



**California
Water
Environment
Association**

**INDUSTRIAL WASTE TREATMENT PLANT OPERATOR
Candidate Handbook**

Excerpted from the
Industrial Waste Treatment Plant Operator Study Guide.
To order the entire study guide please visit www.cwea.org/study

THE TECHNICAL CERTIFICATION PROGRAM (TCP)

BACKGROUND

Water pollution control technology has evolved over the past half century in an exciting and dynamic manner, with many of the changes occurring in recent years. As a consequence, new skills and knowledge have had to be acquired by personnel to remain current in their jobs. Yet the transformation from older, simpler technology to the more advanced technology has not occurred to the same degree in all industrial waste treatment facilities. This situation, coupled with the tendency of industries to conform as much as possible with each other's job titles and salary schedules, has made it difficult to recognize and reward those individuals who have kept abreast with the demands for greater individual technical skills.

In the mid-1970's, the California Water Pollution Control Association (CWPCA, now CWEA, California Water Environment Association) began to study ways to encourage individuals to upgrade their level of technical skill and competence. Through this, the CWPCA Voluntary Certification Program (VCP) was developed. The purpose of this program is to provide recognition to men and women working in the water pollution control field for the technical skills and knowledge they have acquired and use.

VOCATIONS CERTIFIED

The TCP currently certifies individuals in vocations within the water pollution control field:

- Collection System Maintenance
- Electrical /Instrumentation Technician
- Industrial Waste Inspection
- Laboratory Analyst
- Mechanical Technician
- Industrial Waste Treatment Plant Operator

Other vocations may be added in the future if it is shown that enough interest exists to warrant them. The Municipal Wastewater Treatment Plant Operator Certification Program is administered under a separate mandatory program through the State of California Water Resources Control Board.

Persons can be certified in more than one vocation as long as they meet the educational and experience requirements for each vocation and pass the appropriate certification.

The Technical Certification Program

PERSONS ELIGIBLE FOR TCP CERTIFICATION

The TCP is designed to provide professional recognition primarily to individuals employed by or contracting with municipal and sanitation agencies and to persons involved with industries that need to prevent water pollution. However, all individuals are welcomed and encouraged to become certified if they have similar appropriate experience. Membership in the CWEA is not a prerequisite for obtaining certification, but it is encouraged for individual professional development.

DESCRIPTION OF LEVELS OF CERTIFICATION

For each vocation there are four different levels of certification, each representing a higher level of experience and knowledge in that vocation. Certification at each level requires successfully passing a written examination. The four levels of certification are:

GRADE I: The entry level position of each vocation. Persons seeking certification at the Grade I level are required to have one year of full-time experience in any field of water pollution control. Experience in a wastewater vocation other than that for which certification is sought is acceptable. Education credit may not be substituted for this one year of experience. Although it is possible to obtain Grade I certification without having any work experience in that vocation, it is intended that Grade I written examination will test those subjects and skills expected of a person who has worked in that vocation for approximately one year.

GRADE II: The skilled working level or journey level position for each vocation. A person seeking certification at this level must have at least four years of experience in the specific vocation. However, the required experience can be reduced.

GRADE III: The foreman or supervisory level position for each vocation. Person certified at this level normally spend a large portion of their time in the field performing the skilled operations of the vocation. These people will likely be expected to train new employees and supervise crews. A person seeking certification at this level must have at least seven years experience in the specific vocation. However, the required experience can be reduced.

GRADE IV: Persons at the Grade IV level have major input into managerial matters, including preparing budgets, hiring and training staff, and setting company policy. Also, persons at this level are expected to be able to effectively make presentations to company officials and boards to explain policies or situations. As such, the ability of applicants to effectively communicate in both written and spoken form is a major aspect of the Grade IV exam. A person seeking certification at this level must have at least ten years experience in the specific vocation. However, the required experience can be reduced.

WHEN EXAMS ARE GIVEN AND WHEN TO APPLY

Examination is available year-round through four testing windows in the calendar year. You may contact the CWEA office at (510) 382-7800 to obtain the information you will need to apply.

APPLICATION AND RENEWAL FEES

Each applicant must pay the appropriate fee upon making the application to take an examination. Application fees are not refundable if the applicant fails to show up for the appointed examination. Also, any applicant retaking an examination previously failed must pay the full fee. Applicants who are determined not to meet the requirements for the particular grade and vocation for which they have applied will receive a refund of one-half of the application fee.

Upon successfully passing all exam requirements, a certificate will be issued which is valid for a period of one year. A renewal fee must be paid every year. However, any person obtaining a higher grade of certification in any vocation is not required to renew the lower grade certification in that vocation. Failure to pay the required renewal fees beyond one year of the expiration date of the certificate shall be cause for revoking the certificate. Thereafter, reinstatement shall require retesting.

PREPARING FOR THE GRADE I CERTIFICATION EXAMINATION

I. Description of Testing Level

The Grade I Certification Examination is intended to be taken by Industrial Waste Treatment operators who have one year of on-the-job working experience, under close supervision working in a treatment plant. However, one year of work experience in any water pollution control field qualifies you to take the examination.

II. Subject matter covered on the Examination

- A. Responsibilities of industrial wastewater treatment operator including protection of downstream treatment plants, water users, public health and environment.
- B. Terminology for operation of industrial wastewater treatment plants.
- C. Types and function of various wastewater treatment processes
- D. Basic requirements operator safety
- E. Mathematics
 - 1. Area and Volume
 - 2. Conversion of units

III. Sources of Information/Study Checklist for Grade I.

The following study checklist is based on the information contained in two operator training manuals available from California State University, Sacramento.

To order each manual contact:

Ken Kerri
Office of Waste Programs
California State University, Sacramento
6000 "J" Street
Sacramento, Ca. 95819-6025
Telephone (916) 278-6142;
Fax (916) 278-5959; E-mail: wasteroffice @ CSUS.edu

1. INDUSTRIAL WASTE TREATMENT, VOLUME I (IWT1).

2. OPERATION OF WASTEWATER TREATMENT PLANTS, Volume I (OWTP1)

The specific areas of study are shown by Chapter number and title. Study in other related sections of these training manuals may be required to answer all questions on the certification examination. The following study checklist is intended to provide an overview and to allow you to identify areas where you would benefit from more study.

- A. Responsibilities of Operators including protection of public health and environment.

Read IWTP01

Chapter 1. The Industrial Plant Operator.

Read OWTP1

Chapter 1. The Treatment Plant Operator.

Chapter 2. Why Treat Water?

- B. Terminology for Operation of Industrial Wastewater Treatment Plants

Read IWTP0 1

Chapter 1 and 2, Glossary Sections.

Read OWTP 1

Chapter 3. Wastewater Treatment Facilities, Glossary Section.

- C. Types and Function of various Wastewater Treatment Processes.

Read OWTP 1

Chapter 3. Wastewater Treatment Facilities.

- D. Basic Operator Safety Requirements

Read IWTP 1

Chapter 2. Safety

- E. Mathematics

Read OWTP 1

Appendix. How to Solve Wastewater Treatment Plant Arithmetic Problems; A. 2, Areas; and A.3, Volumes and A.9, Steps in Solving Problems.

PREPARING FOR THE GRADE II CERTIFICATION EXAMINATION

I. Description of Testing Level

The Grade II Certification Examination is intended to be taken by journey level industrial wastewater treatment plant operators who have four years of on-the-job working experience. The industrial waste treatment operator taking this examination should be either working in a lead capacity or be ready to be promoted to a lead position.

II. Subject Matter Covered on the Examination

- A. All Grade I subject matter
- B. Regulatory requirements
- C. Preventing and minimizing wastes at the source
- D. Characteristics and sources of industrial wastewaters
- E. Flow measurement
- F. Preliminary treatment (flow equalization, screening, pH adjustment)
- G. Waste treatment ponds
- H. Safety rules for daily operations.
- I. Mathematics
 - 1. 1. Metric system
 - 2. 2. Weight - volume relationships
 - 3. 3. Force, pressure and head
 - 4. 4. Velocity and flow rate
 - 5. 5. Chemical doses

III. Sources of Information/Study Checklist for Grade II.

The following study checklist is based on the information contained in two operator training manuals available from California State University, Sacramento. To order each manual, contact:

Ken Kerri Office of Water Programs California State University, Sacramento 6000 "J" street Sacramento, CA. 95819-6025
Telephone (916) 278-6142 Fax (916) 278-5959 e-mail
wateroffice@csus.edu

1. INDUSTRIAL WASTE TREATMENT, Volume I (IWT1).
OPERATION OF WASTEWATERS TREATMENT PLANTS, Volume I (OWTP1).-

The specific areas of study are shown by Chapter number and title. Study in other related sections of these training manuals may be required to answer all question on the certification examination. The following study checklist is intended to provide an overview and to allow you to identify areas where you would benefit from more study.

- A. All Grade I subject matter
- B. Regulatory requirements
Read IWT 1
Chapter 3. Regulatory requirements
- C. Preventing and minimizing wastes at the source
Read IWT1
Chapter 4. Preventing and Minimizing Wastes at the Source
- D. Characteristics and sources of industrial wastewaters
Read IWT1
Chapter 5. Industrial Wastewaters
- E. Flow measurement
Read IWT1
Chapter 6. Flow Measurement
- F. Preliminary treatment (flow equalization, screening, pH adjustment)
Read IWT1
Chapter 7. Preliminary Treatment

G. Waste treatment ponds

Read OWTP1

Chapter 9. Waste Treatment Ponds

H. Safety rules for daily operations.

Read IWT1

Chapter 2. Safety

I. Mathematics

Read OWTP1

Appendix. How to Solve Wastewater Treatment
Plant Arithmetic Problems, Sections A.4, Metric System; A.5,
Weight - Volume Relationships; A.6, Force, Pressure and Head;
A.7, Velocity and Flow Rate; and A.9, Steps in Solving Problems.

IV. Sample Grade II Examination Questions

PREPARING FOR THE GRADE III CERTIFICATION EXAMINATION

I. Description of the Testing Level

The Grade III Certification Exam is intended to be taken by Industrial Wastewater Treatment Plant Operators working at a foreman or supervisor level position with years of working experience. The person taking this examination should be working as a second level supervisor or ready to be promoted to a position where they will be supervising first level supervisors or crew leaders.

II. Subject Matter Covered on the Examination

- A. All Grade I and II subject matter
- B. Physical - Chemical Treatment Processes
- C. Filtration
- D. Physical Treatment Processes
- E. Treatment of Metal Wastestreams
- F. Mathematics

- 1. Physical - Chemical Treatment
- 2. Filtration
- 3. Physical Treatment Processes
- 4. Treatment of metal wastestreams

Preparing For the Grade III Certification Examination

III. Sources of Information/Study Checklist for Grade III

The following study checklist is based on the information contained in two operator training manuals available from California State University, Sacramento. To order each manual, contact:

Ken Kerri Office of Water Programs California State University, Sacramento 6000 " J " Street Sacramento, CA. 95819-6025; Telephone (916) 278-6142; Fax (916) 278-5959; e-mail: wateroffice@csus.edu

1. INDUSTRIAL WASTE TREATMENT, Volume I (IWT1).
2. TREATMENT OF METAL WASTESTREAMS (TMW).

The specific areas of study are shown by Chapter number title. Study in other related sections of these training manuals may be required to answer all questions on the certification examination. The following study check list is intended to provide an overview and to allow you to identify areas where you would benefit from more study.

- A. All Grade I and II subject matter
- B. Physical-Chemical Treatment Processes

Read IWT 1

Chapter 8. Physical-Chemical Treatment Processes (Coagulation, flocculation, and sedimentation)

- C. Filtration

Read IWT 1

Chapter 9. Filtration.

- D. Physical Treatment Processes

Read IWT1 Chapter 10. Physical Treatment Processes (Air stripping and carbon adsorption).

- E. Treatment of Metal Wastestreams

Read IWT 1

Chapter 11. Treatment of Metal Wastestreams

Read TMW

- F. Mathematics

Read TMW Appendix. How to Solve Arithmetic Problems Sections G, Chemical Solutions; H, Chemical Feeders; I, Polymers and Coagulants; J, Neutralization and pH Adjustment; K, Hydroxide Precipitation; L, Complexed Metal Precipitation; M, Reduction of Hexavalent Chromium; N, Cyanide Destruction; and O, Sludge Treatment.

IV. Sample Grade III Examination Questions

PREPARING FOR THE GRADE IV CERTIFICATION EXAMINATION

I. Description of Testing Level

The Grade IV Certification Examination is intended to be taken by managerial, administrative, or upper supervisory level industrial wastewater treatment plant operators with ten years of experience working in an industrial wastewater treatment plant.

II. Subject Matter Covered on the Examination

- A. All of Grade I, II, and III subject matter
- B. Instrumentation
- C. Residual solids management
- D. Maintenance
- E. Inspection of industrial pretreatment programs
- F. Sampling procedures for wastewater
- G. Applications of computers to plant O & M
- H. Recordkeeping
- I. Report preparation
- J. Staffing and training programs

Preparing For The Grade IV Certification Examination

III. Sources of Information/ Study Checklist for Grade IV

The following study checklist is based on the information contained in four operator training manuals available from California State University, Sacramento. To order each manual, contact:

Ken Kerri Office of Water Programs California State University, Sacramento 6000 "J" Street Sacramento, CA. 95819-6025

Telephone (916) 278-6142; FAX (916) 278-5959; e-mail: wateroffice@csus.edu

1. INDUSTRIAL WASTE TREATMENT, Volume I (IWT1).
2. OPERATION OF WASTEWATERS TREATMENT PLANTS, Volume I (OWTP1).
3. PRETREATMENT FACILITY INSPECTION (PFI).

The specific areas of study are shown by Chapter number and title. Study in other related sections of these training manuals may be required to answer all questions on the certification examination. The following study checklist is intended to provide an overview and to allow you to identify areas where you would benefit from more study.

- A. All Grade I, II, and III subject matter
- B. Instrumentation
Read IWT1
Chapter 12. Instrumentation
- C. Residual Solids Management
Read IWT2
Chapter 7. Residual Solids Management
- D. Maintenance
Read IWT2
Chapter 8. Maintenance
Read OWTP2
Chapter 15. Maintenance
- E. Inspection of industrial pretreatment programs
Read PF1 Chapter 4. Inspection of a Typical Industry, and Chapter 10 Industrial Inspection Procedures
- F. Sampling procedures for wastewater
Read PF1
Chapter 6. Sampling Procedures for Wastewater
- G. Applications of computers to plant O & M
Read OWTP2
Chapter 17. Applications of Computers to Plant O & M

H. Record keeping

Read OWTP2

Chapter 19. Records and Report Writing

I. Report preparation

Read OWTP2

Chapter 19. Records and Report Writing

J. Staffing and training programs

Read IWT2

Chapter 1. The industrial Plant Operator

REFERENCES AND STUDY AIDS Grade I and Grade II

1. INDUSTRIAL WASTE TREATMENT PLANT OPERATION, Volume I, and
2. OPERATION OF WASTEWATER TREATMENT PLANTS, Volume I.
3. TREATMENT OF METAL WASTESTREAMS

Grade III

1. INDUSTRIAL WASTE TREATMENT PLANT OPERATION, Volume I, and
2. TREATMENT OF METAL WASTE STREAMS.

Grade IV

1. INDUSTRIAL WASTE TREATMENT PLANT OPERATION, Volume II,
2. PRETREATMENT FACILITY INSPECTION, and
3. OPERATION OF WASTEWATER TREATMENT PLANTS, Volume II. HOW TO OBTAIN REFERENCES AND STUDY AIDS

References And Study Aids

The references and study aids listed for Grades I, II, III, and IV may be obtained by contacting

Ken Kerri Office of Water Programs California State University Sacramento 6000 " J " Street Sacramento, CA. 95819-6025

Phone (916) 278-6142 Fax (916) 278-5959

DESCRIPTION OF REFERENCES AND STUDY AIDS

INDUSTRIAL WASTE TREATMENT VOLUME I AND II

INDUSTRIAL WASTE TREATMENT, VOLUME I (737 pages), covers the importance and responsibilities of an industrial wastewater treatment plant operator and how to understand and comply with current and future rules and regulations. Sources and characteristics of industrial wastes, flow measurement and the prevention and minimization of wastes at the source are discussed, as well as how to safely operate and maintain preliminary treatment and physical-chemical treatment processes, including filtration, air stripping and carbon adsorption. Other topics covered include instrumentation, troubleshooting for industrial waste treatment processes, and the operation and maintenance of metal wastestream treatment processes.

INDUSTRIAL WASTE TREATMENT, VOLUME II (774 pages), covers the importance and responsibilities of an industrial wastewater treatment plant operator with emphasis on safe operation and maintenance of aerobic and anaerobic biological treatment processes. Treatment processes include fixed growth processes (trickling filter and RBCs), suspended growth processes (activated sludge), sequencing batch reactors, enhanced biological (nutrient) control, upflow anaerobic sludge bed treatment, and residual solids management. Also discussed is the development and implementation of an equipment and facility maintenance program.

OPERATION OF WASTEWATER TREATMENT PLANTS VOLUMES I AND II

OPERATION OF WASTEWATER TREATMENT PLANTS, VOLUME I, contains information on the responsibilities of a treatment plant operator, why wastes must be treated, treatment facilities, and also how to operate and maintain racks, screens, comminutors, sedimentation tanks, trickling filters, rotating biological contactors, package activated sludge plants, oxidation ditches, ponds, chlorination facilities and how to solve treatment plant arithmetic problems. Topics covered in **VOLUME II** include activated sludge, sludge digestion, solids handling, effluent disposal, plant safety and good housekeeping, maintenance, laboratory procedures, uses of computers for plant O & M, analysis and presentation of data, and records and report writing.

TREATMENT OF METAL WASTESTREAMS

TREATMENT OF METAL WASTESTREAMS covers the need for treatment, sources of metal wastestreams, material safety data sheets (MSDSs), employee Right-to-Know laws, methods of treatment, sludge treatment and disposal, operation, maintenance and troubleshooting. The section on treatment processes covers batch and continuous processes, neutralization, hydroxide precipitation, complexed metals removal, reduction of hexavalent chromium, cyanide oxidation, precious metals recovery, oily waste removal, control of solvents and toxic organics.

PRETREATMENT FACILITY INSPECTION

References And Study Aids

PRETREATMENT FACILITY INSPECTION stresses the duties and responsibilities of a pretreatment inspector and describes the development and application of regulations.

Administrative topics include how to plan and fund an industrial waste pretreatment program, develop a data base management program and implement an industrial waste monitoring program. The importance of an effective public relations program and the importance of ethics for a successful program are emphasized. Procedures on how to safely inspect many different types of industries are included with checklists for preparation before entry and lists of pertinent questions that should be answered when inspecting various types of industries. Information is provided on how to monitor wastewater flows and collect and transport representative samples. The generation and sources of industrial wastewaters are outlined along with detailed source control processes and procedures. Waste minimization procedures are described to help inspectors assist industries implement programs. Procedures are provided for responding to emergencies, limiting the impact of an incident and taking enforcement action.

ADDITIONAL REFERENCES

The following references are available from the

Water Environment Federation
Publications Order Department
601 Wythe Street
Alexandria, VA. 22314-1994

phone 1-800-666-0206

fax 1-703-684-2492

1. PRETREATMENT OF INDUSTRIAL WASTES, MOP FD-3 Order No.
2. PLANT MANAGER'S HANDBOOK, MOP SM-4, Order No.

NOTE: The references and study aids listed in this section cover all the material in the Grades I, II, III and IV Certification Examinations. No additional references are recommended or needed.