



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 ~~six~~ 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 ~~examinations~~.

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:

1. One of the required four years may be waived if the applicant has worked for three years in the vocation while holding a Grade I certificate in that vocation (three years of experience are required in this case).
2. Two of the required four years may be waived if the applicant has worked two years in the vocation while holding a Grade I certificate and possesses 12 educational points (120 hours of study). Two years of experience are required in this case.
3. Four hundred and eighty (480) hours of college level courses (24 semester units or 36 quarter units) in a related course of study may substituted for one year of experience, but if so used, this credit may not be counted for AA or Bachelor degree experience equivalency (three years of experience are required in this case).

Section 1

4. Possession of an AA degree in a related field can be substituted for two years experience (two years of experience are required in this case).

5. Possession of a BS or BA degree in a related field can be substituted for three years of experience. Note that for this case, four years of credit is not given for the Bachelor degree in order to insure that the applicant has a minimum of one year experience in the vocation (one year of experience is required in this case).

GRADE III: The foreman or supervisory level position for each vocation. Persons 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:

1. Two of the required seven years may be waived if the applicant has worked for four years in the vocation while holding a Grade II certificate in that vocation (five years of experience are required in this case).

2. Three of the required seven years may be waived if the applicant has worked for three years while holding a Grade II certificate and possesses 24 educational points (four years of experience are required in this case).

3. Four hundred and eighty (480) hours of college level courses (24 semester units or 36 quarters units) in a related course of study may be substituted for one year of experience, but if so used, this credit may not be counted of AA or Bachelor degree experience equivalency (six years of experience are required in this case).

4. Possession of an AA degree in a related field can be substituted for two years of experience (five years of experience are required in this case).

5. Possession of a BS or BA degree in a related field can be substituted for four years of experience (three years of experience are required in this case).

GRADE IV: The managerial, administrative, or upper supervisory level position for each vocation. 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:

1. Three of the required ten years may be waived if the applicant has worked for three years in the vocation while holding a Grade III certificate in that vocation (seven years of experience are required in this case).
2. Four of the required ten years may be waived if the applicant has worked for three years in the vocation while holding a Grade III certificate and possesses 36 educational points (six years of experience are required in this case).
3. Four hundred and eighty (480) hours of college level courses (24 semester units or 36 quarter units) in a related course of study may be substituted for one year of experience, but if so used, this credit may not be counted for AA or Bachelor degree experience equivalency (nine years of experience are required in this case).
4. Possession of an AA degree in a related field can be substituted for two years experience (eight years of experience are required in this case).
5. Possession of a BS or BA degree in a related field can be substituted for four years of experience (six years of experience are required in this case).

WHEN EXAMS ARE GIVEN AND WHEN TO APPLY

Written examinations are given twice a year, normally on the third Saturday of January and July. Applications are available from the local sections of the CWEA, and completed application, along with the appropriate fee, must be submitted to the local section's Certification Committee Chair no later than twelve weeks prior to the examination date. See a current application for upcoming application deadlines and test dates. You may contact the CWEA office at (510) 382-7800 to obtain the information you will need to apply. The local section has the primary responsibility to verify the applicant's compliance with eligibility requirements. Applicants seeking credit for unusual or difficult-to-verify work experience should submit their application well before the deadline, otherwise they may have to wait until the following examination date. Applicants will not be allowed to take more than one examination on any given test date.

Oral examinations for Grade IV applicants who have successfully passed the Grade IV written examinations are normally given about eight to twelve weeks after the written examination. Additional oral examinations may be scheduled if conditions warrant. Each Grade IV applicant is allowed two opportunities pass the oral examination. Failure to pass two successive oral examinations will require that the candidate retake the Grade IV written exam. Candidates may reschedule an oral examination if work schedule, travel distance, or any other reasonable circumstance prevents the candidate from attending, providing that reasonable advance notice is given, Failure to show at a scheduled oral examination is considered a failure.

CONTENTS OF EXAMINATIONS

Written examinations consist of all or some of the following: true or false questions, multiple choice questions, fill-ins, memorandum or report preparation, essay questions and mathematical problems. Other than the use of calculator, no notes or study aids are allowed into the examinations. All necessary conversion factors will be provided to the applicants. While the maximum time allowed for the examination is three hours, all tests are prepared so that an average applicant will have sufficient time to review and check all work, Grade I and Grade II level examinations are usually written to be no more than one and one-half to two hours in length. A good understanding of the subjects listed for any grade level should result in the applicant passing the examination. The minimum passing score for all examinations is seventy percent (70%).

Oral examinations for the Grade IV level certification consist of a 30 to 45-minute appearance before a panel of CWEA Technical Committee Members. The applicant is given four questions, one question dealing exclusively with managerial concepts and three questions dealing with some aspect of the candidate's vocation. Each applicant is given approximately 30 minutes to study the questions and organize his/her thoughts and answers prior to appearing before the panel. The panel members will ask additional detailed questions concerning the applicant's responses to ensure that the applicant has both the broad perspective and the in-depth knowledge expected of persons certified at the Grade IV level.

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 examination 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.

SECTION

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PREPARING FOR
THE GRADE I
CERTIFICATION
EXAMINATION

Section 6

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
 - 3. Loading rates

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).
Cost \$20.00 plus California tax (\$1.45).
2. OPERATION OF WASTEWATER TREATMENT PLANTS,

Volume I (OWTP1) Cost \$20.00 plus California tax (\$1.45)

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 IWT1

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 IWT 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 IWT 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.

SECTION

7

PREPARING FOR
THE GRADE II
CERTIFICATION
EXAMINATION

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. Metric system
 - 2. Weight - volume relationships
 - 3. Force, pressure and head
 - 4. Velocity and flow rate
 - 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). Cost \$20.00 plus California tax (\$1.45)

2. OPERATION OF WASTEWATERS TREATMENT PLANTS, Volume I (OWTP1). Cost \$20.00 plus California tax (\$1.45).

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

Section 7

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

TRUE/ FALSE

1. A Baseline Monitoring Report (BMR) is the first report a direct discharger must submit under the NPDES permit program.
 1. True
 2. False

2. Material distribution should be done through manual pouring from buckets or barrels to minimize spills.
 1. True
 2. False

SECTION



PREPARING FOR
THE GRADE III
CERTIFICATION
EXAMINATION

Section 8

PREPARING FOR THE GRADE III CERTIFICATION EXAMINATION

I. Description of the Testing Level

The Grade III Certification Examination is intended to be taken by Industrial Wastewater Treatment Plant Operators working at a foreman or supervisor level position with seven 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

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). Cost \$20.00 plus California tax (\$1.45).
2. TREATMENT OF METAL WASTESTREAMS (TMW). Cost \$10.00 plus California tax (0.73).

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

Section 8

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

TRUE/FALSE

1. Coagulation is a process of gentle mixing to ensure contact between the coagulant chemical and the suspended solids particles.
 1. True
 2. False

2. Long detention times during periods of low flow may require a higher chemical dosage than shorter detention time during high flows.
 1. True
 2. False

SECTION

9

PREPARING FOR
THE GRADE IV
CERTIFICATION
EXAMINATION

Section 9

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

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). Cost \$20.00 plus California tax (\$1.45). Volume II (IWT2). Cost \$20.00 plus California tax (\$1.45).
2. OPERATION OF WASTEWATERS TREATMENT PLANTS, Volume I (OWTP1). Cost \$20.00 plus California tax (\$1.45). Volume II (OWTP2). Cost \$25.00 plus California tax (\$1.81).
3. PRETREATMENT FACILITY INSPECTION (PFI). Cost \$30.00 plus California tax (\$2.18).

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

Section 9

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

SECTION

10

REFERENCES AND
STUDY AIDS

Section 10

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

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.

The cost of each of the training manuals of **INDUSTRIAL WASTE TREATMENT** is \$20.00 per volume (plus \$1.45 sales tax for Californians). If a person wishes to enroll in the home-study correspondence course the enrollment fee is an additional \$30.00 per enrollment per volume. Successful completion of each course earns a person 9 CEUs or 6 semester units per volume.

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.

The costs of the training manuals for **OPERATION OF WASTEWATER TREATMENT PLANTS, VOLUMES I** (529 pages) and **II** (720 pages) are \$20.00 and \$25.00 respectively (plus \$1.45 and \$1.81 sales tax for Californians). The manuals can be purchased by anyone interested in the field. If a person wishes to enroll in the home-study correspondence courses the enrollment fee is an additional \$30.00 per volume. Successful completion of each course earns a person 9 CEUs or 6 semester units.

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.

The cost of the training manual (130 pages) on **TREATMENT OF METAL WASTESTREAMS** is \$10.00 (plus \$0.73 sales tax for Californians). If a person wishes to enroll in home-study correspondence course the enrollment fee is an additional \$10.00 per enrollment. Successful completion of the course earns a person 4.5 CEUs or 3 semester units.

PRETREATMENT FACILITY INSPECTION

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.

The 768-page training manual sells for \$30.00 (plus \$2.18 sales tax for Californians). If a person wishes to enroll in the home-study correspondence course, the enrollment fee is an additional \$30.00. Successful completion earns a person 9 CEUs or 6 semester units.

Section 10

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. MF2003GB, member price, \$80.25; non-member price \$100.25; prices include shipping and handling.
2. PLANT MANAGER'S HANDBOOK. MOP SM-4, Order No. MSM4GB, member price, \$31.65; non member price, \$40.65; prices include shipping and handling.

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.