maintain plant records, and the use of spreadsheets to maintain data.

Wastewater (WW); Small Wastewater System (SWWS); Laboratory Specialist (LS); Wastewater Collections (COL)





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