ANNUAL REPORT

OFFICE OF WATER PROGRAMS

2000-2001

The Office of Water Programs has, since 1972, provided training for operators in the field at the lowest possible cost. The revenue generated from the training programs is used to provide support to our students, maintain the technical currency of the training materials, promote our program, and initiate new training materials and methods.

NEW AND DEVELOPING

Video Training

US EPA funded a grant – *Small Public Water Systems Technology Assistance Center* – for the Office of Water Programs to prepare a set of ten training videos – ***Small Water Systems Video Information Series*** – which provides needed training for a wide variety of operators, managers, owners, and governing bodies of small public water systems. Dr. Kenneth D. Kerri managed the project. The videos are accompanied by a *LEARNING BOOKLET* that covers highlights of the videos, data recording forms, example arithmetic calculations, and other information difficult to present in a training video. Persons completing this home-study course can earn 3 continuing education units.

CD-ROMs and On-Line Testing

Part of the funding from US EPA (*Small Public Water Systems Technology Assistance Center)* requires the Office of Water Programs to develop a CD-ROM version of the ***Utility Management*** training manual. This version will provide search features to facilitate use of the training and reference manual. It will be distributed at cost. A CD-ROM version of Volume I, ***Operation Of Wastewater Treatment Plants***, is currently being field tested for accuracy and convenience of use. This will be the prototype for CD-ROM development of all our training courses. Dr. Ramzi J. Mahmood is managing this project.

The ability to take tests on line is in high demand and we have nearly completed two on-line testing programs: one for the new ***Small Water Systems Video Information Series*** and one for ***Operation Of Wastewater Treatment Plants***, Volume I.

Spanish Translations

The Office of Water Programs and the National Environmental Training Association (NETA) are working with operators in Baja California, Mexico, to translate into Spanish those portions of our operator training manuals that are pertinent to the O & M needs of operators in Mexico. We have completed the translation of ***Operation And Maintenance Of Wastewater Collection Systems***, Volumes I and II, into ***Operación Y Mantenimiento De Sistemas De Recolección De Aguas Residuales.***

Current translation projects scheduled to be completed by early 2002 include the translation of portions of ***Operation Of Wastewater Treatment Plants***, Volumes I and II, ***Pretreatment Facility Inspection***, and ***Pretreatment Facility Inspection Training Videos***. Our partners in these translation projects include operators from Comisión Estatal de Servicios Públicos de Mexicali (CESPM) and de Tijuana (CESPT).

Certificate Program

In addition to our home-study courses and contracted on-site training, a new certificate program is being offered. Dr. Kurt Ohlinger is managing this program. He is coordinating with Regional and Continuing Education (RCE). This program will be offered as correspondence courses using three of the training manuals published by the Office of Water Programs. The correspondence format will enable students to work at their own pace and to schedule studies around their other commitments. The certificate program consists of successful completion of the correspondence courses for Volumes I and II, ***Water Treatment Plant Operation***, and ***Small Water System Operation And Maintenance***. To complete a course as part of the certificate program, students will submit to the Office of Water Programs the tests provided at the end of each chapter in each manual and then will take a final exam over the Internet. Students will earn six (6) college credits and 90 contact hours for each course. At the completion of all three courses, students will be issued a *WATER TREATMENT PLANT OPERATION SPECIALIST* certificate from the University.

Web Site (www.owp.csus.edu)

The web site for the Office of Water Programs is under reconstruction. In addition to providing information about what is available and how to order materials, it will serve as a training resource through which managers and operators can easily access a single resource for identifying a broad range of training opportunities. The home page will establish links to other web sites that provide up-to-date information on current regulations, emerging technologies, and management of utility agencies. A chat room will be set up to give operators and managers a convenient forum for exchanging ideas and assisting each other in resolving technical problems.

Volume II, SMALL WASTEWATER SYSTEM OPERATION AND MAINTENANCE

Currently in development, this is a new training program focusing on package plants, wetlands treatment, and alternative effluent disposal and reclamation methods. The first drafts of this new manual have been completed and we will be field testing and editing this manual and training program this coming year.

NEW CONTRACTS/PROJECTS

Staff and consultants for the Office of Water Programs have received contracts and grants to provide on-site training.

On-Site Training Contracts

The California Department of Toxic Substances Control (DTSC) requested and provided funding for two, three-day training sessions emphasizing application and hands-on experience. Dr. Ramzi J. Mahmood, Director of the Office of Water Programs and Professor of Civil Engineering, and Dr. Cyrus Aryani, Professor of Civil Engineering, were the instructors. The emphasis in these courses was on applications and hands-on experience in

fundamental concepts in geotechnical engineering and statistics for professionals who deal with environmental data.

The Office of Water Programs received a contract from the California State Water Resource Control Board to present training on pollution prevention for inspectors of pretreatment facilities and the metal finishing industry. Dr. Kurt Ohlinger managed this project and developed a workshop. This workshop was presented in Sacramento (May 23-24), San Jose (May 30-31), Union City (June 20-21), and San Diego (June 27-28). Success was confirmed on a follow-up workshop evaluation survey.

The California State Department of Health is negotiating with the Office of Water Programs, through CSUS Foundation, to develop and produce training videos and an on-line operator training course for operators of both water treatment plants and water distributions systems. These training opportunities will allow operators to earn contact hours needed to renew operator certificates. Dr. Ken Kerri will manage the project and provide his expertise in developing the videos.

ONGOING

Revisions/Updates/New

The Office of Water Programs continues to update and promote its manuals. Revisions this year include Volume II, ***Operation Of Wastewater Treatment Plants***, Fifth Edition. Updated manuals are Volume II, ***Industrial Waste Treatment, Water Distribution System Operation And Maintenance*** and ***Small Water System Operation And Maintenance***. Progress has been made on the development of Volume II, ***Small Wastewater System Operation And Maintenance***, and chapters have been distributed for review. This manual is expected to be available early in 2002.

Stormwater

The CSUS Office of Water Programs provides technical guidance and management services supporting Caltrans stormwater research. Our team of 15 research engineers, scientists, faculty, and staff focuses on treatment technology testing to prevent stormwater pollution, including full-scale testing of pilot projects throughout the state. We provide engineering design, planning, construction oversight, monitoring, data management, and slope stabilization expertise.

To meet the requirements of Caltrans' Statewide National Pollution Discharge Elimination System (NPDES) permit, the Stormwater Program is assisting Caltrans in conducting multi-year statewide monitoring studies to characterize stormwater runoff from California's highways and rights-of-way. Caltrans is currently monitoring stormwater runoff from 57 highway sites, 14 maintenance yards, 13 park and ride lots, 7 highway construction sites, and 3 rest areas. The studies will determine the amounts and types of pollution constituents in order to plan the best means of preventing stormwater pollution and treating runoff.

The Stormwater Program administered more than $28 million dollars in contracts this year for inventing, designing, and testing stormwater treatment, erosion control, planning tools, and other technological solutions for stormwater problems throughout the state of California.

This year's research projects focused on existing technologies, solids removal devices, court-ordered treatment technology pilot studies, sand trap devices, and biological systems. Stormwater Program staff performed extensive literature reviews seeking ways to improve existing technologies for detention basin optimization, alternative inlets and outlets for detention basins, alternative detention devices, chemical treatment of detention basin influent, combined detention/filtration devices, sand filter optimization, alternative filter media, and detention with spray infiltration. As a result of the literature review findings, lab-scale, small-scale, and up to 90 full-scale pilot studies are scheduled for implementation during the next three years.

Program engineers pilot tested eight of our own newly designed and developed devices to capture solids in stormwater runoff. Caltrans recently proposed approving two of the devices for statewide implementation. The Stormwater Program completed the third year of court-ordered research (37 pilot studies testing nine technologies) for Caltrans, and prepared the preliminary results. The final report, compiling three years of design, construction, cost, operation, maintenance, and monitoring data, is scheduled for release this Fall.

Along with Caltrans, the Stormwater Program developed and designed three sand trap devices to capture traction sand in runoff from Caltrans highways and facilities. Two current research efforts on biological treatment systems directly respond to recent State Water Resources Control Board (SWRCB) revisions to the Caltrans Statewide Stormwater Management Plan (SWMP). The Stormwater Program is developing interim siting and design criteria for Caltrans Hydraulically Designed Biofilters (CHDs) and implementing nine CHD pilot studies for operation during the next rainy season. We are developing constructed wetlands siting criteria and evaluating potential constructed wetlands pilot study sites. Development and feasibility testing of new ideas to treat stormwater runoff will remain the focus of next year's activities.

Information Dissemination Activities

Stormwater Program staff remain active in sharing our expertise and research results with the transportation industry and engineering community through participation in conferences, publishing, and sponsored workshops. We organized and held our annual **Stormwater Treatment Practices Workshop** last September. Our Engineers served as moderator and panel members. The Stormwater Program is currently planning workshops in Treatment Technologies and Soil Stabilization to be held this Fall and early next Spring.

Peer-Reviewed Journal Publications

In addition, the Stormwater Program organized and held their annual **Stormwater Treatment Practices Workshop** last September. Our engineers served as moderator and panel members.

Lippner, Gary, **John Johnston**, **Suzanne Combs**, Kimberly Walter, and David Marx, "Results of the Caltrans Litter Management Pilot Study," *Transportation Research Record,* Transportation Research Board, National Academy Press, Washington, D.C., 2001.

Kayhanian, M., **K. Murphy**, L. Regenmorter, and R. Haller, "Characteristics of Stormwater Runoff From Highway Construction Sites in California," presented at the January 2001 meeting of the Transportation Research Board and accepted for publication in the TRB Journal.

Other Publications

Kayhanian, Masoud, **John Johnston**, **Howard Yamaguchi**, and Steve Borroum, "Caltrans Storm Water Management Program," *Stormwater,* v 2, n 2, March/April 2001.

Lippner, G. and **G. Moeller**, "Study Qualifies Boom Sweeper Litter Pickup Ability," *American Sweeper,* Volume 8, 2000.

Conference Proceedings and Presentations

Lippner, G., **J. Johnston**, **S. Combs**, K. Walter, and D. Marx, "Results of the Caltrans Litter Management Pilot Study," *Proceedings of the Transportation Research Board Annual Meeting*, Washington, D.C., January 2001.

Kayhanian, M., **A. Singh**, and **S. Meyer**, "Impact of Non-Detects in Water Quality Data on Estimation of Constituent Mass Loading," paper presented at the International Water Association conference on Diffuse/Nonpoint Pollution and Watershed Management, Milwaukee, WI, June 2001.

Currier, B., S. Taylor, Y. Borroum, G. Friedman, D. Robison, M. Barrett, S. Borroum, **C. Beitia**, "California Department of Transportation BMP Retrofit Pilot Program," Transportation Research Board 8th Annual Meeting, Washington D.C., January 7-11, 2001.

Taylor S., L. Hansen, and **C. Beitia**, "Assessment of Costs and Benefits of Detention for Water Quality Enhancement," American Society of Civil Engineers World Water & Environmental Resources Congress 2001, Orlando, FL, May 20-24, 2001.

Moeller, G. and **G. Lippner**, "Practicability of Detention Basins for Treatment of Caltrans Highway Runoff Based on a Maximum Extent Practicable Evaluation," Transportation Research Board 8th Annual Meeting, Washington D.C., January 7-11, 2001.

Walker, M., A. Cooper, C. Tesoro, and **G. Moeller**, "Water Quality Assessment for the California Department of Transportation San Diego Region," 2000 Joint Conference on Water Resources Engineering and Water Resources Planning and Management, American Society of Civil Engineers, Minneapolis, MN, July 30 - August 2, 2000.

Conference Presentations

Myers, S., **A. Singh**, **M. Kayhanian**, J. Wild, **J. Johnston**, A. Bale, and **G. Moeller,** "A GIS Based Model to Predict the Effectiveness of Best Management Practice On Storm Water Pollutant Mass Loads," *5th International Conference on Diffuse Pollution and Watershed Management*, Milwaukee, WI, June 2001.

Stenstrom, M., S-L. Lau, H-H. Lee, J. S. Ma, H. Ha, L-Y. Kim, S. Khan, and **M. Kayhanian**, "First Flush Stormwater from Highway Runoff," *EWRI World Water and Environmental Resources Congress*, Orlando, FL, May 2001.

Amano, R. M., L. R. Flynn, **M. Kayhanian**, and E. Othmer, "Automated Verification and Validation of Caltrans Storm Water Analytical Data," *Annual Waste Testing and Quality Assurance (WTQA)*, Arlington, VA, August 2001

Conference Posters

Johnston, J., and **G. Moeller**, "15,000 Miles of Linear Watershed: One Transportation Agency's Response to the Clean Water Act," presented at the 2000 Joint Conference on Water Resources Engineering and Water Resources Planning and Management, American Society of Civil Engineers, Minneapolis, MN, July 30 - August 2, 2000.

Meyer, S., A. Singh, et al., "GIS Model to Predict Storm Water Pollutant Mass Loading from Various Land Uses," presented at the International Water Association conference on Diffuse/Nonpoint Pollution and Watershed Management, Milwaukee, WI, June 2001.

Presentations Without Papers

Johnston, J., "After the Pilots … Caltrans Future Research Plans," Caltrans-sponsored Storm Water Treatment Practices Workshop, Los Angeles, CA, September 21, 2000.

Reports

District 7 Erosion Control Pilot Study - Lawsuit Related (accepted by plaintiffs)
Soil Stabilization for Temporary Slopes Study

Software Development

Our staff assisted Caltrans in developing several new software tools for effective stormwater planning. These tools can be used by project managers and staff to estimate, plan, and budget cost-effective solutions to a wide variety of stormwater-related problems.

Scott Meyer developed the **Basin Sizer** program to help users design permanent stormwater treatment basins by providing information on water quality volumes, storm depths, and intensity-duration-frequency curves. The **Load Model** program was developed to estimate annual stormwater runoff loads from many different land uses and calculate the effects of implementing the best technologies. **Amardeep Singh** and **Scott Meyer** aided in developing **Data Management Tool,** a Geographic Information System (GIS)-based data analysis tool that allows users to query the Caltrans Statewide Monitoring Database and perform statistical analyses on water quality data.

The Caltrans Stormwater Program uses many laboratories and environmental consultants who do not use the same quality assurance/quality control (QA/QC) standards while reporting water quality data. **Masoud Kayhenian** and **Amardeep Singh** assisted with the development of **Automated Data Validation.** This software improves the integrity and quality of analytical results submitted by laboratories; streamlines and standardizes the data validation process for Caltrans; reduces costs and turn-around time for review of chemistry results; and produces a standardized data validation output for importing information into the Caltrans database.

Misty Scharff assisted in developing the **HEAT** (Highway Erosion Assessment Tool), a state-of-the-art software program used to evaluate the success of vegetated erosion control for California's very diverse climatic and geographic conditions. **Ms. Scharff** also aided in developing the Caltrans District-Level Vegetation Establishment and Guidelines (District 5) Prototype. This geographic information system (GIS) tool will be submitted for statewide use.

SUMMARIES OF CUMULATIVE STATISTICS BY TITLE

Small Wastewater System Operation and Maintenance
Volume I (1997)

To date, 2,992 manuals have been purchased, 1,219 enrollments have been purchased, and 645 students have successfully completed this training program. More than 35 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 23 other countries have purchased manuals and enrollments.

Operation of Wastewater Treatment Plants
Volume I (First Edition1980; Fourth Edition 1992)

To date, 165,168 manuals have been purchased, 50,588 enrollments have been purchased, and 29,834 students have successfully completed this training program. More than 429 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 51 other countries have purchased manuals and enrollments.

Operation of Wastewater Treatment Plants
Volume II (First Edition 1980; Fifth Edition 2001)

To date, 119,352 manuals have been purchased, 25,947 enrollments have been purchased, and 15,173 students have successfully completed this training program. More than 385 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 55 other countries have purchased manuals and enrollments.

Advanced Waste Treatment
(First Edition 1987; Third Edition 1995)

To date, 46,182 manuals have been purchased, 10,620 enrollments have been purchased, and 6,821 students have successfully completed this training program. More than 251 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 47 other countries have purchased manuals and enrollments.

Industrial Waste Treatment
Volume I (First Edition 1987; Second Edition 1994)

To date, 21,674 manuals have been purchased, 4,072 enrollments have been purchased, and 2,245 students have successfully completed this training program. More than 157 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 47 other countries have purchased manuals and enrollments.

Industrial Waste Treatment
Volume II (First Edition 1987; Second Edition 1995)

To date, 11,469 manuals have been purchased, 1,580 enrollments have been purchased, and 937 students have successfully completed this training program. More than 121 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 43 other countries have purchased manuals and enrollments.

Treatment of Metal Wastestreams
(First Edition 1986; Second Edition 1993)

To date, 25,892 manuals have been purchased, 6,763 enrollments have been purchased, and 5,489 students have successfully completed this training program. More than 132 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 42 other countries have purchased manuals and enrollments.

Pretreatment Facility Inspection
(First Edition 1988; Third Edition 1996)

To date, 13,927 manuals have been purchased, 5,281 enrollments have been purchased, and 3,405 students have successfully completed this training program. More than 105 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 37 other countries have purchased manuals and enrollments.

Operation and Maintenance of Wastewater Collection Systems
Volume I (First Edition 1976; Fifth Edition 1996)

To date, 47,124 manuals have been purchased, 9,897 enrollments have been purchased, and 6,784 students have successfully completed this training program. More than 163 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 45 other countries have purchased manuals and enrollments.

Operation and Maintenance of Wastewater Collection Systems
Volume II (First Edition 1987; Fifth Edition 1998)

To date, 34,442 manuals have been purchased, 5,046 enrollments have been purchased, and 3,523 students have successfully completed this training program. More than 155 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 45 other countries have purchased manuals and enrollments.

Collection Systems: Methods for Evaluating and Improving Performance (First Edition 1998)

More than 1,264 copies of this additional resource for operators and managers of wastewater collection systems have been sold throughout the United States and Canada, in 13 other countries, and to 22 colleges and universities.

Water Treatment Plant Operation
Volume I (First Edition 1983; Fourth Edition 1999)

To date, 101,376 manuals have been purchased, 14,925 enrollments have been purchased, and 16,955 students have successfully completed this training program. More than 275 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 49 other countries have purchased manuals and enrollments.

Water Treatment Plant Operation
Volume II (First Edition 1983; Third Edition 1998)

To date, 34,442 manuals have been purchased, 5,046 enrollments have been purchased, and 3,523 students have successfully completed this training program. More than 155 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 45 other countries have purchased manuals and enrollments.

Small Water System Operation and Maintenance
(First Edition 1987; Fourth Edition 1999)

To date, 48,448 manuals have been purchased, 10,128 enrollments have been purchased, and 5,297 students have successfully completed this training program. More than 195 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 52 other countries have purchased manuals and enrollments.

Water Distribution System Operation and Maintenance
(First Edition 1987; Fourth Edition 2000)

To date, 71,372 manuals have been purchased, 14,897 enrollments have been purchased, and 8,606 students have successfully completed this training program. More than 205 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 25 other countries have purchased manuals and enrollments.

Utility Management
(1998)

To date, 5,524 manuals have been purchased, 2,464 enrollments have been purchased, and 1,865 students have successfully completed this training program. More than 29 colleges and universities use this manual as a textbook. Individuals and/or companies in Canada and 26 other countries have purchased manuals and enrollments.

Pretreatment Facility Inspection Training Videos
(1998)

This set of five videos is designed to train inspectors to use safe and efficient procedures when inspecting industrial pretreatment facilities. It can be used in conjunction with the manual, ***Pretreatment Facility Inspection.*** To date, 890 sets of these videos have been purchased.

Wastewater Collection System O & M Training Videos
(1997)

Created for operators of wastewater collection systems, these videos are suitable for training new and experienced collection system operators to safely operate and maintain their systems. They can be used with Volumes I and II of ***Operation And Maintenance Of Wastewater Collection Systems***. To date, 903 sets are being used throughout the United States, Canada, and several foreign countries.

Small Water Systems Video Information Series
(2001)

This new course provides needed training for a wide variety of operators, managers, owners, and governing bodies of small public water systems.

Operación y Mantenimiento de Sistemas de Recolección de Aguas Residuales (First Edition 1999)

Collection system operators in Baja California assisted with customizing and translating into Spanish portions of the operator training manuals, Volumes I and II, ***Operation And Maintenance Of Wastewater Collection Systems***. To date, 1,246 copies have been sold.

SUMMARY OF STATISTICS – Fiscal Year 2000-2001

The following pages present charts reflecting the following statistics:

During Fiscal Year 2000-2001, 53,642 manuals were sold; 12,832 enrollments were sold; and 1,793 sets of videos were sold. Over 8,993 operators/students successfully completed a program. At the end of this fiscal year, 2,790 students were actively working on one or more of the operator training programs.

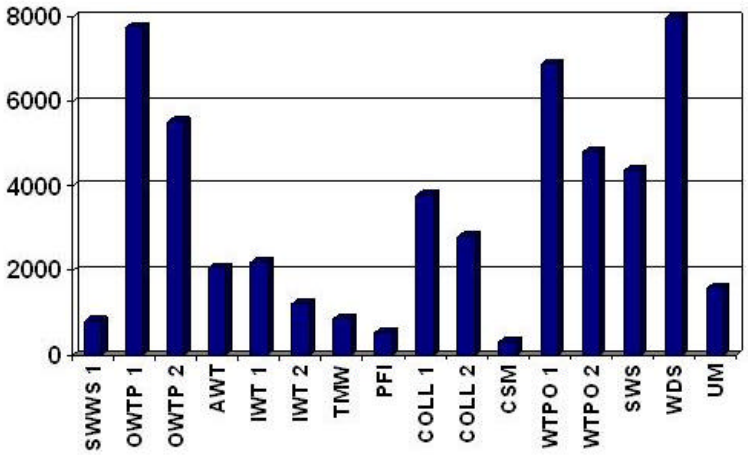
Abbreviation Guide for following pages:

OWTP 1 – OPERATION OF WASTEWATER TREATMENT PLANTS, Volume I
OWTP 2 – OPERATION OF WASTEWATER TREATMENT PLANTS, Volume II
AWT – ADVANCED WASTE TREATMENT
IWT 1 – INDUSTRIAL WASTE TREATMENT, Volume I
IWT 2 – INDUSTRIAL WASTE TREATMENT, Volume II
TMW – TREATMENT OF METAL WASTESTREAMS
PFI – PRETREATMENT FACILITY INSPECTION
COLL1 – OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS, Volume I
COLL 2 – OPERATION AND MAINTENANCE OF WASTEWATER COLLECTION SYSTEMS, Volume II
CSM – COLLECTION SYSTEMS: METHODS FOR EVALUATING AND IMPROVING PERFORMANCE
WTPO 1 – WATER TREATMENT PLANT OPERATION, Volume I
WTPO 2 – WATER TREATMENT PLANT OPERATION, Volume II
SWS – SMALL WATER SYSTEM OPERATION AND MAINTENANCE
WDS – WATER DISTRIBUTION SYSTEM OPERATION AND MAINTENANCE
UM – UTILITY MANAGEMENT

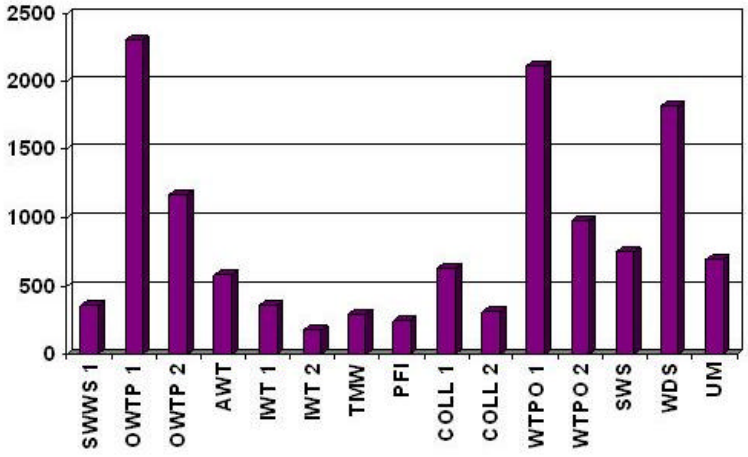
Videos

PFIV – PRETREATMENT FACILITY INSPECTION TRAINING VIDEOS
COLLV – COLLECTION SYSTEM O & M TRAINING VIDEOS
SWSV – SMALL WATER SYSTEMS VIDEO INFORMATION SERIES

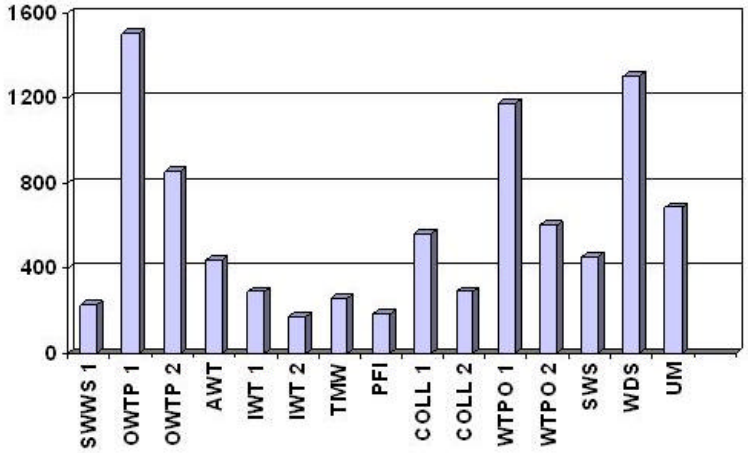
MANUALS SOLD
2000-2001



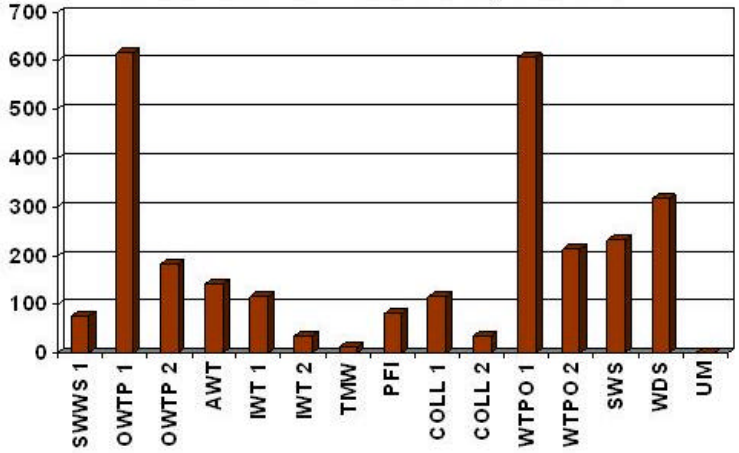
ENROLLMENTS PURCHASED
2000-2001



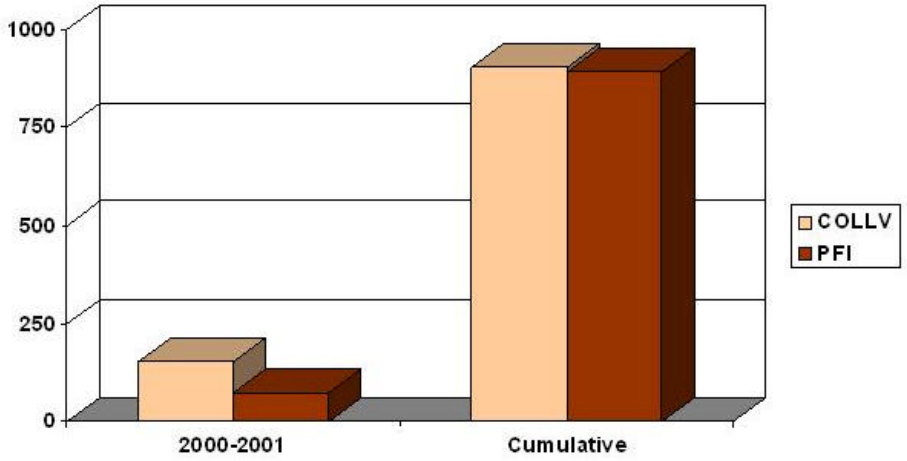
COURSES COMPLETED
2000-2001



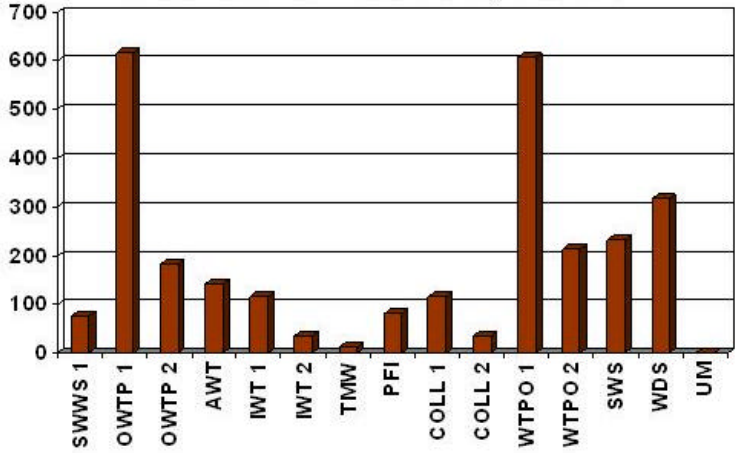
STUDENTS ACTIVE
AS OF JUNE 30, 2001

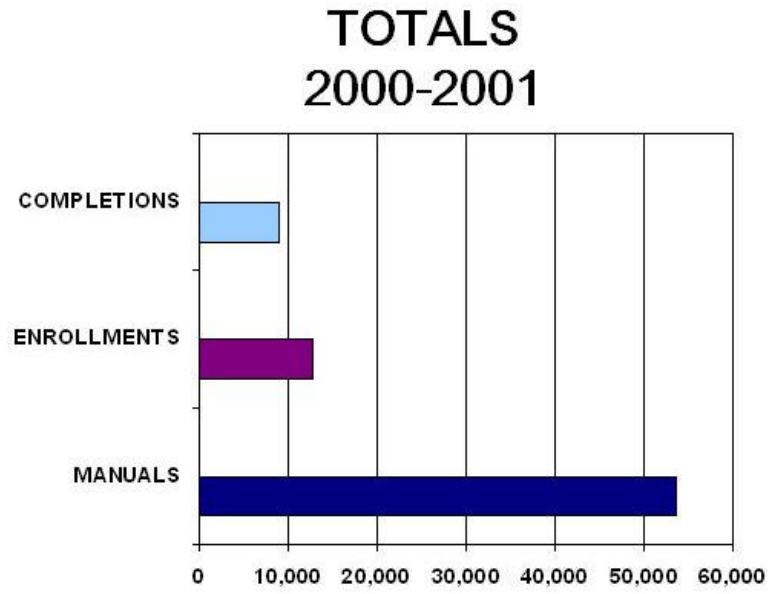


VIDEOS



STUDENTS ACTIVE AS OF JUNE 30, 2001




TOTALS
2000-2001
COMPLETIONS
ENROLLMENTS
MANUALS
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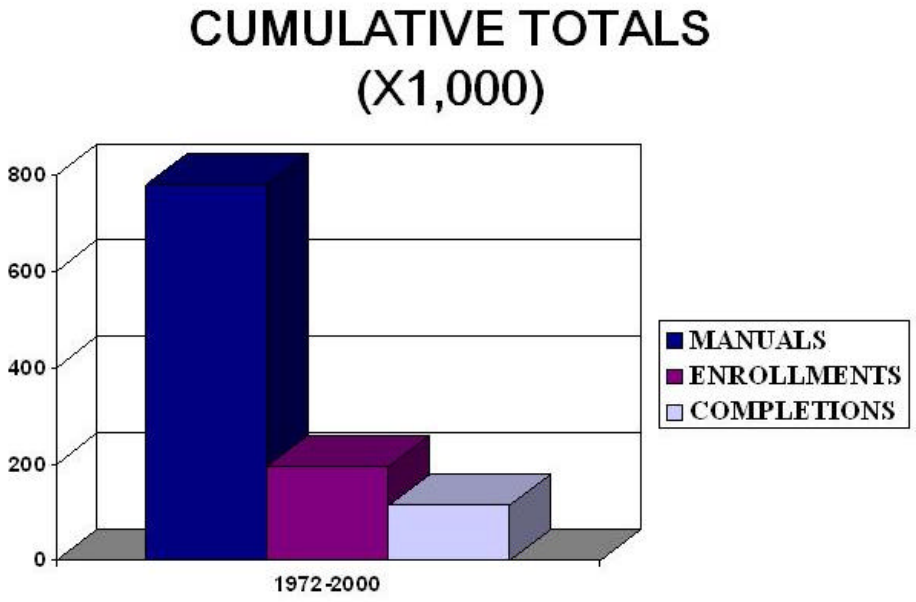
30,000
40,000
50,000
60,000


CUMULATIVE TOTALS
(X1,000)
800
600
400
200
0
1972-2000
MANUALS
ENROLLMENTS
COMPLETIONS

THREE-YEAR SUMMARY