

DRINKING WATER AND WASTEWATER TREATMENT PLANT AND DISTRIBUTION SYSTEM OPERATORS

California Occupational Guide Number 443
Interest Area: Realistic
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WHAT DO WATER AND WASTEWATER TREATMENT PLANT AND SYSTEM OPERATORS DO?

DRINKING WATER AND WASTEWATER TREATMENT PLANT AND DISTRIBUTION SYSTEM OPERATORS ensure that water used for domestic and commercial purposes is safe for drinking and beneficial for the environment. They work with equipment and processes used to clarify, purify, and disinfect surface or groundwater for human consumption. WASTEWATER TREATMENT OPERATORS, work with equipment to remove potentially harmful industrial, agricultural, and domestic contaminants from wastewater before it is returned to the environment or recycled. Together with engineers, regulators, scientists, and technicians, Operators are responsible for meeting Federal, State and Local Agency's water quality standards.

The job duties of Operators vary depending on the type and size of plant. In small plants, one Operator may be responsible for all operations and other tasks in maintenance, source control, laboratory analysis, collection systems, and public relations. In large plants, Operators may perform a small but complex segment of the processing operation. The skilled work performed by Operators involves the operation, control, and maintenance of electric motors, valves, pumps, chemical feeding devices, and mixers. They use equipment to regulate the flow of untreated water into treatment plants and the flow of treated water out of these plants. They monitor flow rates, water level and distribution, and pressure levels. Operators perform chemical or biological tests on water samples. They add specified amounts of chlorine, ammonia, lime, and other chemicals to disinfect and clarify water. They also operate and monitor process units treating the solids removed from wastewater as well as the foul air generated from treatment. Other duties include daily reading and logging of meters, gauges, and indicators. They prepare required reports based on gauge readings, test results, and water volume processed. Operators inspect equipment and perform routine maintenance. Increasingly, they use computers and automated equipment in their work.

Drinking Water and Wastewater Treatment Plant and Distribution System Operators perform the following tasks:

- Operate and adjust equipment controls to purify and clarify water, process and treat wastewater, air and solids, recycle or discharge treated water, and generate power.
- Inspect equipment and monitor operating conditions, meters, and gauges to determine load requirements and detect malfunctions.
- Add chemicals, such as ammonia, chlorine, and lime, to purify and disinfect water and other chemicals, such as ferric chloride, peroxide, and polymers, to enhance treatment of wastewater.
- Collect and test water and wastewater samples, using test equipment and color analysis standards.
- Record operational and laboratory data, observations of processes, and meter and gauge readings on specified forms.
- Clean and maintain tanks, basins and filter beds, using hand tools and power tools.
- Maintain, repair, and lubricate equipment, using hand tools and power tools.
- Direct and coordinate plant workers engaged in routine operations and maintenance activities.

WHAT SKILLS ARE IMPORTANT?

Important skills, knowledge, and abilities for Water and Wastewater Treatment Plant Operators include:

- Microbiology—Basic knowledge of microorganisms used in wastewater treatment like Anaerobic Digestion and Activated Sludge.

- Biology – Basic knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.
- Chemistry – Basic knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interaction, danger signs, production techniques, and disposal methods.
- Physics—Knowledge of hydraulics, flow dynamics, electricity and head pressure.
- Problem Sensitivity – The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- Near Vision – The ability to see details at close range (within a few feet of the observer).
- Operation and Control – Controlling operations of equipment or systems manually.
- Troubleshooting – Determining causes of operating errors and deciding what to do about it.
- Computers—The ability to use various softwares to control automated equipment or process units and to communicate with co-workers including e-mail, data entry and word processing.
- Ability to work well with others
- Initiative

Operators need mechanical aptitude and the ability to read and understand charts and graphs and carry out oral and written instructions. Operators must be able to make independent decisions within specified standards. Operators must also have knowledge of the materials, tools, and methods used in general construction, repair, maintenance and operation of treatment plants and related pump stations; knowledge of elementary chemistry and biology; knowledge of the operation and maintenance of motors, pumps, and related equipment; ability to perform heavy manual labor, learn to perform laboratory tests, maintain records and take readings of gauges and meters, follow detailed oral and written instructions, analyze, survey and act with minimum supervision.

WHAT'S THE WORK ENVIRONMENT?

The work is performed both indoors and outdoors during all types of weather conditions. Necessary personal protective equipment (PPE) is usually supplied by employers and may include rainwear, protective clothing, and uniforms. Other PPE are hard hats, ear plugs or muffs, gloves (leather, rubber, latex, etc.), non-slip-soled boots (steel-toe and shank possible), safety glasses, goggles, and face shields; employers will train and provide explanation when these items are to be used. Operators may be exposed to noise from electrical motors and pumps and unpleasant odors. However, modern plants have developed safety systems to prevent exposure to hazardous chemicals and chlorine fumes. Water and wastewater treatment plants must be kept clean and orderly to minimize potential hazards from electric shock, moving machinery, and slippery walkways.

Union Membership

Operators can become members of various unions such as Stationary Engineers, International Brotherhood of Electrical Workers, or the International Union of Operating Engineers. According to the *Career Guide to Industries* almost a third of workers in utilities belong to unions nationally, which is more than double the union membership rate for all other industries.

WHAT'S THE CALIFORNIA JOB OUTLOOK?

The following information is from the occupational projections produced by the Employment Development Department (EDD) Labor Market Information Division (LMID):

Drinking Water and Wastewater Treatment Plant and Distribution System Operators CA DHS reports ~13,000 licensed drinking water operators and SWRCB reports ~5600 licensed wastewater operators. This is a growing field and one impacted by large numbers of retirements; there is a great need for new operators in CA and people need to be encouraged to enter the field.

Estimated number of workers in 2000:	7,600
Estimated number of workers in 2010:	9,200
Projected Growth 2000-2010:	21.1%
Est. openings due to separations by 2010:	2,600

These figures do not include self-employment.

Drinking Water and Wastewater Treatment Plant and Distribution System Operators will grow at an average rate compared to all occupations in California. There will be an estimated total of 4,200 job opportunities in this occupation from 2000 through 2010 or an average of 420 jobs a year.

Trends

Federal regulation to ensure clean water for a growing population will increase employment in water and wastewater treatment. Water and wastewater treatment are the only segment of the utilities industry experiencing employment growth. In addition to protecting water supplies from environmental contaminants, water utilities now employ security procedures to protect water from deliberate contamination.

WHAT DOES THE JOB PAY?

California Earnings

The following information is from the Occupational Employment Statistics Survey of Employers by EDD/LMID.

Drinking Water and Wastewater Treatment Plant and
Distribution System Operators
2003 Wages

Hourly wages range from	\$18.34	to	\$27.49
Average hourly wage	\$22.95		
Average annual wage	\$47,736		

These figures do not include self-employment

Hours

Operators can work stationary or rotating shifts, weekends included, and are paid a shift differential for swing or graveyard shifts. Shifts can vary from 8-hour to 12-hour slots. Overtime hours may be necessary when emergencies occur and are generally paid at time and one-half or double time rates.

Benefits

Benefits include vacations, holidays and sick leave; health, dental and vision insurance; and retirement plans.

HOW DO I PREPARE FOR THE JOB?

Education and Training

Entrance requirements vary somewhat, depending on the employer. Some employers require applicants to have an associate's or bachelor's degree in water treatment technology. Other employers hire applicants who have a high school education or equivalent. Many employers hire inexperienced but highly motivated applicants and train them on-the-job. Some hire only experienced, certified operators. In some areas of the State, the union and government may offer a joint water treatment operators apprenticeship program that normally takes four and one-half years. The California Training and Education Programs lists 17 training or education institutions offering wastewater treatment programs in California. (See Other Sources of Information.) Trainees receive intensive on-the-job training and attend technical classes after work. High school students can begin preparing for this type of work by taking math and science classes. California State University, Sacramento Office of Water Programs offers distance-learning Operator training to assist small communities train Operators and improve performance.

Professional organizations like the California Water Environment Association (CWEA) and the American Water Works Association (AWWA) can provide technical training at seminars, conferences and workshops and have reference materials like the Standard Methods for Water and Wastewater Laboratory Analysis. The CWEA also has local sections which provide on-site tours, technical speakers at lunch/dinner meetings and other interactive learning opportunities. Some individuals also provide training on specific topics, including preparation for state exams, math, and various process control issues, usually at facilities or agency locations.

Licensing and Certification

The Department of Health Services (DOHS) certifies Drinking Water Systems Operators. Certification depends upon the class of the water facility—either a distribution system or a treatment facility. There are five levels of certification for water facilities, water treatment operators, and distribution operators. Operators may be cross-certified for both treatment and distribution operator tasks. Applicants for must meet experience requirement and pass an examination for each of the five levels of certification. Thus a Grade T3 Water Treatment Plant Operator is certified to treat water, and a Grade D3 Water Treatment Plant Operator is certified for water distribution system operation.

The State Water Resources Control Board (SWRCB) certifies Wastewater Treatment Plant Operators. Certification requirements for various positions (Operator, Supervisor, Chief Plant Operator) depend upon the classification of the facility—related to the treatment levels and flow capacities. There are five levels of certification for wastewater operators.

The certification process requires both types of Operators to have specific amounts of on-the-job training, complete training courses, and pass a competency examination for each grade level of certification-- Grades I through V. Operators with no prior experience generally begin as Operators-in-training and work under ~~close~~ direct supervision of certified Operators. As a condition of continued employment, trainees are required to obtain a Grade I certificate within two years. Most employers require a valid driver's license.

Continuing Education

Certification renewal may require completion of continuing education units (CEU) or contact hours. The number of contact hours required depends on the certificate grade. Check with the DOHS and the SWRCB for specific requirements. See also Education and Training section above for opportunities to get contact hours or CEUs.

HOW DO I FIND THE JOB?

Both types of Operators are needed in communities or facilities large enough to have a water system and treatment plant. Cities, towns, or water utility districts employ most Operators. A few Operators work in national parks or private campgrounds. Others work in industries required to treat their own wastewater.

Applying directly to employers remains one of the most effective job search methods. Most employers are public utilities, cities and counties. Search in the government section of the phone book for public utilities using terms such as Sanitation Agency or District, Wastewater Authority, or Water Utility or District. Note: Sanitation can also refer to solids waste or trash disposal. Search these **yellow page** and classified ad listings for:

- Water Treatment Operator
- Wastewater Treatment Operator
- Engineers – Water Supply
- Environmental and Ecological Services
- Laboratories – Analytical
- Water Companies – Utility
- Water Filtration and Purification Equipment
- Contract Operations for Water and Wastewater Treatment

The following Internet resources can be helpful to the job search process:

America's Job Bank	www.ajb.dni.us
CalJOBSSM	www.caljobs.ca.gov
Major Employers by County	www.calmis.ca.gov/htmlfile/subject/MajorER.htm
Local Job Service Offices	www.edd.ca.gov/jsloc.htm
One-Stop Career	www.edd.ca.gov/ONE-STOP/pic.htm

Centers List

Job Search and Resume Writing	www.worksmart.ca.gov/ success_tips_menu.html
CWEA Job Bank	http://www.cwea.org/e-bulletin/jobs.html
WEF Career Opportunities	http://www.wef.org/careeropps/

Professional organizations provide networking opportunities as well as post job openings on their web sites. Attending conferences, seminars and workshops can put one in contact with already employed Operators who know of potential job openings. One firm provides job postings along with its daily newsletter of newspaper/magazine water-related articles.

www.cwea.org
www.wef.org
www.bcwaternews.com

WHERE CAN THIS JOB LEAD?

Water and Wastewater Treatment Plant Operators require specific amounts of on-the-job training, completion of training courses, and passing a competency examination for each certification level (Grades I through V). Each grade level brings more responsibility and a higher salary. Other higher-level positions are Senior or Lead Plant Operator, Operations Supervisor, Chief Plant Operator, Operations Manager, or Superintendent. Once Grade Level V is obtained, the next step would be a management position in public works or other agency administration. This job can also lead to positions in other states or countries, or other types of positions with regulatory agencies, contracting companies, or consulting firms.

OTHER SOURCES OF INFORMATION

Association of Boards of Certification
208 Fifth Street
Ames, Iowa 50010-6529
(515) 232-3623
www.abccert.org/

California/Nevada Section American Water Works Association (CA-NV AWWA) Certification Program
10574 Acacia Street, Suite D6, Rancho Cucamonga, CA 91730
Phone: (909) 481-7200 Fax: (909) 481-4688

www.ca-nv-awwa.org

Office of Water Programs
California State University, Sacramento
6000 J Street Sacramento, CA 95819-6025
(916) 278-6142
www.owp.csus.edu/

California Groundwater Association (CGA)
PO Box 14369
Santa Rosa, CA 95402-6369 USA
(707) 578-4408

Fax: (707) 546-4906
wellguy@groundh2o.org

California Rural Water Association (CRWA)
1215 K Street, Suite 930
Sacramento, CA 95814
(800) 833-0322
www.calruralwater.org

California State Water Resources Control Board (SWRCB)

Office of Operator Certification
P.O. Box 944212
Sacramento, CA 94244-2120
(916) 341-5639
www.swrcb.ca.gov/cwphome/opcert

California Water Environment Association Technical Certification Program (CWEA TCP)

7677 Oakport Street, Suite 525
Oakland, CA 94621-1944
Phone: (510) 382-7800
www.cwea.org

California Water Treatment Operator Certification
Department of Health Services
Operator Certification Program, MS#7417
P.O. Box 997413
Sacramento, CA 95899-7413
(916) 449-5642
www.dhs.ca.gov/ps/ddwem/technical/certification/opcert.html

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1994
(800) 666-0206 or (703) 684-2452
www.wef.org/careerpaths/

California Training and Education Programs
www.soicc.ca.gov/ctep/

CA Division of Apprenticeship Standards
For the closest district office, visit www.dir.ca.gov/DAS/das.html,
or call Apprenticeship Standards Information listed in your telephone directory business white pages

America's Career InfoNet
www.acinet.org

Employment Projections by Occupation
www.calmis.ca.gov/htmlfile/subject/occproj.htm

Employment and Wages by Occupation
[www.calmis.ca.gov/file/occup\\$/OES\\$.htm](http://www.calmis.ca.gov/file/occup$/OES$.htm)

RELATED OCCUPATIONAL GUIDES*

Stationary Engineers and Boiler Operators	No. 234
Power Plant Operators	No. 474
Laboratory Assistants and Technicians* (Except Health)	No. 201

OCCUPATIONAL CODE REFERENCES

SOC (*Standard Occupational Classification*)

Water and Wastewater Treatment Plant Operators	51-8031
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O*NET (*Occupational Information Network*)

Water and Wastewater Treatment Plant Operators	51-8031.00
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OES (*Occupational Employment Statistics*)

Water and Wastewater Treatment Plant Operators	950020
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